NATIONAL COUNCIL FOR TECHNICAL AND VOCATIONAL EDUCATION AND TRAINING

MAY 2023

PROPOSED OCCUPATIONAL STANDARDS

OCCUPATION: LIVESTOCK VETERINARY ENGINEER

LEVEL: NTA 8

TABLE OF CONTENT

CONTENTS

ABBREVIATIONS

ATP	Adenosine Triphosphate
cDNA	Complementary Deoxyribonucleic Acid
CBET	Competency Based Education and Training
DNA	Deoxyribonucleic Acid
DR	Digital Radiography
ELISA	Enzyme-linked Immunosorbent Assay
ERP	Enterprise Resource Planning
MR	Methyl Red
NACTVET	National Council for Technical and Vocational Education and Training
NOS	National Occupational Standards
OS	Occupational Standards
PCR	Polymerase Chain Reaction
PBS	Phosphate Buffered Saline
qPCR	Real-time Quantitative PCR Detecting System
RNA	Ribonucleic Acid
RT-PCR	Reverse Transcription-Polymerase Chain Reaction
SPF	Specific Pathogen Free

TET	Technical Education and Training
TVET	Technical and Vocational Education and Training
VP test	Voges-Proskauer (VP) Test
VP reagent	VP Reagent (Solution A: 6% α-naphthol Ethanol Solution; Solution B: 40% Potassium Hydroxide Solution)

GLOSSARY OF TERMS

Circumstantial Knowledge:	Detailed knowledge, which allows the decision-making in regard to different circumstances and cross cutting issues.
Competence:	The ability to use knowledge, understanding, practical, and thinking skills to perform effectively to the workplace standards required in employment.
Competency:	A description of the ability one possesses when able to perform a given occupational task effectively and efficiently.
Competency-based Education:	An instructional programme that derives its content from validated tasks and bases assessment on the learner's performance.
Curriculum:	A description or composite of statements about "what is to be learned" by the trainee/student in a particular instructional programme; a product that states the "intended learning outcomes".
Educational/Training Programme:	The complete curriculum and instruction (what and how) that is designed to prepare a person for employment in a job or other particular performance situation.
Occupation:	A specific position requiring the performance of specific tasks – essentially the same tasks are performed by all employees having the same title. (Example: baker)
Occupational Area:	This is a broad grouping of related jobs. (Example: food service)
Occupational Competence:	The application of knowledge and skills that consistently meet the standards required by the work context.
Occupational Standards:	Specific requirements of competences people are expected to demonstrate in a particular occupational area, including knowledge and relevant attitudes. They also act as a performance tool of assessment of the prescribed outcomes.
Occupational/Job Analysis:	A process used to identify the tasks that are important to employees in any given occupation**.**

Performance Criteria: Indicate expected end results or outcomes in the form of evaluative statements.

Skills: The ability to perform occupational tasks with a high degree of proficiency within a given occupation. Skill is conceived of as a composite of three completely interdependent components: cognitive, affective, and psychomotor.

Standards: A set of statements, which if proved true under working conditions, means that an individual is meeting an expected level and type of performance.

Task Analysis: The process of analysing each task to determine the steps, circumstantial knowledge, attitudes, performance standards, tools and materials needed, as well as safety concerns required for the employees performing it.

Task: A work activity that has a definite beginning and ending, is observable or measurable, and consists of two or more definite steps that leads to a product, service, or decision.

Underpinning Knowledge: Crucial knowledge that an individual must acquire in order to demonstrate competences that are associated in performing a given task.

Verification Process: The process of having experts review and confirm the importance of the task (competency) statements identified through occupational analysis. Other questions, such as the degree of task learning difficulty are also frequently asked. This process is also sometimes referred to as validation.

1.0. INTRODUCTION

Technical Education and Training (TET) is one of the most important education sub-sectors in Tanzania, responsible for developing a skilled workforce to support the country's industrialization economic agenda. Tanzania's *Development Vision 2025* intends to raise the country's economy to a middle-income status. This requires a skilled workforce that is aligned with the needs of the public and private sectors of the economy. The National Council for Technical and Vocational Education and Training of Tanzania has begun the job of drafting Occupational Standards that will eventually be adopted as National Occupational Standards for TET in order to ensure that it meets the needs of the labour market and the country's economic agenda.

National Occupational Standards (NOS) are performance criteria that are matched with labour market demands. Each National Occupational Standard describes functions, performance standards, and knowledge/understanding for one important function or task. They combine skills, knowledge, and attitudes to describe best practice. They are useful tools for establishing job roles, personnel recruiting, supervision, and appraisal, as well as TET standards. They're also helpful for benchmarking and harmonizing qualifications on a national and international level. Standards, in general, provide a solid framework for high-quality TET that is labour market-relevant, current and consistent in delivery across all public and private institutions.

However, it must be noted that, Occupational Standards and Training standards/qualifications standards are different. Occupational Standards are defined in terms of activities performed by a person in a selected occupation (such as livestock veterinary engineers performing animal surgeries and managing surgical emergencies) and they are usually defined by employers following procedures agreed upon by all stakeholders. Education and training standards are developed from the activities defined in occupational standards, and they include learning objectives to ensure that the necessary skills and knowledge are developed by a person to enable him or her to function at an agreed level in an occupation. Education and Training standards are used to define curricula in training institutions. It is however critical that there must be a direct link between the Occupational Standards and the training standards to respond to demands of the labour market.

In TET delivery, Tanzania adopted the Competence Based Education and Training (CBET) approach. The CBET approach focuses on providing learners with the skills and knowledge required to meet the

Occupational Standards. Occupational Standards are thus the starting point for developing competency-based training (CBET) programmes. TET institutions will be required to benchmark their curricula with relevant Occupational Standards.

Occupational Standards are developed based on a given occupation's current and future demands. As a result, they serve as a means of bridging the gap between the worlds of employment and technical education and training (TET).

The Livestock Veterinary Engineer Occupation has its own set of occupational standards. The document explains how the Occupational Standards were developed, as well as the scope, the occupational profile in the form of DACUM charts, and the Occupational Standards.

2.0. OCCUPATIONAL STANDARD DEVELOPMENT PROCESS

The Occupational Standards development process began with an examination of major documents that guide Tanzanian skill development. The *10-year National Skills Development Strategy (2016-2026)* was one of the documents reviewed, and it outlined six (6) economic sectors that should be prioritized when developing skills development programmes.

These sectors include: Transport and Logistics, Tourism and Hospitality, Agribusiness, Construction, Energy and ICT. NACTE labour market reports were also used in the literature review to determine the skills demand in the Tanzanian labour market as a whole.

After the literature review, a workshop comprised of experts and educators with substantial knowledge and experience in the occupation conducted an occupational analysis utilizing the DACUM approach to produce the occupational profile. The analysis resulted in DACUM Charts, which are attached as **Appendix 1** to this document.

The Occupational Standards were then developed. Experts in Occupational Analysis and the Development of Occupational Standards facilitated the workshop. Interviews, online surveys, and a stakeholder forum were used to validate the Occupational Standards. Engineers, Supervisory Technicians on the job, and experienced Livestock Veterinary Engineers were key informants in the survey to discover occupational trends. The information was used to gain insight from the workplaces regarding trends and changes in the profession, including how well graduates are prepared for working in the occupation. A total of ..... online surveys were completed by experts

from the labour market across the country. Apart from the survey aiding in defining the scope for the occupational analysis, they also served to engage a wide cross-section of experts in the occupation. Apart from this, the stakeholders' forum was attended by ... participants from different parts of the country representing various companies.

3.0. THE SCOPE AND OVERVIEW OF THE OCCUPATION STANDARDS FOR LIVESTOCK VETERINARY ENGINEER

The standards cover a broad range of duties and tasks that can be performed by a Livestock Veterinary Engineer. However, the occupational standards are not meant to replace individual job descriptions. Instead, they are to be used for guidance in defining skill levels and knowledge for the technician in specific settings or positions. The Livestock Veterinary Engineer may perform tasks in a number of key areas of the Occupational Standards, but not necessarily in all areas. For example, in large operations, other individuals may be employed or designated to perform specific tasks.

Livestock Veterinary Engineers should inspect the operation and management of farms, monitor and address epidemic diseases, assess performance, and implement selective breeding and pairing under the supervision of senior engineers in this program or other relevant professional engineers. In the workshop, engineers complete various technical tasks, ranging from simple performance test, animal castration, handling of affected animals, immunization of livestock and poultry, use of precision instruments, to surgeries, prevention and control of epidemic diseases, laboratory diagnostics, biosafety assessment and reconstruction, operation and management of farms, animal disease prevention and control, inspection and quarantine of animals and their products, and improvement of livestock and poultry breeds. Generally, the Livestock Veterinary Engineer performs the following responsibilities:

a) Animal castration

b) Use of biological precision instruments

c) Handling of affected animals

d) Culture and identification of pathogenic bacteria

e) Monitoring of epidemic diseases on the farm

f) Disposal of animal epidemic diseases

g) Epidemic disease investigation

h) Performance test and selective breeding and pairing techniques

i) Virus culture

j) Surgery

k) Biosafety assessment and reconstruction

l) Prevention and control of epidemic diseases

m) Molecular biological diagnosis and analysis

n) Inspection and testing technique management

o) Serological experiment

p) Preparation of breed improvement and breeding plans

q) Operation and management of farms

The Occupational Standards have been clustered into NTA qualification levels, i.e. NTA 7 and 8.

4.0. VALIDITY PERIOD

Due to the rapid development of technology, the validity period of occupational standards is 3-5 years. The review will proceed in the same manner as the one before it, with new occupational standards being developed based on current trends of the labour market.

5.0. OCCUPATIONAL STANDARDS

5.1 OCCUPATIONAL STANDARDS FOR LIVESTOCK VETERINARY ENGINEER - NTA 8

OCCUPATION	LIVESTOCK VETERINARY ENGINEER	**OCCUPATION CODE**	
DUTY TITLE	VIRUS CULTURE	**DUTY NO.**	801
TASK TITLE	CHICKEN CHORIOALLANTOIC MEMBRANE AND ALLANTOIC CAVITY INOCULATION	**TASK NO.**	8011
PERFORMANCE CRITERIA	The person performing this task must be able to perform the chicken chorioallantoic membrane and allantoic cavity inoculation according to the requirements for chicken chorioallantoic membrane and allantoic cavity inoculation, as well as the standard operating procedures for virus monitoring in experimental animals.		
RANGE STATEMENT	The task can be performed in laboratories under the supervision of senior engineers in this program or other relevant professional engineers. The tools and equipment to be used include: 1. Incubator; 2. Flashlight, marker pen, cotton swab, measuring cylinder, waste bottle, blue-capped bottle, and lighter; 3. Egg candler, illuminating lamp, egg cup, egg tray, chicken embryo puncture tool, and paraffin; 4. Syringe; 5. Scissors, tweezer, alcohol burner, gauze, pipettor, and pipette tip; 6. 9-11-day-old chicken embryos; 7. Disinfectant: 2.5% iodine, 75% alcohol, and 2% lysol; 8. Newcastle disease virus.		

EVIDENCE REQUIREMENT	
PRACTICAL PERFORMANCE	**UNDERPINNING KNOWLEDGE**
The person performing this task must be able to do the following: 1. Obtain the necessary resources for the task; 2. Identify the categories of tools and equipment; 3. Use the tools and equipment; 4. Select chicken embryos; 5. Inspect the incubation conditions;	**Detailed knowledge about:** **1.0 Methods** The person performing this task must be able to explain how to: 1.1 Incubate the chicken embryos; 1.2 Select the viable chicken embryos; 1.3 Perform the chicken chorioallantoic membrane inoculation; 1.4 Perform the chicken embryo allantoic cavity

6. Control the incubation temperature, humidity, and air quality; 7. Detect unfertilized eggs, viable embryos, and non-viable embryos; 8. Prepare for the inoculation; 9. Inoculate the virus; 10. Culture the virus; 11. Clean the tools, equipment and workplaces; 12. Store tools and equipment.	inoculation. **2.0 Principles** The person performing this task must be able to explain the following principles: 2.1 Structure and developmental physiology of chicken embryo; 2.2 Principles of aseptic operations; 2.3 Principles of virus cultivation. **3.0 Theories** The person performing this task must be able to explain the following: 3.1 Methods for incubation and egg candling of chicken embryos; 3.2 Inoculation of chicken chorioallantoic membrane and allantoic cavity and virus culture method. **4.0 Essential Skills** 4.1 Communication skills; 4.2 Management skills; 4.3 Data collection skills; 4.4 Teamwork skills; 4.5 Report writing skills; 4.6 Information technology application skills.
DESCRIPTION OF THE END PRODUCT / SERVICE	The virus is inoculated into the chicken chorioallantoic membrane and allantoic cavity according to the purpose of inoculation and technical requirements.
CIRCUMSTANTIAL KNOWLEDGE	**Detailed knowledge about:** 1. General knowledge of safe use of electricity; 2. Animal anatomical physiology; 3. Veterinary pharmacology; 4. Animal microbiology; 5. Animal infectious diseases; 6. Pipetting knowledge of pipettor; 7. Occupational health and biosafety; 8. Knowledge of waste disposal.

OCCUPATION	LIVESTOCK VETERINARY ENGINEER	**OCCUPATION CODE**	
DUTY TITLE	VIRUS CULTURE	**DUTY NO.**	801
TASK TITLE	CHICKEN EMBRYO YOLK SAC AND AMNIOTIC CAVITY INOCULATION	**TASK NO.**	8012
PERFORMANCE CRITERIA	The person performing this task must be able to perform the chicken embryo yolk sac and aminotic inoculation according to the requirements for chicken embryo yolk sac and amniotic cavity, as well as the standard operating procedures for virus monitoring in experimental animals.		
RANGE STATEMENT	The task can be performed in laboratories under the supervision of senior engineers in this program or other relevant professional engineers. The tools and equipment to be used include: 1. Incubator; 2. Flashlight, marker pen, cotton swab, measuring cylinder, waste bottle, blue-capped bottle, and lighter; 3. Egg candler, illuminating lamp, egg cup, egg tray, chicken embryo puncture tool, and paraffin; 4. Syringe; 5. Scissors, tweezer, alcohol burner, gauze, pipettor, and pipette tip; 6. 9-11-day-old chicken embryos; 7. Disinfectant: 2.5% iodine, 75% alcohol, and 2% lysol; 8. Newcastle disease virus.		

EVIDENCE REQUIREMENT	
PRACTICAL PERFORMANCE	**UNDERPINNING KNOWLEDGE**
The person performing this task must be able to do the following: 1. Obtain the necessary resources for the task; 2. Identify the categories of tools and equipment; 3. Use the tools and equipment; 4. Select chicken embryos; 5. Inspect the incubation conditions; 6. Control the incubation temperature, humidity, and air quality; 7. Detect unfertilized eggs, viable embryos, and non-viable embryos;	**Detailed knowledge about:** **1.0 Methods** The person performing this task must be able to explain how to: 1.1 Incubate the chicken embryos; 1.2 Select the viable chicken embryos; 1.3 Perform the chicken embryo yolk sac inoculation; 1.4 Perform the chicken embryo amniotic cavity inoculation. **2.0 Principles** The person performing this task must be able to

8. Prepare for the inoculation; 9. Inoculate the virus; 10. Culture the virus; 11. Clean the tools, equipment and workplaces; 12. Store tools and equipment.	explain the following principles: 2.1 Structure and developmental physiology of chicken embryo; 2.2 Principles of aseptic operations; 2.3 Principles of virus cultivation. **3.0 Theories** The person performing this task must be able to explain the following: 3.1 Methods for incubation and egg candling of chicken embryos; 3.2 Inoculation of chicken embryo yolk sac and amniotic cavity and virus culture method. **4.0 Essential Skills** 4.1 Communication skills; 4.2 Management skills; 4.3 Data collection skills; 4.4 Teamwork skills; 4.5 Report writing skills; 4.6 Information technology application skills.
DESCRIPTION OF THE END PRODUCT / SERVICE	The virus is inoculated into the chicken embryo yolk sac and amniotic cavity according to the purpose of inoculation and technical requirements.
CIRCUMSTANTIAL KNOWLEDGE	**Detailed knowledge about:** 1. General knowledge of safe use of electricity; 2. Animal anatomical physiology; 3. Veterinary pharmacology; 4. Animal microbiology; 5. Animal infectious diseases; 6. Pipetting knowledge of pipettor; 7. Occupational health and biosafety; 8. Knowledge of waste disposal.

<table>
<tr><td>OCCUPATION</td><td>LIVESTOCK VETERINARY ENGINEER</td><td>OCCUPATION CODE</td><td></td></tr>
<tr><td>DUTY TITLE</td><td>VIRUS CULTURE</td><td>DUTY NO.</td><td>801</td></tr>
<tr><td>TASK TITLE</td><td>VIRUS HARVEST</td><td>TASK NO.</td><td>8013</td></tr>
<tr><td>PERFORMANCE CRITERIA</td><td colspan="3">The person performing this task must be able to harvest the virus according to the requirements for virus harvest, as well as the standard operating procedures for virus monitoring in experimental animals.</td></tr>
<tr><td>RANGE STATEMENT</td><td colspan="3">The task can be performed in laboratories under the supervision of senior engineers in this program or other relevant professional engineers. The tools and equipment to be used include:
1. Cultured chicken embryos;
2. Egg tester;
3. Ophthalmic tweezer, waste bottle, and blue-capped bottle;
4. 5mL pipettor, and 5mL pipette tip;
5. Disinfectant: 0.1% benzalkonium bromide, 2.5% iodine tincture, and cotton swab.</td></tr>
<tr><td colspan="4">EVIDENCE REQUIREMENT</td></tr>
<tr><td colspan="2">PRACTICAL PERFORMANCE</td><td colspan="2">UNDERPINNING KNOWLEDGE</td></tr>
<tr><td colspan="2">The person performing this task must be able to do the following:
1. Obtain the necessary resources for the task;
2. Inoculate frozen chicken embryos after incubation;
3. Extract the allantoic fluid;
4. Collect the amniotic fluid;
5. Obtain the chorioallantoic membrane;
6. Clean the tools, equipment and workplaces;
7. Store tools and equipment.</td><td colspan="2">Detailed knowledge about:
1.0 Methods
The person performing this task must be able to explain how to:
1.1 Frozen inoculated chicken embryos after incubation;
1.2 Harvest the virus.

2.0 Principles
The person performing this task must be able to explain the following principles:
2.1 Structure and developmental physiology of chicken embryo;
2.2 Aseptic operation principle;
2.3 Principles of biosafety management.

3.0 Theories
The person performing this task must be able to</td></tr>
</table>

	explain the following: 3.1 Virus harvest procedures; 3.2 Virus detection methods. **4.0 Essential Skills** 4.1 Management skills; 4.2 Data collection skills; 4.3 Teamwork skills; 4.4 Writing skills.
DESCRIPTION OF THE END PRODUCT / SERVICE	The virus is harvested from the chicken embryo chorioallantoic membrane, allantoic fluid, yolk sac, and amniotic fluid according to the purpose of inoculation and technical requirements.
CIRCUMSTANTIAL KNOWLEDGE	**Detailed knowledge about:** 1. Animal anatomical physiology; 2. Animal microbiology; 3. Animal infectious diseases; 4. Pipetting knowledge of pipettor; 5. Occupational health and biosafety; 6. Knowledge of waste disposal.

OCCUPATION	LIVESTOCK VETERINARY ENGINEER	**OCCUPATION CODE**	
DUTY TITLE	SURGERY	**DUTY NO.**	802
TASK TITLE	ANIMAL CESAREAN SECTION	**TASK NO.**	8021
PERFORMANCE CRITERIA	The person performing this task must be able to carry out animal cesarean sections in accordance with the requirements of surgical techniques and the relevant operational procedures for animal surgery.		
RANGE STATEMENT	The task can be performed in animal operating rooms under the supervision of senior engineers in this program or other relevant professional engineers. The tools and equipment to be used include: 1. Surgical equipment: monitor, operating table, shadowless lamp, sphygmomanometer, respiratory anesthesia machine, oxygen tank, autoclave, drying oven, veterinary hematology analyzer, animal biochemical analyzer, animal electrocardiograph, B-mode ultrasound (or X-ray set), and infusion pump; 2. Complete set of cesarean section instruments: scalpel handle, surgical blade with compatible handle, straight tweezer (without hook), toothed tweezer (with hook), pointed scissors, blunt scissors, tissue forcep, retractor, straight hemostatic forcep, curved hemostatic forcep, needle holder, towel clamp, sponge forcep, and suture scissors; 3. Surgical supplies and consumables: indwelling needle, syringe, medical tape, EDTA tube, sodium heparin tube, infusion set, infusion support, stethoscope, scalp needle, three-edged needle, suture thread, suture round needle, and sterile cotton ball; 4. Drugs: hemostatic, anesthetic, painkiller, anti-inflammatory drug, sodium chloride, glucose, lactated Ringer's solution, cardiac tonic, oxygen, vasopressor, 75% alcohol, iodophor, atropine, and sedative.		

EVIDENCE REQUIREMENT

PRACTICAL PERFORMANCE	**UNDERPINNING KNOWLEDGE**
The person performing this task must be able to do the following: 1. Observe health and personal protective measures; 2. Select appropriate instruments, equipment, consumables, and drugs based on different animals; 3. Assess the health of the surgical animal; 4. Prepare the animal for surgery;	**Detailed knowledge about:** **1.0 Methods** The person performing this task must be able to explain how to: 1.1 Inspect the surgical animal; 1.2 Use instruments and equipment for animal cesarean sections; 1.3 Use instruments and drugs for animal cesarean sections; 1.4 Prepare the animal before cesarean sections;

5. Fix and anesthetize the surgical animal; 6. Select and disinfect the surgical site; 7. Perform the surgery; 8. Manage surgical emergencies; 9. Provide care and first aid to neonatal animals; 10. Treat and care for animals post-surgery.	1.5 Perform animal cesarean sections; 1.6 Manage surgical emergencies arising from animal cesarean section; 1.7 Provide care and first aid to neonatal animals; 1.8 Treat and care for animals post-surgery. **2.0 Principles** The person performing this task must be able to explain the following principles: 2.1 Aseptic principles of surgery; 2.2 Principles of rescuing animals from surgical emergencies; 2.3 Principles of care and first aid for neonatal animals in cesarean section. **3.0 Theories** The person performing this task must be able to explain the following: 3.1 Importance of assessing the health of animals undergoing cesarean section; 3.2 Importance of preparing animals before cesarean section; 3.3 Importance of determining the cesarean section procedure; 3.4 Methods for managing surgical emergencies; 3.5 Methods for treating and managing animals post-surgery. **4.0 Essential Skills** 4.1 Communication skills; 4.2 Management skills; 4.3 Data collection skills; 4.4 Customer service skills; 4.5 Teamwork skills.
DESCRIPTION OF THE END PRODUCT / SERVICE	The cesarean sections on commonly found animals in Tanzania can be successfully performed in accordance with technical requirements.
CIRCUMSTANTIAL KNOWLEDGE	**Detailed knowledge about:** 1. Knowledge of animal pathology; 2. Occupational health and safety;

	3. Waste disposal.

OCCUPATION	LIVESTOCK VETERINARY ENGINEER	**OCCUPATION CODE**	
DUTY TITLE	SURGERY	**DUTY NO.**	802
TASK TITLE	ANIMAL VISCERAL SURGERY	**TASK NO.**	8022
PERFORMANCE CRITERIA	The person performing this task must be able to carry out animal visceral surgeries in accordance with the requirements of surgical techniques and the relevant operational procedures for animal surgery.		
RANGE STATEMENT	The task can be performed in animal operating rooms under the supervision of senior engineers in this program or other relevant professional engineers. The tools and equipment to be used include: 1. Surgical equipment: monitor, operating table, shadowless lamp, sphygmomanometer, respiratory anesthesia machine, oxygen tank, autoclave, drying oven, veterinary hematology analyzer, animal biochemical analyzer, animal electrocardiograph, B-mode ultrasound (or X-ray set), and infusion pump; 2. Complete set of visceral surgical instruments: scalpel handle, surgical blade with compatible handle, straight tweezer (without hook), toothed tweezer (with hook), pointed scissors, blunt scissors, tissue forcep, retractor, straight hemostatic forcep, curved hemostatic forcep, needle holder, towel clamp, sponge forcep, and suture scissors; 3. Surgical supplies and consumables: indwelling needle, syringe, medical tape, EDTA tube, sodium heparin tube, infusion set, infusion support, stethoscope, scalp needle, three-edged needle, suture thread, suture round needle, and sterile cotton ball; 4. Drugs: hemostatic, anesthetic, painkiller, anti-inflammatory drug, sodium chloride, glucose, lactated Ringer's solution, cardiac tonic, oxygen, vasopressor, 75% alcohol, iodophor, atropine, and sedative.		

EVIDENCE REQUIREMENT

PRACTICAL PERFORMANCE	**UNDERPINNING KNOWLEDGE**
The person performing this task must be able to do the following: 1. Observe health and personal protective measures; 2. Select appropriate instruments, equipment, consumables, and drugs; 3. Assess the health of the surgical animal; 4. Prepare the animal for surgery;	**Detailed knowledge about:** **1.0 Methods** The person performing this task must be able to explain how to: 1.1 Inspect the surgical animal; 1.2 Use instruments and equipment for animal visceral surgeries; 1.3 Use instruments and drugs for animal visceral surgeries;

5. Fix and anesthetize the surgical animal; 6. Select and disinfect the surgical site; 7. Perform the surgery; 8. Manage surgical emergencies; 9. Treat and care for animals post-surgery.	1.4 Prepare the animal before visceral surgery; 1.5 Perform visceral surgery on the animal; 1.6 Address surgical emergencies arising from visceral surgery; 1.7 Treat and care for animals post-surgery. **2.0 Principles** The person performing this task must be able to explain the following principles: 2.1 Aseptic principles of surgery; 2.2 Principles of rescuing animals from surgical emergencies; 2.3 Surgical management principles of different visceral organs of animals. **3.0 Theories** The person performing this task must be able to explain the following: 3.1 Importance of assessing the health of surgical animals; 3.2 Importance of preparing animals before surgery; 3.3 Importance of making surgical plans; 3.4 Methods for managing surgical emergencies; 3.5 Methods for treating and caring for surgical animals. **4.0 Essential Skills** 4.1 Communication skills; 4.2 Management skills; 4.3 Data collection skills; 4.4 Customer service skills; 4.5 Teamwork skills; 4.6 Equipment application skills.
DESCRIPTION OF THE END PRODUCT / SERVICE	The visceral surgeries on commonly found animals in Tanzania can be successfully performed in accordance with technical requirements.
CIRCUMSTANTIAL KNOWLEDGE	**Detailed knowledge about:** 1. Knowledge of animal pathology; 2. Animal visceral function; 3. Occupational health and safety; 4. Waste disposal.

OCCUPATION	LIVESTOCK VETERINARY ENGINEER	**OCCUPATION CODE**	
DUTY TITLE	SURGERY	**DUTY NO.**	802
TASK TITLE	ANIMAL FRACTURE SURGERY	**TASK NO.**	8023
PERFORMANCE CRITERIA	The person performing this task must be able to carry out animal fracture surgeries in accordance with the requirements of surgical techniques and the relevant operational procedures for animal surgery.		
RANGE STATEMENT	The task can be performed in animal operating rooms under the supervision of senior engineers in this program or other relevant professional engineers. The tools and equipment to be used include: 1. Surgical equipment: monitor, operating table, shadowless lamp, sphygmomanometer, respiratory anesthesia machine, oxygen tank, autoclave, drying oven, veterinary hematology analyzer, animal biochemical analyzer, animal electrocardiograph, X-ray set, and infusion pump; 2. Complete set of conventional surgical instruments: scalpel handle, surgical blade with compatible handle, straight tweezer (without hook), toothed tweezer (with hook), pointed scissors, blunt scissors, tissue forcep, retractor, straight hemostatic forcep, curved hemostatic forcep, needle holder, towel clamp, sponge forcep, and suture scissors; 3. Specialized orthopedic instruments: plate holder, reduction forcep, bone-cutting forcep, wire cutter, Kocher forcep, medical vice, bone hammer, multifunctional bending device, self-locking hollow drill, Kocher bending forcep, depth gauge, nail holding forcep, nail holder, retractor, skin tissue retractor, small bone saw, Kocher bending device, guide wire introducer, quick-change handle, screwdriver (with screws and handle), periosteal elevator, multi-faced flat file, bidirectional drill guide, orthopedic drill bit, hollow drill bit, oscillating saw, cortical screw, locking screw, traction screw, bone plate, Kocher needle, and steel wire; 4. Medical consumables: indwelling needle, syringe, medical tape, EDTA tube, sodium heparin tube, infusion set, infusion support, stethoscope, scalp needle, three-edged needle, suture thread, suture round needle, and sterile cotton ball; 5. Drugs: hemostatic, anesthetic, painkiller, anti-inflammatory drug, sodium chloride, glucose, lactated Ringer's solution, cardiac tonic, oxygen, vasopressor, 75% alcohol, iodophor, atropine, and sedative.		
EVIDENCE REQUIREMENT			
PRACTICAL PERFORMANCE		**UNDERPINNING KNOWLEDGE**	

The person performing this task must be able to do the following: 1. Observe health and personal protective measures; 2. Select appropriate instruments, equipment, consumables, and drugs based on the fracture positions of different animals; 3. Assess the health of the surgical animal; 4. Prepare the animal for surgery; 5. Fix and anesthetize the surgical animal; 6. Choose the surgical site, and disinfect the surgery; 7. Perform the surgery; 8. Manage surgical emergencies; 9. Treat and care for animals post-surgery.	**Detailed knowledge about:** **1.0 Methods** The person performing this task must be able to explain how to: 1.1 Inspect the surgical animal with a fracture; 1.2 Use instruments and equipment for animal fracture surgeries; 1.3 Use instruments and drugs for animal fracture surgeries; 1.4 Prepare the animal before fracture surgery; 1.5 Perform animal fracture surgeries; 1.6 Address surgical emergencies arising from fracture surgery; 1.7 Treat and care for animals post-surgery. **2.0 Principles** The person performing this task must be able to explain the following principles: 2.1 Aseptic principles of surgery; 2.2 Principles of rescuing animals from surgical emergencies; 2.3 Treatment principles of different fracture positions of animals. **3.0 Theories** The person performing this task must be able to explain the following: 3.1 Importance of assessing the health of animals undergoing fracture surgeries; 3.2 Importance of preoperative preparation for fracture surgery; 3.3 Importance of making fracture surgical plans; 3.4 Methods for managing surgical emergencies; 3.5 Methods for treating and caring for animals post-surgery. **4.0 Essential Skills** 4.1 Communication skills; 4.2 Management skills; 4.3 Data collection skills;

	4.4 Customer service skills; 4.5 Teamwork skills; 4.6 Equipment application skills.
DESCRIPTION OF THE END PRODUCT / SERVICE	The cesarean sections on commonly found animals in Tanzania can be successfully performed in accordance with technical requirements.
CIRCUMSTANTIAL KNOWLEDGE	**Detailed knowledge about:** 1. Knowledge of animal pathology; 2. Occupational health and safety; 3. Waste disposal.

OCCUPATION	LIVESTOCK VETERINARY ENGINEER	**OCCUPATION CODE**	
DUTY TITLE	BIOSAFETY ASSESSMENT AND RECONSTRUCTION	**DUTY NO.**	803
TASK TITLE	EVALUATION OF DISINFECTION EFFECTIVENESS	**TASK NO.**	8031
PERFORMANCE CRITERIA	The person performing this task must be able to evaluate the disinfection effectiveness based on disinfection technical requirements and related operational procedures.		
RANGE STATEMENT	The task can be performed in laboratories under the supervision of senior engineers in this program or other relevant professional engineers. The tools and equipment to be used include: 1. Disinfectant concentration test strips; 2. Adenosine triphosphate (ATP) bioluminescence detection device; 3. Alcohol meter; 4. Residual chlorine meter; 5. Chemical indicator for disinfection effectiveness evaluation; 6. Indicator bacteria for disinfection effectiveness evaluation; 7. Culture medium.		

EVIDENCE REQUIREMENT

PRACTICAL PERFORMANCE	**UNDERPINNING KNOWLEDGE**
The person performing this task must be able to do the following: 1. Ensure personal safety protection; 2. Obtain the necessary resources for the task; 3. Evaluate the disinfection effectiveness; 4. Select appropriate tools and equipment; 5. Determine the concentration of the disinfectant; 6. Select the correct chemical indicator; 7. Select the appropriate indicator bacteria; 8. Clean the tools, equipment and workplaces;	**Detailed knowledge about:** **1.0 Methods** The person performing this task must be able to explain how to: 1.1 Use disinfectants; 1.2 Use disinfection effectiveness testing instruments. **2.0 Principles** The person performing this task must be able to explain the following principles: 2.1 Disinfection principle; 2.2 Selection principle of disinfectant; 2.3 Principles of disinfection effectiveness evaluation. **3.0 Theories** The person performing this task must be able to explain

9. Store tools and equipment.	the following: 3.1 Purpose of disinfectants; 3.2 Usage of disinfection sterilization equipment; 3.3 Methods for evaluating the effectiveness of different disinfection methods. **4.0 Essential Skills** 4.1 Communication skills; 4.2 Management skills; 4.3 Data collection and analysis skills; 4.4 Customer service skills; 4.5 Teamwork skills; 4.6 Report writing skills; 4.7 Experimental operation skills.
DESCRIPTION OF THE END PRODUCT / SERVICE	The evaluation of disinfection effectiveness is carried out in accordance with technical requirements.
CIRCUMSTANTIAL KNOWLEDGE	**Detailed knowledge about:** 1. Veterinary pharmacological knowledge; 2. Occupational health and safety; 3. Waste disposal.

OCCUPATION	LIVESTOCK VETERINARY ENGINEER	**OCCUPATION CODE**	
DUTY TITLE	BIOSAFETY ASSESSMENT AND RECONSTRUCTION	**DUTY NO.**	803
TASK TITLE	IDENTIFICATION AND CONTROL OF BIOSAFETY RISKS	**TASK NO.**	8032
PERFORMANCE CRITERIA	The person performing this task must be able to identify and control biosafety risks based on biosafety technical requirements and relevant standard operating procedures.		
RANGE STATEMENT	The task can be performed in farms and laboratories under the supervision of senior engineers in this program or other relevant professional engineers. The tools and equipment to be used include: 1. Biosafety-related laws and regulations; 2. Office and related electronic equipment.		

EVIDENCE REQUIREMENT

PRACTICAL PERFORMANCE	**UNDERPINNING KNOWLEDGE**
The person performing this task must be able to do the following: 1. Observe the health and safety prevention measures; 2. Obtain the necessary resources for the task; 3. Identify and control biosafety risks; 4. Collect and analyze relevant information and data; 5. Perform harmless treatment of deceased animals.	**Detailed knowledge about:** **1.0 Methods** The person performing this task must be able to explain how to: 1.1 Investigate the biosafety of farms; 1.2 Control the biosafety of farms. **2.0 Principles** The person performing this task must be able to explain the following principles: 2.1 Principles of biosafety risk assessment; 2.2 Principles of biosafety prevention and control. **3.0 Theories** The person performing this task must be able to explain the following: 3.1 Site selection requirements for farms; 3.2 Planning and layout within the farm; 3.3 Measures for site disinfection; 3.4 Introduction measures.

	4.0 Essential Skills 4.1 Communication skills; 4.2 Management skills; 4.3 Data collection skills; 4.4 Customer service skills; 4.5 Teamwork skills; 4.6 Report writing skills; 4.7 Data analysis skills.
DESCRIPTION OF THE END PRODUCT / SERVICE	The identification and control of biosafety risks are carried out in accordance with technical requirements.
CIRCUMSTANTIAL KNOWLEDGE	**Detailed knowledge about:** 1. Biological characteristics of pathogenic biological factors; 2. Animal feeding and experimental activities; 3. Knowledge of risks during the disposal process of infectious waste; 4. Knowledge of the infectivity and pathogenicity of pathogenic biological factors; 5. Biosafety measures for large-scale farming operations; 6. Occupational health and safety; 7. Waste disposal methods.

OCCUPATION	LIVESTOCK VETERINARY ENGINEER	**OCCUPATION CODE**	
DUTY TITLE	BIOSAFETY ASSESSMENT AND RECONSTRUCTION	**DUTY NO.**	803
TASK TITLE	DEVELOPMENT OF BIOSAFETY PLAN	**TASK NO.**	8033
PERFORMANCE CRITERIA	The person performing this task must be able to develop biosafety plans based on biosafety technical requirements and relevant standard operating procedures.		
RANGE STATEMENT	The task can be performed in farms and laboratories under the supervision of senior engineers in this program or other relevant professional engineers. The tools and equipment to be used include: 1. Biosafety-related laws and regulations; 2. Office and related electronic equipment.		

EVIDENCE REQUIREMENT	
PRACTICAL PERFORMANCE	**UNDERPINNING KNOWLEDGE**
The person performing this task must be able to do the following: 1. Observe the health and safety prevention measures; 2. Obtain the necessary resources for the task; 3. Develop a biosafety plan; 4. Consult relevant regulations and policies in the livestock industry; 5. Diagnose animal epidemic diseases; 6. Implement the biosafety control plan.	**Detailed knowledge about:** **1.0 Methods** The person performing this task must be able to explain how to: 1.1 Establish a disinfection system for the farm; 1.2 Improve the management system for farm personnel and supplies; 1.3 Formulate a reasonable introduction system. **2.0 Principles** The person performing this task must be able to explain the following principles: 2.1 Principles for developing a biosafety plan for the farm; 2.2 Principles for achieving biosafety standards on the farm. **3.0 Theories** The person performing this task must be able to explain the following: 3.1 Measures to interrupt the transmission pathways of epidemic diseases;

	3.2 Importance of eliminating sources of infection; 3.3 Methods to protect susceptible animals; 3.4 Comprehensive biosafety measures for the farm. **4.0 Essential Skills** 4.1 Communication skills; 4.2 Management skills; 4.3 Data collection skills; 4.4 Customer service skills; 4.5 Teamwork skills; 4.6 Report writing skills; 4.7 Data analysis skills.
DESCRIPTION OF THE END PRODUCT / SERVICE	The biosafety plan is developed in accordance with technical requirements.
CIRCUMSTANTIAL KNOWLEDGE	**Detailed knowledge about:** 1. Knowledge of livestock and poultry infectious diseases; 2. Knowledge of animal feeding; 3. Measures for handling bedding, waste, and dirt; 4. Occupational health and safety.

OCCUPATION	LIVESTOCK VETERINARY ENGINEER	**OCCUPATION CODE**	
DUTY TITLE	PREVENTION AND CONTROL OF EPIDEMIC DISEASES	**DUTY NO.**	804
TASK TITLE	DEVELOPMENT OF A MONITORING PLAN OF EPIDEMIC DISEASES	**TASK NO.**	8041
PERFORMANCE CRITERIA	The person performing this task must be able to develop a monitoring plan of epidemic diseases based on the technical requirements of epidemic disease monitoring and relevant standards and operating procedures for prevention and control of epidemic diseases.		
RANGE STATEMENT	The task can be performed in farms and laboratories under the supervision of senior engineers in this program or other relevant professional engineers. The tools and equipment to be used include: 1. Relevant laws and regulations of the livestock industry; 2. Office and related electronic equipment.		

EVIDENCE REQUIREMENT

PRACTICAL PERFORMANCE	**UNDERPINNING KNOWLEDGE**
The person performing this task must be able to do the following: 1. Ensure personal safety protection; 2. Obtain the necessary resources for the task; 3. Develop a monitoring plan of epidemic diseases; 4. Diagnose animal epidemic diseases; 5. Determine the epidemic disease monitoring targets; 6. Determine the epidemic disease monitoring time; 7. Determine the epidemic disease monitoring quantity; 8. Conduct epidemiological investigations; 9. Collect samples for testing; 10. Test the samples; **11.** Collect data, and perform monitoring evaluation.	**Detailed knowledge about:** **1.0 Methods** The person performing this task must be able to explain how to: 1.1 Detect epidemic diseases; 1.2 Dispose of epidemic diseases. **2.0 Principles** The person performing this task must be able to explain the following principles: 2.1 Principles of epidemic disease detection; 2.2 Principles of animal epidemic disease monitoring; 2.3 Principles of defining epidemic focuses; 2.4 Principles of developing a monitoring plan of epidemic diseases. **3.0 Theories** The person performing this task must be able to explain how to:

	3.1 Methods for detecting immune antibody levels; 3.2 Measures for handling detection results. **4.0 Essential Skills** 4.1 Communication skills; 4.2 Management skills; 4.3 Data collection skills; 4.4 Customer service skills; 4.5 Teamwork skills; 4.6 Report writing skills; 4.7 Information technology application skills; 4.8 Data analysis skills.
DESCRIPTION OF THE END PRODUCT / SERVICE	The monitoring plan of epidemic diseases is developed in accordance with technical requirements.
CIRCUMSTANTIAL KNOWLEDGE	**Detailed knowledge about:** 1. Knowledge of laws and regulations related to animal epidemic diseases; 2. Occupational health and safety; 3. Animal infectious diseases; 4. Waste disposal methods.

OCCUPATION	LIVESTOCK VETERINARY ENGINEER	**OCCUPATION CODE**	
DUTY TITLE	PREVENTION AND CONTROL OF EPIDEMIC DISEASES	**DUTY NO.**	804
TASK TITLE	FORMULATION OF HEALTHCARE MEASURES	**TASK NO.**	8042
PERFORMANCE CRITERIA	The person performing this task must be able to develop healthcare measures based on the technical requirements of animal healthcare and relevant standards and operating procedures for prevention and control of epidemic diseases.		
RANGE STATEMENT	The task can be performed in farms and laboratories under the supervision of senior engineers in this program or other relevant professional engineers. The tools and equipment to be used include: 1. Relevant laws and regulations of the livestock industry; 2. Corporate rules and regulations; 3. Office and related electronic equipment.		

EVIDENCE REQUIREMENT	
PRACTICAL PERFORMANCE	**UNDERPINNING KNOWLEDGE**
The person performing this task must be able to do the following: 1. Ensure personal safety protection; 2. Obtain the necessary resources for the task; 3. Establish healthcare measures; 4. Implement introduction quarantine; 5. Practice sanitation and disinfection; 6. Perform immunization.	**Detailed knowledge about:** **1.0 Methods** The person performing this task must be able to explain how to: 1.1 Develop a vaccination scheme; 1.2 Perform immunization; 1.3 Make a deworming plan. **2.0 Principles** The person performing this task must be able to explain the following principles: 2.1 Principles for establishing livestock and poultry healthcare measures; 2.2 Principles of deworming. **3.0 Theories** The person performing this task must be able to explain the following: 3.1 Importance of immunization;

	3.2 Importance of livestock and poultry healthcare. **4.0 Essential Skills** 4.1 Communication skills; 4.2 Management skills; 4.3 Data collection skills; 4.4 Customer service skills; 4.5 Teamwork skills; 4.6 Report writing skills; 4.7 Information technology application skills; 4.8 Data analysis skills.
DESCRIPTION OF THE END PRODUCT / SERVICE	Healthcare measures are formulated in accordance with technical requirements.
CIRCUMSTANTIAL KNOWLEDGE	**Detailed knowledge about:** 1. Relevant regulations and policies in the livestock industry; 2. Knowledge of animal feeding; 3. Occupational health and safety; 4. Knowledge of animal welfare; 5. Waste disposal methods.

OCCUPATION	LIVESTOCK VETERINARY ENGINEER	**OCCUPATION CODE**	
DUTY TITLE	PREVENTION AND CONTROL OF EPIDEMIC DISEASES	**DUTY NO.**	804
TASK TITLE	COMPREHENSIVE TREATMENT MEASURES WHEN EPIDEMIC DISEASES OCCUR	**TASK NO.**	8043
PERFORMANCE CRITERIA	The person performing this task must be able to take comprehensive treatment measures when epidemic diseases occur based on the technical requirements for animal epidemic disease control and relevant standards and operating procedures for prevention and control of epidemic diseases.		
RANGE STATEMENT	The task can be performed in farms and laboratories under the supervision of senior engineers in this program or other relevant professional engineers. The tools and equipment to be used include: 1. Relevant laws and regulations of the livestock industry; 2. Office and related electronic equipment; 3. Disinfection materials and tools; 4. Immunization materials; 5. Epidemic disease-related drugs; 6. Tools for harmless treatment.		

EVIDENCE REQUIREMENT

PRACTICAL PERFORMANCE	**UNDERPINNING KNOWLEDGE**
The person performing this task must be able to do the following: 1. Ensure personal safety protection; 2. Obtain the necessary resources for the task; 3. Evaluate the disinfection effectiveness; 4. Diagnose animal epidemic diseases; 5. Develop a contingency plan for epidemic diseases; 6. Report the epidemic disease; 7. Blockade the epidemic disease area; 8. Quarantine infected animals; 9. Perform emergency immunization; 10. Carry out harmless treatment.	**Detailed knowledge about:** **1.0 Methods** The person performing this task must be able to explain how to: 1.1 Deal with the epidemic disease; 1.2 Prevent and control infected animals. **2.0 Principles** The person performing this task must be able to explain the following principles: 2.1 Principles of animal epidemic disease management; 2.2 Principles of immunization; 2.3 Principles of comprehensive epidemic disease management.

	3.0 Theories The person performing this task must be able to explain the following: 3.1 Importance of comprehensive epidemic disease management; 3.2 Methods for comprehensive prevention and control of infected animals. **4.0 Essential Skills** 4.1 Communication skills; 4.2 Management skills; 4.3 Data collection skills; 4.4 Customer service skills; 4.5 Teamwork skills; 4.6 Report writing skills; 4.7 Information technology application skills; 4.8 Data analysis skills.
DESCRIPTION OF THE END PRODUCT / SERVICE	Comprehensive management is conducted in response to animal epidemic disease outbreaks.
CIRCUMSTANTIAL KNOWLEDGE	**Detailed knowledge about:** 1. Waste disposal; 2. Transmission pathway of epidemic disease; 3. Occupational health and safety.

OCCUPATION	LIVESTOCK VETERINARY ENGINEER	**OCCUPATION CODE**	
DUTY TITLE	MOLECULAR BIOLOGICAL DIAGNOSIS AND ANALYSIS	**DUTY NO.**	805
TASK TITLE	REVERSE TRANSCRIPTION-POLYMERASE CHAIN REACTION DETECTION	**TASK NO.**	8051
PERFORMANCE CRITERIA	The person performing this task must be able to amplify the target gene fragments according to the detection requirements.		
RANGE STATEMENT	The task can be performed in laboratories under the supervision of senior engineers in this program or other relevant professional engineers. The tools and equipment to be used include: 1. Clean bench; 2. Micro-shaker; 3. Fully automated rapid sample grinder; 4. Temperature-controlled centrifuge; 5. Nucleic acid/protein concentration determination instrument; 6. General PCR instrument; 7. Gradient PCR instrument; 8. Gel electrophoresis apparatus; 9. Electrophoresis tank; 10. Gel imaging analysis system; 11. Ice maker; 12. -20℃ refrigerator; 13. -80℃ refrigerator; 14. MORLAB ultrapure water purifier.		

EVIDENCE REQUIREMENT	
PRACTICAL PERFORMANCE	**UNDERPINNING KNOWLEDGE**
The person performing this task must be able to do the following: 1. Observe the health and safety prevention measures; 2. Develop a specific and detailed experiment scheme; 3. Select appropriate instruments and equipment; 4. Select the corresponding consumables and reagents;	**Detailed knowledge about:** **1.0 Methods** The person performing this task must be able to explain how to: 1.1 Extract tissue RNA (TRIzol method); 1.2 Perform reverse transcription to synthesize cDNA; 1.3 Amplify target gene (PCR method).

5. Select the correct RNA extraction method; 6. Extract tissue RNA; 7. Detect RNA concentration (ultraviolet spectrophotometry); 8. Assess RNA quality; 9. Perform reverse transcription to synthesize cDNA; 10. Design primers; 11. Detect the optimal annealing temperature of primers; 12. Carry out agarose gel electrophoresis detection; 13. Amplify the target gene using PCR; 14. Analyze gel images; 15. Store and manage experimental data and images; 16. Adjust the experiment scheme; 17. Clean the tools, equipment and workplaces; 18. Store tools and equipment.	**2.0 Principles** The person performing this task must be able to explain the following principles: 2.1 Principle of primer design; 2.2 Principles of aseptic operations; 2.3 Basic principle of PCR technology; 2.4 Principles of biosafety management. **3.0 Theories** The person performing this task must be able to explain the following: 3.1 Methods for RNA extraction and preservation; 3.2 Methods for primer design; 3.3 Methods for detecting the optimal annealing temperature of primers; 3.4 Methods for RT-PCR detection. **4.0 Essential Skills** 4.1 Communication skills; 4.2 Management skills; 4.3 Data collection skills; 4.4 Teamwork skills; 4.5 Report writing skills; 4.6 Information technology application skills; 4.7 Data analysis skills.
DESCRIPTION OF THE END PRODUCT / SERVICE	A highly specific target gene fragment is to be amplified in accordance with technical requirements and experimental standard operating procedures.
CIRCUMSTANTIAL KNOWLEDGE	**Detailed knowledge about:** 1. Animal anatomical physiology; 2. Laboratory biosafety management; 3. Animal microbiology; 4. Occupational health and safety; 5. Waste disposal methods.

OCCUPATION	LIVESTOCK VETERINARY ENGINEER	**OCCUPATION CODE**	
DUTY TITLE	MOLECULAR BIOLOGICAL DIAGNOSIS AND ANALYSIS	**DUTY NO.**	805
TASK TITLE	REAL-TIME FLUORESCENCE QUANTITATIVE DETECTION	**TASK NO.**	8052
PERFORMANCE CRITERIA	The person performing this task must be able to quantitatively analyze specific DNA sequences in the test samples according to the detection requirements.		
RANGE STATEMENT	The task can be performed in laboratories under the supervision of senior engineers in this program or other relevant professional engineers. The tools and equipment to be used include: 1. Clean bench; 2. Micro-shaker; 3. Fully automated rapid sample grinder; 4. Temperature-controlled centrifuge; 5. Nucleic acid/protein concentration determination instrument; 6. General PCR instrument; 7. Gradient PCR instrument; 8. Gel electrophoresis apparatus; 9. Electrophoresis tank; 10. Gel imaging analysis system; 11. Ice maker; 12. -20℃ refrigerator; 13. -80℃ refrigerator; 14. MORLAB ultrapure water purifier; 15. Fluorescent quantitative PCR instrument.		

EVIDENCE REQUIREMENT	
PRACTICAL PERFORMANCE	**UNDERPINNING KNOWLEDGE**
The person performing this task must be able to do the following: 1. Observe the health and safety prevention measures; 2. Develop a specific and detailed experiment scheme; 3. Select appropriate instruments and equipment; 4. Select the corresponding consumables and	**Detailed knowledge about:** **1.0 Methods** The person performing this task must be able to explain how to: 1.1 Extract tissue RNA (TRIzol method); 1.2 Reverse transcription synthesis of cDNA; 1.3 Amplify target gene (qPCR method).

reagents; 5. Select the correct RNA extraction method; 6. Extract tissue RNA; 7. Detect RNA concentration (ultraviolet spectrophotometry); 8. Assess RNA quality; 9. Perform reverse transcription to synthesize cDNA; 10. Design primers; 11. Detect the optimal annealing temperature of primers; 12. Carry out agarose gel electrophoresis detection; 13. Amplify the target gene using PCR; 14. Analyze gel images; 15. Store and manage experimental data and images; 16. Adjust the experiment scheme; 17. Clean the tools, equipment and workplaces; 18. Store tools and equipment.	**2.0 Principles** The person performing this task must be able to explain the following principles: 2.1 Primer design principle; 2.2 Principles of aseptic operations; 2.3 Basic principle of qPCR technology; 2.4 Principles of biosafety management. **3.0 Theories** The person performing this task must be able to explain the following: 3.1 Methods for RNA extraction and preservation; 3.2 Methods for primer design; 3.3 Methods for detecting the optimal annealing temperature of primers; 3.4 Methods for RT-qPCR detection. **4.0 Essential Skills** 4.1 Communication skills; 4.2 Management skills; 4.3 Data collection skills; 4.4 Customer service skills; 4.5 Report writing skills; 4.6 Information technology application skills; 4.7 Data analysis skills.
DESCRIPTION OF THE END PRODUCT / SERVICE	Quantitative analysis of specific DNA sequences in the test samples is to be performed in accordance with technical requirements and experimental standard operating procedures.
CIRCUMSTANTIAL KNOWLEDGE	**Detailed knowledge about:** 1. Animal anatomical physiology; 2. Laboratory biosafety management; 3. Animal microbiology; 4. Occupational health and safety; 5. Waste disposal methods.

OCCUPATION	LIVESTOCK VETERINARY ENGINEER	**OCCUPATION CODE**	
DUTY TITLE	INSPECTION AND TESTING TECHNIQUE MANAGEMENT	**DUTY NO.**	806
TASK TITLE	INSPECTION AND TESTING MANAGEMENT	**TASK NO.**	8061
PERFORMANCE CRITERIA	The person performing this task must be able to conduct animal inspection and testing in accordance with the requirements of the inspection and testing technique and relevant standards for animal detection.		
RANGE STATEMENT	The task can be performed in laboratories under the supervision of senior engineers in this program or other relevant professional engineers. The tools and equipment to be used include: 1. Freezing microtome; 2. Blood analyzer; 3. Optical microscope; 4. Inverted microscope; 5. CO_2 incubator; 6. Fully automated autoclave; 7. Sample homogenizer grinder; 8. Gel imager; 9. Advanced microscope; 10. Immunochromatographic fast detector; 11. Fully automated enzyme immunoassay system; 12. Fully automated capillary electrophoresis analyzer; 13. Clean bench; 14. Temperature-controlled centrifuge; 15. Nucleic acid/protein concentration determination instrument; 16. PCR instrument; 17. Fluorescent quantitative PCR instrument; 18. Ultra-low temperature freezer; 19. Ventilation hood; 20. Electrophoresis apparatus; 21. Ultrapure water meter; 22. Water-proof constant temperature incubator; 23. Image acquisition system; 24. CO_2 cell incubator; 25. Constant temperature biochemical incubator; 26. Electronic balance;		

	27. Magnetic stirrer; 28. Gradient PCR instrument; 29. pH meter; 30. Inspection and testing rules and regulations; 31. Conference room (equipped with conference tables and chairs, projectors, etc.).

EVIDENCE REQUIREMENT	
PRACTICAL PERFORMANCE	**UNDERPINNING KNOWLEDGE**
The person performing this task must be able to do the following: 1. Observe the health and safety prevention measures; 2. Clearly establish inspection and testing procedures; 3. Determine the scope, classification, and subjects of inspection and quarantine; 4. Develop quarantine procedures; 5. Handle quarantined animals and animal products; 6. Perform clinical examinations of quarantined animals; 7. Implement origin quarantine; 8. Implement slaughter quarantine; 9. Carry out quarantine supervision; 10. Inspect and quarantine infectious diseases; 11. Inspect and quarantine parasitic diseases; 12. Analyze and detect testing data.	**Detailed knowledge about:** **1.0 Methods** The person performing this task must be able to explain how to: 1.1 Conduct quarantine inspections in animal production and distribution; 1.2 Perform quarantine inspections for animal epidemic diseases. **2.0 Principles** The person performing this task must be able to explain the following principles: 2.1 Principles of animal quarantine; 2.2 Principles of handling animals and animal products; 2.3 Principles of biosafety management. **3.0 Theories** The person performing this task must be able to explain the following: 3.1 Importance of animal quarantine; 3.2 Methods of clinical quarantine; 3.3 Methods of inspection and testing. **4.0 Essential Skills** 4.1 Communication skills; 4.2 Management skills; 4.3 Data collection skills; 4.4 Information technology application skills.
DESCRIPTION OF THE END PRODUCT	The inspection and testing techniques are

/ SERVICE	introduced to complete the detection in accordance with technical requirements and experimental standard operating procedures.
CIRCUMSTANTIAL KNOWLEDGE	**Detailed knowledge about:** 1. Animal anatomical physiology; 2. Animal pathology; 3. Animal biochemistry; 4. Animal microbiology; 5. Animal infectious diseases; 6. Animal parasites; 7. Occupational health and safety; 8. Waste disposal methods; 9. Laboratory biosafety management; 10. Commonly-used experimental techniques of inspection and testing.

OCCUPATION	LIVESTOCK VETERINARY ENGINEER	**OCCUPATION CODE**	
DUTY TITLE	INSPECTION AND TESTING TECHNIQUE MANAGEMENT	**DUTY NO.**	806
TASK TITLE	TRAINING ON INSPECTION AND TESTING TECHNIQUES	**TASK NO.**	8062
PERFORMANCE CRITERIA	The person performing this task must be able to complete the training on inspection and testing techniques in accordance with the requirements of the inspection and testing technique and relevant standards for animal detection.		
RANGE STATEMENT	The task can be performed in laboratories under the supervision of senior engineers in this program or other relevant professional engineers. The tools and equipment to be used include: 1. Freezing microtome; 2. Blood analyzer; 3. Optical microscope; 4. Inverted microscope; 5. CO_2 incubator; 6. Fully automated autoclave; 7. Sample homogenizer grinder; 8. Gel imager; 9. Advanced microscope; 10. Immunochromatographic fast detector; 11. Fully automated enzyme immunoassay system; 12. Fully automated capillary electrophoresis analyzer; 13. Clean bench; 14. Temperature-controlled centrifuge; 15. Nucleic acid/protein concentration determination instrument; 16. PCR instrument; 17. Fluorescent quantitative PCR instrument; 18. Ultra-low temperature freezer; 19. Ventilation hood; 20. Electrophoresis apparatus; 21. Ultrapure water meter; 22. Water-proof constant temperature incubator; 23. Image acquisition system; 24. CO_2 cell incubator; 25. Constant temperature biochemical incubator; 26. Electronic balance;		

	27. Magnetic stirrer; 28. Gradient PCR instrument; 29. pH meter; 30. Inspection and testing rules and regulations; 31. Conference room (equipped with conference tables and chairs, projectors, etc.).

EVIDENCE REQUIREMENT	
PRACTICAL PERFORMANCE	**UNDERPINNING KNOWLEDGE**
The person performing this task must be able to do the following: 1. Observe the health and safety prevention measures; 2. Clearly establish inspection and testing procedures; 3. Determine the scope, classification, and subjects of inspection and quarantine; 4. Develop quarantine procedures; 5. Handle quarantined animals and animal products; 6. Perform clinical examinations of quarantined animals; 7. Implement origin quarantine; 8. Implement slaughter quarantine; 9. Carry out quarantine supervision; 10. Inspect and quarantine infectious diseases; 11. Inspect and quarantine parasitic diseases; 12. Analyze and detect testing data; 13. Train on inspection and testing techniques.	**Detailed knowledge about:** **1.0 Methods** The person performing this task must be able to explain how to: 1.1 Carry out training on quarantine inspections in animal production and distribution; 1.2 Carry out training on animal epidemic disease quarantine. **2.0 Principles** The person performing this task must be able to explain the following principles: 2.1 Basic principles of quarantine; 2.2 Principles of handling animals and animal products; 2.3 Principles of biosafety management. **3.0 Theories** The person performing this task must be able to explain the following: 3.1 Importance of animal quarantine; 3.2 Methods of clinical quarantine; 3.3 Importance of training on inspection and testing techniques; 3.4 Quarantine-related laws and regulations. **4.0 Essential Skills** 4.1 Communication skills; 4.2 Management skills; 4.3 Customer service skills;

	4.4 Teamwork skills; 4.5 Report writing skills; 4.6 Information technology application skills; 4.7 Data analysis skills.
DESCRIPTION OF THE END PRODUCT / SERVICE	The training on inspection and testing techniques is conducted in accordance with technical requirements and experimental standard operating procedures.
CIRCUMSTANTIAL KNOWLEDGE	**Detailed knowledge about:** 1. Animal anatomical physiology; 2. Waste disposal methods; 3. Training methods of inspection and testing; 4. Animal microbiology; 5. Occupational health and safety.

OCCUPATION	LIVESTOCK VETERINARY ENGINEER	**OCCUPATION CODE**	
DUTY TITLE	SEROLOGICAL TEST	**DUTY NO.**	807
TASK TITLE	PLATE AGGREGATION TEST	**TASK NO.**	8071
PERFORMANCE CRITERIA	The person performing this task must be able to conduct the plate aggregation test in accordance with the requirements of the plate aggregation test and standard operating procedures for serological experiments.		
RANGE STATEMENT	The task can be performed in laboratories under the supervision of senior engineers in this program or other relevant professional engineers. The materials and reagents to be used include: 1. Glass plate, glass slide, graduated pipette, and micropipette; 2. Brucella plate aggregation antigen, Brucella Rose-Benga plate aggregation antigen, Brucella standard positive serum, Brucella standard negative serum, and serum sample (cattle, sheep, or pigs); 3. Chicken pullorum plate aggregation antigen, chicken pullorum positive serum, chicken pullorum negative serum, and serum sample from tested chickens.		

EVIDENCE REQUIREMENT

PRACTICAL PERFORMANCE	**UNDERPINNING KNOWLEDGE**
The person performing this task must be able to do the following: 1. Obtain the necessary resources for the task; 2. Receive and handle the relevant samples; 3. Perform the plate aggregation test; 4. Prepare the materials and reagents before the test; 5. Handle the test procedure, and address any issues that may arise; 6. Determine the test results; 7. Organize the experimental materials and reagents after the test; 8. Dispose of the samples after the test; 9. Disinfect the laboratory.	**Detailed knowledge about:** **1.0 Methods** The person performing this task must be able to explain how to: 1.1 Receive and handle the samples; 1.2 Prepare the experimental materials and reagents; 1.3 Address any issues encountered during the test; 1.4 Determine the test results; 1.5 Organize the experimental materials and reagents; 1.6 Choose a disinfection method. **2.0 Principles** The person performing this task must be able to explain the following principles: 2.1 Principles of receiving and handling samples; 2.2 Principles of judging test results;

	2.3 Principles of disposal of test samples; 2.4 Principles of laboratory disinfection. **3.0 Theories** The person performing this task must be able to explain the following: 3.1 Methods of plate aggregation test. **4.0 Essential Skills** 4.1 Management skills; 4.2 Data collection skills; 4.3 Teamwork skills; 4.4 Report writing skills; 4.5 Data analysis skills.
DESCRIPTION OF THE END PRODUCT / SERVICE	The plate aggregation test is completed in accordance with technical requirements and relevant experimental procedures.
CIRCUMSTANTIAL KNOWLEDGE	**Detailed knowledge about:** 1. Laboratory biosafety management; 2. Laboratory waste disposal methods; 3. Laboratory electricity safety; 4. Occupational health and safety.

OCCUPATION	LIVESTOCK VETERINARY ENGINEER	**OCCUPATION CODE**	
DUTY TITLE	SEROLOGICAL TEST	**DUTY NO.**	807
TASK TITLE	RING PRECIPITATION TEST	**TASK NO.**	8072
PERFORMANCE CRITERIA	The person performing this task must be able to conduct the ring precipitation test in accordance with the requirements of the ring precipitation test and standard operating procedures for serological experiments.		
RANGE STATEMENT	The task can be performed in laboratories under the supervision of senior engineers in this program or other relevant professional engineers. The materials and reagents to be used include: 1. Test tube, test tube rack, beaker, alcohol burner, scissors, capillary pipette, micropipette, and autoclave; 2. Test antigen, precipitin serum, precipitin standard antigen, saline, and 0.5% phenol saline.		

EVIDENCE REQUIREMENT

PRACTICAL PERFORMANCE	**UNDERPINNING KNOWLEDGE**
The person performing this task must be able to do the following: 1. Obtain the necessary resources for the task; 2. Receive and handle the relevant samples; 3. Perform the ring precipitation test; 4. Prepare the materials and reagents before the test; 5. Handle the test procedure, and address any issues that may arise; 6. Determine the test results; 7. Organize the experimental materials and reagents after the test; 8. Dispose of the samples after the test; 9. Disinfect the laboratory.	**Detailed knowledge about:** **1.0 Methods** The person performing this task must be able to explain how to: 1.1 Receive and handle the samples; 1.2 Prepare the experimental materials and reagents; 1.3 Address any issues encountered during the test; 1.4 Determine the test results; 1.5 Organize the experimental materials and reagents; 1.6 Choose a disinfection method. **2.0 Principles** The person performing this task must be able to explain the following principles: 2.1 Principles of receiving and handling samples; 2.2 Principles of judging test results; 2.3 Principles of disposal of test samples; 2.4 Principles of laboratory disinfection.

	3.0 Theories The person performing this task must be able to explain the following: 3.1 Methods of ring precipitation test. **4.0 Essential Skills** 4.1 Management skills; 4.2 Data collection skills; 4.3 Teamwork skills; 4.4 Report writing skills; 4.5 Information technology application skills; 4.6 Data analysis skills.
DESCRIPTION OF THE END PRODUCT / SERVICE	The ring precipitation test is completed in accordance with technical requirements and relevant experimental procedures.
CIRCUMSTANTIAL KNOWLEDGE	**Detailed knowledge about:** 1. Laboratory biosafety management; 2. Laboratory waste disposal methods; 3. Laboratory electricity safety; 4. Occupational health and safety.

OCCUPATION	LIVESTOCK VETERINARY ENGINEER	**OCCUPATION CODE**	
DUTY TITLE	SEROLOGICAL TEST	**DUTY NO.**	807
TASK TITLE	AGAR DIFFUSION TEST	**TASK NO.**	8073
PERFORMANCE CRITERIA	The person performing this task must be able to conduct the agar diffusion test in accordance with the requirements of the agar diffusion test and standard operating procedures for serological experiments.		
RANGE STATEMENT	The task can be performed in laboratories under the supervision of senior engineers in this program or other relevant professional engineers. The materials and reagents to be used include: 1. Plate, glass slide, beaker, alcohol burner, perforator, needle, capillary pipette, and micropipette; 2. Test serum, positive serum, agar diffusion standard antigen, agar powder, saline, and 8.5% NaCl solution.		

EVIDENCE REQUIREMENT

PRACTICAL PERFORMANCE	**UNDERPINNING KNOWLEDGE**
The person performing this task must be able to do the following: 1. Obtain the necessary resources for the task; 2. Receive and handle the relevant samples; 3. Perform the agar diffusion test; 4. Prepare the materials and reagents before the test; 5. Handle the test procedure, and address any issues that may arise; 6. Determine the test results; 7. Organize the experimental materials and reagents after the test; 8. Dispose of the samples after the test; 9. Disinfect the laboratory.	**Detailed knowledge about:** **1.0 Methods** The person performing this task must be able to explain how to: 1.1 Receive and handle the samples; 1.2 Prepare the experimental materials and reagents; 1.3 Address any issues encountered during the test; 1.4 Determine the test results; 1.5 Organize the experimental materials and reagents; 1.6 Choose a disinfection method. **2.0 Principles** The person performing this task must be able to explain the following principles: 2.1 Principles of receiving and handling samples; 2.2 Principles of judging test results; 2.3 Principles of disposal of test samples; 2.4 Principles of laboratory disinfection.

	3.0 Theories The person performing this task must be able to explain the following: 3.1 Methods of agar diffusion test; 3.2 Operational steps and precautions for agar diffusion test; 3.3 Determination of results and criteria for agar diffusion test. **4.0 Essential Skills** 4.1 Management skills; 4.2 Data collection skills; 4.3 Report writing skills; 4.4 Data analysis skills.
DESCRIPTION OF THE END PRODUCT / SERVICE	The agar diffusion test is completed in accordance with technical requirements and relevant experimental procedures.
CIRCUMSTANTIAL KNOWLEDGE	**Detailed knowledge about:** 1. Laboratory biosafety management; 2. Laboratory waste disposal methods; 3. Laboratory electricity safety; 4. Occupational health and safety.

OCCUPATION	LIVESTOCK VETERINARY ENGINEER	**OCCUPATION CODE**	
DUTY TITLE	SEROLOGICAL TEST	**DUTY NO.**	807
TASK TITLE	INDIRECT AGGLUTINATION TEST	**TASK NO.**	8074
PERFORMANCE CRITERIA	The person performing this task must be able to conduct the indirect agglutination test in accordance with the requirements of the indirect agglutination test and standard operating procedures for serological experiments.		
RANGE STATEMENT	The task can be performed in laboratories under the supervision of senior engineers in this program or other relevant professional engineers. The materials and reagents to be used include: 1. 96-well V-shaped coagulation plate, micropipette, and micro-oscillator; 2. Test serum, artificial particle antigen (sensitizing particles), standard positive serum, standard negative serum, saline, and diluent.		

EVIDENCE REQUIREMENT

PRACTICAL PERFORMANCE	**UNDERPINNING KNOWLEDGE**
The person performing this task must be able to do the following: 1. Obtain the necessary resources for the task; 2. Receive and handle the relevant samples; 3. Complete the operation steps of the indirect agglutination test; 4. Prepare the materials and reagents before the test; 5. Handle the test procedure, and address any issues that may arise; 6. Determine the test results; 7. Organize the experimental materials and reagents after the test; 8. Dispose of the samples after the test; 9. Disinfect the laboratory.	**Detailed knowledge about:** **1.0 Methods** The person performing this task must be able to explain how to: 1.1 Receive and handle the samples; 1.2 Prepare the experimental materials and reagents; 1.3 Address any issues encountered during the test; 1.4 Determine the test results; 1.5 Organize the experimental materials and reagents; 1.6 Choose a disinfection method. **2.0 Principles** The person performing this task must be able to explain the following principles: 2.1 Principles of receiving and handling samples; 2.2 Principles of judging test results; 2.3 Principles of disposal of test samples; 2.4 Principles of laboratory disinfection.

	3.0 Theories The person performing this task must be able to explain the following: 3.1 Methods of indirect agglutination test; 3.2 Criteria for judging the results of the indirect agglutination test; 3.3 Knowledge of sample reception, handling, and storage. **4.0 Essential Skills** 4.1 Management skills; 4.2 Data collection skills; 4.3 Teamwork skills; 4.4 Report writing skills; 4.5 Data analysis skills.
DESCRIPTION OF THE END PRODUCT / SERVICE	The indirect agglutination test is completed in accordance with technical requirements and relevant experimental procedures.
CIRCUMSTANTIAL KNOWLEDGE	**Detailed knowledge about:** 1. Laboratory biosafety management; 2. Laboratory waste disposal methods; 3. Laboratory electricity safety; 4. Occupational health and safety.

OCCUPATION	LIVESTOCK VETERINARY ENGINEER	**OCCUPATION CODE**	
DUTY TITLE	SEROLOGICAL TEST	**DUTY NO.**	807
TASK TITLE	HEMAGGLUTINATION/HEMAGGLUTINATION INHIBITION TEST	**TASK NO.**	8075
PERFORMANCE CRITERIA	The person performing this task must be able to complete the hemagglutination / hemagglutination inhibition tests in accordance with the requirements of the hemagglutination / hemagglutination inhibition test and standard operating procedures for serological experiments.		
RANGE STATEMENT	The task can be performed in laboratories under the supervision of senior engineers in this program or other relevant professional engineers. The materials and reagents to be used include: 1. Centrifuge, centrifuge tube, syringe, 96-well V-shaped coagulation plate, micropipette, and micro-oscillator; 2. Test serum, 1% red blood cell suspension, standard positive serum, standard negative serum, saline, and diluent.		

EVIDENCE REQUIREMENT

PRACTICAL PERFORMANCE	**UNDERPINNING KNOWLEDGE**
The person performing this task must be able to do the following: 1. Obtain the necessary resources for the task; 2. Receive and handle the relevant samples; 3. Perform the hemagglutination / hemagglutination inhibition test; 4. Prepare the materials and reagents before the test; 5. Handle the test procedure, and address any issues that may arise; 6. Determine the test results; 7. Organize the experimental materials and reagents after the test; 8. Dispose of the samples after the test; 9. Disinfect the laboratory.	**Detailed knowledge about:** **1.0 Methods** The person performing this task must be able to explain how to: 1.1 Receive and handle the samples; 1.2 Prepare the experimental materials and reagents; 1.3 Address any issues encountered during the test; 1.4 Determine the test results; 1.5 Organize the experimental materials and reagents; 1.6 Choose a disinfection method. **2.0 Principles** The person performing this task must be able to explain the following principles: 2.1 Principles of receiving and handling samples; 2.2 Principles of judging test results; 2.3 Principles of disposal of test samples;

	2.4 Principles of laboratory disinfection. **3.0 Theories** The person performing this task must be able to explain the following: 3.1 Methods of hemagglutination/hemagglutination inhibition test; 3.2 Criteria for judging the results of the hemagglutination/hemagglutination inhibition test; 3.3 Knowledge of sample reception, handling, and storage. **4.0 Essential Skills** 4.1 Communication skills; 4.2 Management skills; 4.3 Data collection skills; 4.4 Teamwork skills; 4.5 Report writing skills; 4.6 Data analysis skills.
DESCRIPTION OF THE END PRODUCT / SERVICE	The hemagglutination / hemagglutination inhibition test is completed in accordance with technical requirements and relevant experimental procedures.
CIRCUMSTANTIAL KNOWLEDGE	**Detailed knowledge about:** 1. Laboratory biosafety management; 2. Laboratory waste disposal methods; 3. Laboratory electricity safety; 4. Occupational health and safety.

OCCUPATION	LIVESTOCK VETERINARY ENGINEER	**OCCUPATION CODE**	
DUTY TITLE	SEROLOGICAL TEST	**DUTY NO.**	807
TASK TITLE	COMPLEMENT FIXATION TEST	**TASK NO.**	8076
PERFORMANCE CRITERIA	The person performing this task must be able to conduct the complement fixation test in accordance with the requirements of the complement fixation test and standard operating procedures for serological experiments.		
RANGE STATEMENT	The task can be performed in laboratories under the supervision of senior engineers in this program or other relevant professional engineers. The materials and reagents to be used include: 1. Test tube, test tube rack, and micropipette; 2. Test serum, known antigen, complement, sensitized red blood cells, saline, and diluent.		

EVIDENCE REQUIREMENT

PRACTICAL PERFORMANCE	**UNDERPINNING KNOWLEDGE**
The person performing this task must be able to do the following: 1. Obtain the necessary resources for the task; 2. Receive and handle the relevant samples; 3. Complete the operation steps of the complement fixation test; 4. Prepare the materials and reagents before the test; 5. Handle the test procedure, and address any issues that may arise; 6. Determine the test results; 7. Organize the experimental materials and reagents after the test; 8. Dispose of the samples after the test; 9. Disinfect the laboratory.	**Detailed knowledge about:** **1.0 Methods** The person performing this task must be able to explain how to: 1.1 Receive and handle the samples; 1.2 Prepare the experimental materials and reagents; 1.3 Address any issues encountered during the test; 1.4 Determine the test results; 1.5 Organize the experimental materials and reagents; 1.6 Choose a disinfection method. **2.0 Principles** The person performing this task must be able to explain the following principles: 2.1 Principles of receiving and handling samples; 2.2 Principles of judging test results; 2.3 Principles of disposal of test samples; 2.4 Principles of laboratory disinfection.

	3.0 Theories The person performing this task must be able to explain the following: 3.1 Methods of complement fixation test; 3.2 Knowledge of sample reception, handling, and storage; 3.3 Operation steps of the complement fixation test; 3.4 Criteria for judging the results of the complement fixation test. **4.0 Essential Skills** 4.1 Management skills; 4.2 Data collection skills; 4.3 Report writing skills; 4.4 Data analysis skills.
DESCRIPTION OF THE END PRODUCT / SERVICE	The complement fixation test is completed in accordance with technical requirements and relevant experimental procedures.
CIRCUMSTANTIAL KNOWLEDGE	**Detailed knowledge about:** 1. Laboratory biosafety management; 2. Laboratory waste disposal methods; 3. Laboratory electricity safety; 4. Occupational health and safety.

OCCUPATION	LIVESTOCK VETERINARY ENGINEER	**OCCUPATION CODE**	
DUTY TITLE	SEROLOGICAL TEST	**DUTY NO.**	807
TASK TITLE	ENZYME-LINKED IMMUNOSORBENT ASSAY	**TASK NO.**	8077
PERFORMANCE CRITERIA	The person performing this task must be able to conduct the enzyme-linked immunosorbent assay in accordance with the requirements of the enzyme-linked immunosorbent assay and standard operating procedures for serological experiments.		
RANGE STATEMENT	The task can be performed in laboratories under the supervision of senior engineers in this program or other relevant professional engineers. The materials and reagents to be used include: 1. ELISA plate, antigen-antibody reaction plate, ELIASA, micropipette, measuring cylinder, beaker, and constant temperature incubator; 2. Test serum, capture antibody, enzyme conjugate, viral antigen, substrate solution, stop solution, buffer solution, positive control serum, negative control serum, and ultrapure water.		

EVIDENCE REQUIREMENT

PRACTICAL PERFORMANCE	**UNDERPINNING KNOWLEDGE**
The person performing this task must be able to do the following: 1. Obtain the necessary resources for the task; 2. Receive and handle the relevant samples; 3. Complete the operation steps of the enzyme-linked immunosorbent assay; 4. Prepare the materials and reagents before the test; 5. Handle the test procedure, and address any issues that may arise; 6. Determine the test results; 7. Organize the experimental materials and reagents after the test; 8. Dispose of the samples after the test; 9. Disinfect the laboratory.	**Detailed knowledge about:** **1.0 Methods** The person performing this task must be able to explain how to: 1.1 Receive and handle the samples; 1.2 Prepare the experimental materials and reagents; 1.3 Address any issues encountered during the test; 1.4 Determine the test results; 1.5 Organize the experimental materials and reagents; 1.6 Choose a disinfection method. **2.0 Principles** The person performing this task must be able to explain the following principles: 2.1 Principles of receiving and handling samples; 2.2 Principles of judging test results; 2.3 Principles of disposal of test samples;

	2.4 Principles of laboratory disinfection. **3.0 Theories** The person performing this task must be able to explain the following: 3.1 Methods of enzyme-linked immunosorbent assay; 3.2 Criteria for judging the results of the enzyme-linked immunosorbent assay; 3.3 Knowledge of sample reception, handling, and storage. **4.0 Essential Skills** 4.1 Communication skills; 4.2 Management skills; 4.3 Data collection skills; 4.4 Customer service skills; 4.5 Teamwork skills; 4.6 Report writing skills; 4.7 Information technology application skills; 4.8 Data analysis skills.
DESCRIPTION OF THE END PRODUCT / SERVICE	The enzyme-linked immunosorbent assay is completed in accordance with technical requirements and relevant experimental procedures.
CIRCUMSTANTIAL KNOWLEDGE	**Detailed knowledge about:** 1. Laboratory biosafety management; 2. Laboratory waste disposal methods; 3. Laboratory electricity safety; 4. Occupational health and safety.

OCCUPATION	LIVESTOCK VETERINARY ENGINEER	**OCCUPATION CODE**	
DUTY TITLE	SEROLOGICAL TEST	**DUTY NO.**	807
TASK TITLE	FLUORESCENT ANTIBODY TEST	**TASK NO.**	8078
PERFORMANCE CRITERIA	The person performing this task must be able to conduct the fluorescent antibody test in accordance with the requirements of the fluorescent antibody test and standard operating procedures for serological experiments.		
RANGE STATEMENT	The task can be performed in laboratories under the supervision of senior engineers in this program or other relevant professional engineers. The materials and reagents to be used include: 1. Glass slide, and fluorescence microscope; 2. Test antigen, labeled specific fluorescent antibody, and 0.01mol/L pH7.4 PBS buffer solution.		

EVIDENCE REQUIREMENT

PRACTICAL PERFORMANCE	**UNDERPINNING KNOWLEDGE**
The person performing this task must be able to do the following: 1. Obtain the necessary resources for the task; 2. Receive and handle the relevant samples; 3. Prepare the materials and reagents before the test; 4. Perform the fluorescent antibody test; 5. Handle the test procedure, and address any issues that may arise; 6. Determine the test results; 7. Organize the experimental materials and reagents after the test; 8. Dispose of the samples after the test; 9. Disinfect the laboratory.	**Detailed knowledge about:** **1.0 Methods** The person performing this task must be able to explain how to: 1.1 Receive and handle the samples; 1.2 Prepare the experimental materials and reagents; 1.3 Address any issues encountered during the test; 1.4 Determine the test results; 1.5 Organize the experimental materials and reagents; 1.6 Choose a disinfection method. **2.0 Principles** The person performing this task must be able to explain the following principles: 2.1 Principles of receiving and handling samples; 2.2 Principles of judging test results; 2.3 Principles of disposal of test samples; 2.4 Principles of laboratory disinfection. **3.0 Theories**

	The person performing this task must be able to explain the following: 3.1 Methods of fluorescent antibody test; 3.2 Operation steps of fluorescent antibody test; 3.3 Criteria for judging the results of the fluorescent antibody test; 3.4 Knowledge of sample reception, handling, and storage. **4.0 Essential Skills** 4.1 Communication skills; 4.2 Data collection skills; 4.3 Customer service skills; 4.4 Report writing skills; 4.5 Data analysis skills.
DESCRIPTION OF THE END PRODUCT / SERVICE	The fluorescent antibody test is completed in accordance with technical requirements and relevant experimental procedures.
CIRCUMSTANTIAL KNOWLEDGE	**Detailed knowledge about:** 1. Laboratory biosafety management; 2. Laboratory waste disposal methods; 3. Laboratory electricity safety; 4. Occupational health and safety.

OCCUPATION	LIVESTOCK VETERINARY ENGINEER	**OCCUPATION CODE**	
DUTY TITLE	PREPARATION OF BREED IMPROVEMENT AND BREEDING PLANS	**DUTY NO.**	808
TASK TITLE	BREED IMPROVEMENT PLAN	**TASK NO.**	8081
PERFORMANCE CRITERIA	The person performing this task must be able to develop a breed improvement plan based on breeding objectives and local genetic resources.		
RANGE STATEMENT	The task can be performed in farms under the supervision of senior engineers in this program or other relevant professional engineers. The tools and equipment to be used include: 1. Computer, breeding software, measuring rod, weighing scale, DHI equipment, etc.		

EVIDENCE REQUIREMENT

PRACTICAL PERFORMANCE	**UNDERPINNING KNOWLEDGE**
The person performing this task must be able to do the following: 1. Comply with local livestock laws and regulations; 2. Obtain the necessary resources for the task; 3. Analyze the characteristics of local breed resources; 4. Determine the goals for improving yield, disease resistance, stress tolerance, and other traits in the improved breeds; 5. Select appropriate breeding materials; 6. Implement an improvement plan that includes breeding, cultivation technique, and farming technology improvement; 7. Evaluate the performance of the improved breeds; **8.** Implement post-improvement breed management.	**Detailed knowledge about:** **1.0 Methods** The person performing this task must be able to explain how to: 1.1 Choose suitable breeds; 1.2 Develop a breed improvement plan for farms. **2.0 Principles** The person performing this task must be able to explain the following principles: 2.1 Basic laws of heredity; 2.2 Relevant laws and regulations on animal breeding; 2.3 Importance of breed improvement. **3.0 Theories** The person performing this task must be able to explain the following: 3.1 Methods of pedigree compilation; 3.2 Methods of animal breeding; 3.3 Methods of selective breeding and pairing; 3.4 Breeding and crossbreeding improvement methods for the breed; 3.5 Methods for determining performance.

	4.0 Essential Skills 4.1 Communication skills; 4.2 Organizational and management skills; 4.3 Skills of processing and analyzing breeding data; 4.4 Information technology application skills; 4.5 Report writing skills.
DESCRIPTION OF THE END PRODUCT / SERVICE	A locally adapted breed improvement plan is developed based on breeding objectives and local genetic resources.
CIRCUMSTANTIAL KNOWLEDGE	**Detailed knowledge about:** 1. Application of biotechnology in breed improvement; 2. Biosafety management; 3. Waste disposal methods; 4. Occupational health and safety; 5. Ethical and moral norms.

OCCUPATION	LIVESTOCK VETERINARY ENGINEER	**OCCUPATION CODE**	
DUTY TITLE	PREPARATION OF BREED IMPROVEMENT AND BREEDING PLANS	**DUTY NO.**	808
TASK TITLE	BREEDING PLAN	**TASK NO.**	8082
PERFORMANCE CRITERIA	The person performing this task must be able to develop breeding plans for the farm based on the requirements of animal breeding techniques and relevant standard operating procedures for animal breed improvement and breeding.		
RANGE STATEMENT	The task can be performed in farms under the supervision of senior engineers in this program or other relevant professional engineers. The tools and equipment to be used include: 1. Computer, printer, paper, etc.		

EVIDENCE REQUIREMENT

PRACTICAL PERFORMANCE	**UNDERPINNING KNOWLEDGE**
The person performing this task must be able to do the following: 1. Analyze the scale, management objectives, financial strength, and technical capabilities of the farm; 2. Develop a breeding plan that includes scale, direction, quality, feasibility, etc.; 3. Implement the breeding plan; 4. Evaluate the breeding results; 5. Eliminate animals that have no breeding value.	**Detailed knowledge about:** **1.0 Methods** The person performing this task must be able to explain how to: 1.1 Develop breeding plans for the farm. **2.0 Principles** The person performing this task must be able to explain the following principles: 2.1 Animal reproductive physiology; 2.2 Reproductive hormones and their application principles; 2.3 Laws and regulations related to farms; 2.4 Selection and elimination criteria of breeding animals. **3.0 Theories** The person performing this task must be able to explain the following: 3.1 Importance of developing breeding plans; 3.2 Breeding techniques such as synchronized estrus, artificial insemination, and embryo transfer; 3.3 Knowledge of assessing the reproductive

	performance of breeding animals; 3.4 Steps involved in artificial insemination; 3.5 Steps involved in pregnancy diagnosis. **4.0 Essential Skills** 4.1 Communication and coordination skills; 4.2 Organization and implementation skills; 4.3 Data processing and analysis skills.
DESCRIPTION OF THE END PRODUCT / SERVICE	The development and implementation of the breeding plan for the farm are completed based on the operational conditions and market demands of the farm.
CIRCUMSTANTIAL KNOWLEDGE	**Detailed knowledge about:** 1. Assistance in parturition of female livestock and care of offspring; 2. Biosafety management; 3. Waste disposal methods; 4. Occupational health and safety; 5. Ethical and moral norms; 6. Treatment of breeding disorders.

OCCUPATION	LIVESTOCK VETERINARY ENGINEER	**OCCUPATION CODE**	
DUTY TITLE	OPERATION AND MANAGEMENT OF FARMS	**DUTY NO.**	809
TASK TITLE	PRODUCTION MANAGEMENT	**TASK NO.**	8091
PERFORMANCE CRITERIA	The person performing this task must be able to organize the production front-line staff to complete the production management task of the farm based on the management objectives of the farm and the existing production conditions and rules and regulations of the enterprise.		
RANGE STATEMENT	The task can be performed in various production lines and workshops under the supervision of senior engineers in this program or other relevant professional engineers. The tools and equipment to be used include: 1. Office (equipped with office desks and chairs, document cabinets, computers, printers, etc.); 2. Conference room (equipped with conference tables and chairs, projectors, etc.); 3. Signboard (equipped with large display screens where conditions permit); 4. Farm production management software (including mobile APP); 5. Corporate rules and regulations, and management manuals.		

EVIDENCE REQUIREMENT

PRACTICAL PERFORMANCE	**UNDERPINNING KNOWLEDGE**
The person performing this task must be able to do the following: 1. Manage work safety; 2. Develop production plans; 3. Design and optimize production processes; 4. Decompose and allocate production tasks; 5. Establish production positions, and define job responsibilities; 6. Establish weekly work procedures and daily work routines; 7. Collect and analyze production data; 8. Organize and chair weekly meetings; 9. Seek approval and report on work.	**Detailed knowledge about:** **1.0 Methods** The person performing this task must be able to explain how to: 1.1 Analyze and track production data on the farm; 1.2 Develop production plans for the farm. **2.0 Principles** The person performing this task must be able to explain the following principles: 2.1 Application of the principle of performance management that integrates responsibility, authority, and rights; 2.2 Constant attention to the principles of work safety on the farm. **3.0 Theories**

	The person performing this task must be able to explain the following: 3.1 Importance of system theory, control theory, and information theory in production management; 3.2 Methods of production management on the farm. **4.0 Essential Skills** 4.1 Communication skills; 4.2 Management skills; 4.3 Data collection skills; 4.4 Customer service skills; 4.5 Teamwork skills; 4.6 Report writing skills; 4.7 Information technology application skills; 4.8 Data analysis skills.
DESCRIPTION OF THE END PRODUCT / SERVICE	The completion rate of various production tasks, the number of days without production incidents, and the employee satisfaction level on the farm are monitored.
CIRCUMSTANTIAL KNOWLEDGE	**Detailed knowledge about:** 1. Knowledge of farm safety; 2. Knowledge of farm production; 3. Farm waste disposal; 4. Occupational health and safety.

OCCUPATION	LIVESTOCK VETERINARY ENGINEER	**OCCUPATION CODE**	
DUTY TITLE	OPERATION AND MANAGEMENT OF FARMS	**DUTY NO.**	809
TASK TITLE	TALENT MANAGEMENT	**TASK NO.**	8092
PERFORMANCE CRITERIA	The person performing this task must be able to complete employee recruitment, training, and performance appraisal based on the management objectives of the farm, the existing personnel structure and quantity, and the regulations stipulated by labor laws.		
RANGE STATEMENT	The task can be performed in various production lines, production workshops, training classrooms, vocational schools, and talent markets under the supervision of senior engineers in this program or other relevant professional engineers. The tools and equipment to be used include: 1. Office (equipped with office desks and chairs, document cabinets, computers, printers, etc.); 2. Conference room (equipped with conference tables and chairs, projectors, etc.); 3. ERP enterprise management information system (including mobile APP); 4. Corporate rules and regulations, and management manuals.		

EVIDENCE REQUIREMENT	
PRACTICAL PERFORMANCE	**UNDERPINNING KNOWLEDGE**
The person performing this task must be able to do the following: 1. Analyze and describe the positions on the farm; 2. Create company profiles and recruitment notices; 3. Recruit graduates from schools and individuals from the community; 4. Organize training and assessments for new employees; 5. Organize training and assessments for existing employees; 6. Organize promotion training and promotion assessments; 7. Organize and implement team-building exercises;	**Detailed knowledge about:** **1.0 Methods** The person performing this task must be able to explain how to: 1.1 Recruit employees; 1.2 Train employees; 1.3 Assess employees. **2.0 Principles** The person performing this task must be able to explain the following principles: 2.1 Principle of matching personnel to positions; 2.2 Principle of fair remuneration based on work; 2.3. Principle of performance rewards.

8. Conduct job assessments, and provide job allowances; 9. Conduct performance appraisals, and provide performance rewards.	**3.0 Theories** The person performing this task must be able to explain the following: 3.1 Labor laws and relevant labor protection regulations; 3.2 Labor management and wage compensation system on the farm; 3.3 Development prospects of the farm and employee career growth path. **4.0 Essential Skills** 4.1 Communication skills; 4.2 Management skills; 4.3 Data collection skills; 4.4 Customer service skills; 4.5 Teamwork skills; 4.6 Report writing skills; 4.7 Information technology application skills; 4.8 Data analysis skills.
DESCRIPTION OF THE END PRODUCT / SERVICE	The staffing of personnel in various positions on the farm is ensured, resulting in high labor productivity and a reduction in labor disputes.
CIRCUMSTANTIAL KNOWLEDGE	**Detailed knowledge about:** 1. Knowledge of relevant labor laws and labor protection regulations; 2. Analysis and description of job requirements for various positions on the farm; 3. Talent recruitment knowledge; 4. Human resource development and training; 5. Job assessment and salary allowance distribution; 6. Knowledge of performance appraisal.

OCCUPATION	LIVESTOCK VETERINARY ENGINEER	**OCCUPATION CODE**	
DUTY TITLE	OPERATION AND MANAGEMENT OF FARMS	**DUTY NO.**	809
TASK TITLE	FUND MANAGEMENT	**TASK NO.**	8093
PERFORMANCE CRITERIA	The person performing this task must be able to complete fundraising, project investment planning, cost accounting, material procurement, and working capital management based on the management objectives of the farm, the current financial situation, and financial management systems in place.		
RANGE STATEMENT	The task can be performed in the finance department and logistics support department under the supervision of senior engineers in this program or other relevant professional engineers. The tools and equipment to be used include: 1. Office (equipped with office desks and chairs, document cabinets, computers, printers, safes, etc.); 2. ERP enterprise management information system (including mobile APP); 3. Corporate rules and regulations, and management manuals.		

EVIDENCE REQUIREMENT	
PRACTICAL PERFORMANCE	**UNDERPINNING KNOWLEDGE**
The person performing this task must be able to do the following: 1. Analyze financial statements; 2. Raise funds (through methods such as issuing shares, issuing bonds, bank loans, etc.); 3. Develop project investment plans; 4. Calculate product costs and profits; 5. Manage material procurement, storage, and issuance; 6. Manage working capital; 7. Prepare financial budgets; 8. Prepare financial statements.	**Detailed knowledge about:** **1.0 Methods** The person performing this task must be able to explain how to: 1.1 Calculate costs in the livestock farming enterprise; 1.2 Manage the finances of the livestock farming enterprise; 1.3 Manage the physical assets of the livestock farming enterprise. **2.0 Principles** The person performing this task must be able to explain the following principles: 2.1 Principle of clear property rights; 2.2 Principle of prudent management; 2.3 Principle of cost reduction and efficiency enhancement.

	3.0 Theories The person performing this task must be able to explain the following: 3.1 Generally Accepted Accounting Principles (GAAP) for joint-stock companies; 3.2 Methods for determining and calculating the cost composition of livestock and poultry products; 3.3 Importance of efficient capital management and risk control; 3.4 Knowledge of corporate financial accounting; 3.5 Knowledge of corporate financial management; 3.6 General knowledge of finance, taxation, futures, and other business practices; 3.7 Knowledge of farm planning and investment budgeting; 3.8 Knowledge of cost accounting for livestock and poultry products. **4.0 Essential Skills** 4.1 Communication skills; 4.2 Management skills; 4.3 Data collection skills; 4.4 Customer service skills; 4.5 Teamwork skills; 4.6 Report writing skills; 4.7 Information technology application skills; 4.8 Data analysis skills.
DESCRIPTION OF THE END PRODUCT / SERVICE	The financial and material accounts of the farm are well-maintained, thus ensuring high returns on investment for projects, secure debt repayment, and safe accounts receivable.
CIRCUMSTANTIAL KNOWLEDGE	**Detailed knowledge about:** 1. Knowledge of farm material procurement and warehouse management; 2. Waste disposal methods; 3. Occupational health and safety; 4. Knowledge of accounting-related laws.

OCCUPATION	LIVESTOCK VETERINARY ENGINEER	**OCCUPATION CODE**	
DUTY TITLE	OPERATION AND MANAGEMENT OF FARMS	**DUTY NO.**	809
TASK TITLE	MARKETING MANAGEMENT	**TASK NO.**	8094
PERFORMANCE CRITERIA	The person performing this task must be able to conduct market research, analyze market trends, develop marketing strategies, and implement network marketing based on the management objectives of the farm and the sales situation of livestock and poultry products.		
RANGE STATEMENT	The task can be performed in the product sales (business) department under the supervision of senior engineers in this program or other relevant professional engineers. The tools and equipment to be used include: 1. Office (equipped with office desks and chairs, document cabinets, computers, printers, safes, etc.); 2. ERP enterprise management information system (including mobile APP); 3. Corporate rules and regulations, and management manuals.		

EVIDENCE REQUIREMENT	
PRACTICAL PERFORMANCE	**UNDERPINNING KNOWLEDGE**
The person performing this task must be able to do the following: 1. Conduct market research for livestock and poultry products; 2. Analyze market trends for livestock and poultry products; 3. Manage product quality; 4. Manage the brand; 5. Manage distribution channels; 6. Develop marketing strategies; 7. Implement network marketing; 8. Provide technical services; 9. Manage customer relationships.	**Detailed knowledge about:** **1.0 Methods** The person performing this task must be able to explain how to: 1.1 Conduct online sales; 1.2 Conduct offline sales; 1.3 Handle customer complaints. **2.0 Principles** The person performing this task must be able to explain the following principles: 2.1 Principle of prioritizing reputation and customer satisfaction; 2.2 Principle of product excellence and service efficiency enhancement. **3.0 Theories** The person performing this task must be able to explain the following: 3.1 Importance of marketing positioning;

	3.2 Marketing mix strategies; 3.3 Methods of internet traffic marketing. **4.0 Essential Skills** 4.1 Communication skills; 4.2 Management skills; 4.3 Data collection skills; 4.4 Customer service skills; 4.5 Teamwork skills; 4.6 Report writing skills; 4.7 Information technology application skills; 4.8 Data analysis skills.
DESCRIPTION OF THE END PRODUCT / SERVICE	The products produced by the farm are marketed in the market, with high brand recognition and reputation, as well as high customer satisfaction and loyalty.
CIRCUMSTANTIAL KNOWLEDGE	**Detailed knowledge about:** 1. Occupational health and safety; 2. Marketing-related legal knowledge; 3. Marketing psychology.

OCCUPATION	LIVESTOCK VETERINARY ENGINEER	**OCCUPATION CODE**	
DUTY TITLE	OPERATION AND MANAGEMENT OF FARMS	**DUTY NO.**	809
TASK TITLE	INTELLIGENT CONTROL OF FARMS	**TASK NO.**	8095
PERFORMANCE CRITERIA	The person performing this task must be able to design and operate the intelligent control system in the farm based on the requirements of intelligent control technology and relevant standard operating procedures for intelligent control of the farm.		
RANGE STATEMENT	The task can be performed in farms under the supervision of senior engineers in this program or other relevant professional engineers. The tools and equipment to be used include: 1. Intelligent control system of farms; 2. Farm automation equipment.		

EVIDENCE REQUIREMENT

PRACTICAL PERFORMANCE	**UNDERPINNING KNOWLEDGE**
The person performing this task must be able to do the following: 1. Observe the health and safety prevention measures; 2. Obtain the necessary resources for the task; 3. Analyze the environmental parameters and equipment requirements of the farm; 4. Install automation equipment, sensors, control systems, and other intelligent control systems; 5. Set parameters for the intelligent control system; 6. Handle abnormal situations and alarms on the farm; **7.** Record and analyze data from the intelligent control system on the farm.	**Detailed knowledge about:** **1.0 Methods** The person performing this task must be able to explain how to: 1.1 Set parameters for the intelligent control system on the farm; 1.2 Operate the intelligent control system on the farm. **2.0 Principles** The person performing this task must be able to explain the following principles: 2.1 Environmental parameters on the farm; 2.2 Physiological parameters of livestock and poultry. **3.0 Theories** The person performing this task must be able to explain the following: 3.1 Importance of environmental parameters such as temperature, humidity, light, and water quality in the growth of livestock and poultry;

	3.2 Methods of operating the intelligent control system. **4.0 Essential Skills** 4.1 Communication skills; 4.2 Management skills; 4.3 Data collection skills; 4.4 Teamwork skills; 4.5 Information technology application skills; 4.6 Data analysis skills.
DESCRIPTION OF THE END PRODUCT / SERVICE	The construction and operation of the intelligent system on the farm are completed according to the technical requirements for the construction of the farm.
CIRCUMSTANTIAL KNOWLEDGE	**Detailed knowledge about:** 1. Knowledge of network architecture; 2. Optimal temperature, humidity, light, and other environmental conditions on the farm; 3. Occupational health and safety.

TABLE 1: DACUM CHARTS FOR LIVESTOCK VETERINARY ENGINEER - NTA 8

DUTIES	TASKS	ENABLERS
1.0 Virus culture	1.1 Chicken chorioallantoic membrane and allantoic cavity inoculation. 1.2 Chicken embryo yolk sac and amniotic cavity inoculation. 1.3 Virus harvest.	**General skills and knowledge** · Selection of chicken embryos · Inspection of incubation conditions · Management and operation of chicken embryo incubation · Pre-treatment before inoculation · Safety operation of chicken chorioallantoic membrane inoculation · Safety operation of chicken embryo allantoic cavity inoculation · Safety operation of chicken embryo yolk sac inoculation · Safety operation of chicken embryo amniotic cavity inoculation · Extraction of allantoic fluid · Acquisition of chorioallantoic membrane · Freezing operations after inoculating chicken embryos · Extraction of amniotic fluid · Cleaning of tools, equipment and workplaces · Storage of tools and equipment · Occupational health and safety · Waste disposal methods **Tools and equipment** · Incubator · Flashlight · Egg candler · Illuminating lamp · Marker pen · Lighter · Alcohol burner · Measuring cylinder · Waste bottle · Blue-capped bottle · Egg cup

DUTIES	TASKS	ENABLERS
		· Egg tray · Chicken embryo puncture tool · Syringe · Scissors · Ophthalmic tweezer · Egg tester · 5mL pipettor · 5mL pipette tip **Materials** · Gauze · Cotton swab · Paraffin · Newcastle disease virus · Cultured chicken embryos · 2.5% iodine · 75% alcohol · 2% lysol · 0.1% benzalkonium bromide **Requirements for employees** · Conscientiousness and meticulousness professionalism, honesty and trustworthiness, and reasonable time management
2.0 Surgery	2.1 Animal cesarean section. 2.2 Abdominal visceral surgery. 2.3 Fracture surgery.	**General skills and knowledge** · Communication skills · Management skills · Data collection skills · Customer service skills · Teamwork skills · Equipment application inspection skills · Selection of suitable instruments, equipment, consumables, and drugs based on different surgical positions in different animals · Assessment of the health of animals pending operations

DUTIES	TASKS	ENABLERS
		· Preoperative preparation · Surgical fixation and anesthesia · Surgical site preparation and disinfection · Surgical techniques · Management of surgical emergencies · Postoperative treatment and care for animals; **Tools and equipment** · Monitor, operating table, shadowless lamp, sphygmomanometer, respiratory anesthesia machine, oxygen tank, autoclave, drying oven, veterinary hematology analyzer, animal biochemical analyzer, animal electrocardiograph, X-ray set, and infusion pump · Scalpel handle, surgical blade with compatible handle, straight tweezer (without hook), toothed tweezer (with hook), pointed scissors, blunt scissors, tissue forcep, retractor, straight hemostatic forcep, curved hemostatic forcep, needle holder, towel clamp, sponge forcep, and suture scissors · Plate holder, reduction forcep, bone-cutting forcep, wire cutter, Kocher forcep, medical vice, bone hammer, multifunctional bending device, self-locking hollow drill, Kocher bending forcep, depth gauge, nail holding forcep, nail holder, retractor, skin tissue retractor, small bone saw, Kocher bending device, guide wire introducer, quick-change handle, screwdriver (with screws and handle), periosteal elevator, multi-faced flat file, bidirectional drill guide, orthopedic drill bit, hollow drill bit, oscillating saw, cortical screw, locking screw, traction screw, bone plate, Kocher needle, and steel wire **Materials**

DUTIES	TASKS	ENABLERS
		· Indwelling needle, syringe, medical tape, EDTA tube, sodium heparin tube, infusion set, infusion support, stethoscope, scalp needle, three-edged needle, suture thread, suture round needle, and sterile cotton ball · Hemostatic, anesthetic, painkiller, anti-inflammatory drug, sodium chloride, glucose, lactated Ringer's solution, cardiac tonic, oxygen, vasopressor, 75% alcohol, iodophor, atropine, and sedative **Requirements for employees** · Conscientiousness and meticulousness professionalism, honesty and trustworthiness, and reasonable time management
3.0 Biosafety assessment and reconstruction of fracture surgery	3.1 Evaluation of disinfection effectiveness. 3.2 Identification and control of biosafety risks. 3.3 Comprehensive treatment measures when epidemic diseases occur.	**General skills and knowledge** · Principle, applicable scope, and determination method of disinfectant concentration test strips · Instructions for using ATP bioluminescence detection device · Rapid methods for determining disinfectant concentration · Selection of the correct chemical indicator · Selection of the correct indicator bacteria · Preparation of culture media · Biological characteristics of pathogenic biological factors · Feeding and experimental activities involving animals carrying pathogenic biological factors · Risks during the disposal process of infectious waste · Infectivity and pathogenicity of pathogenic biological factors · Biosafety measures for large-scale farming operations · Harmless treatment of deceased animals · Methods for controlling the farming

DUTIES	TASKS	ENABLERS
		environment on the farm · Methods for controlling personnel on the farm · Management of livestock (poultry) populations · Cleaning and disinfection of facilities, items, and tools · Control of feed and water · Handling of bedding, waste, and dirt · Cleaning of tools, equipment and workplaces · Storage of tools and equipment · Occupational health and safety · Waste disposal methods **Tools and equipment** · Adenosine triphosphate (ATP) bioluminescence detection device · Alcohol meter · Residual chlorine meter · Office and related electronic equipment **Materials** · Disinfectant concentration test strip · Chemical indicator for disinfection effectiveness evaluation · Indicator bacteria for disinfection effectiveness evaluation · Biosafety-related laws and regulations · Culture medium **Requirements for employees** · Conscientiousness and meticulousness professionalism, honesty and trustworthiness, and reasonable time management
4.0 Prevention and control of epidemic	4.1 Development of a monitoring plan of epidemic diseases.	**General skills and knowledge** · Determination of the scope of epidemic

DUTIES	TASKS	ENABLERS
diseases	4.2 Formulation of healthcare measures. 4.3 Development of biosafety plan.	disease monitoring · Determination of the timing of epidemic disease monitoring · Determination of the number of epidemic disease monitoring · Epidemiological investigation · Collection of samples for testing · Sample testing · Handling and reporting of monitoring results · Rational layout of the facility · Introduction quarantine · Sanitation and disinfection · Immunization · Feed formulation · Development of a contingency plan for epidemic diseases · Reporting of epidemic diseases · Quarantine of epidemic disease areas · Quarantine of infected animals · Immunization · Disposal of deceased animals · Harmless treatment · Reporting to the superiors **Tools and equipment** · Office and related electronic equipment · Disinfection materials and tools · Tools for harmless treatment **Materials** · Relevant laws and regulations of the livestock industry · Corporate rules and regulations · Immunization materials · Epidemic disease-related drugs **Requirements for employees**

DUTIES	TASKS	ENABLERS
		· Conscientiousness and meticulousness professionalism, honesty and trustworthiness, and reasonable time management
5.0 Molecular biological diagnosis and analysis	5.1 RT-PCR. 5.2 RT-qPCR.	**General skills and knowledge** · Communication skills · Management skills · Data collection skills · Customer service skills · Teamwork skills · Report writing skills · Information technology application skills · Data analysis skills · Occupational health and safety · Selection of instruments and equipment · Storage of molecular biology experimental materials · Selection of the appropriate RNA extraction method · Extraction of tissue RNA · Detection of RNA concentration using ultraviolet spectrophotometry · Reverse transcription synthesis of cDNA · Storage of RNA and cDNA · Primer design · Detection of optimal annealing temperature of primers · Agarose gel electrophoresis · PCR amplification · Calculation of target gene levels · Storage and handling of experimental data and images · Adjustment of experiment schemes based on adverse data results · Safety operation of RT-PCR experiments · Cleaning of tools, equipment and workplaces · Storage of tools and equipment · Waste disposal methods

DUTIES	TASKS	ENABLERS
		Tools and equipment · Clean bench · Micro-shaker · Fully automated rapid sample grinder · Temperature-controlled centrifuge · Nucleic acid/protein concentration determination instrument · General PCR instrument · Gradient PCR instrument · Gel electrophoresis apparatus · Electrophoresis tank · Gel imaging analysis system · Ice maker · -20℃ refrigerator · -80℃ refrigerator · MORLAB ultrapure water purifier · Fluorescent quantitative PCR instrument · Liquid nitrogen container · Pipettor · RNA extraction reagent · Reverse transcription reagent · PCR reagent · qPCR reagent · 75% alcohol · Tissue scissors · 384-well plate · Aseptic pipette head **Materials** · Tissue or cell material used to extract RNA · RNA · cDNA **Requirements for employees** Conscientiousness and meticulousness professionalism, honesty and trustworthiness,

DUTIES	TASKS	ENABLERS
		and reasonable time management
6.0 Inspection and testing technique management	6.1 Inspection and testing technique management. 6.2 Inspection and testing technique management training.	**General skills and knowledge** · Communication skills · Management skills · Data collection skills · Customer service skills · Teamwork skills · Report writing skills · Information technology application skills · Development of training programs for inspection and testing techniques · Design and optimization of testing plans · Decomposition and assignment of testing tasks · Establishment of testing positions, and formulation of job responsibilities · Regulations and rules for inspection and testing · Collection of quarantine samples · Scope, classification, and targets of quarantine · Procedures and ways of quarantine · Quarantine treatment methods · Clinical examination and testing techniques · Origin quarantine · Slaughter quarantine · Quarantine supervision · Quarantine of major infectious diseases · Quarantine of major parasitic diseases · Analysis and summary of testing data · Skills related to technical training **Tools and equipment** · Freezing microtome · Blood analyzer · Optical microscope · Inverted microscope

DUTIES	TASKS	ENABLERS
		· CO_2 incubator · Fully automated autoclave · Sample homogenizer grinder · Gel imager · Advanced microscope · Immunochromatographic fast detector · Fully automated enzyme immunoassay system · Fully automated capillary electrophoresis analyzer · Clean bench · Temperature-controlled centrifuge · Nucleic acid/protein concentration determination instrument · PCR instrument · Fluorescent quantitative PCR instrument · Ultra-low temperature freezer · Ventilation hood · Electrophoresis apparatus · Ultrapure water meter · Water-proof constant temperature incubator · Image acquisition system · CO_2 cell incubator · Constant temperature biochemical incubator · Electronic balance · Magnetic stirrer · Gradient PCR instrument · pH meter · Conference room (equipped with conference tables and chairs, projectors, etc.) · Aseptic pipette head · Cell culture plate · 384-well plate · Beaker · Glass rod

DUTIES	TASKS	ENABLERS
		· Measuring cylinder · Pipette · Gloves · Protective suits · Mask · Detection reagent · Rapid detection board · Glass slide · Cover slide · Disinfectants: 2.5% iodine, 75% alcohol, 2% lysol, and 0.1% benzalkonium bromide **Materials** · Samples for quarantine inspection **Requirements for employees** · Conscientiousness and meticulousness professionalism, honesty and trustworthiness, and reasonable time management
7.0 Serological test	7.1 Plate aggregation test. 7.2 Ring precipitation test. 7.3 Agar diffusion test. 7.4 Indirect agglutination test. 7.5 Hemagglutination / hemagglutination inhibition test. 7.6 Complement fixation test. 7.7 Enzyme-linked immunosorbent assay. 7.8 Fluorescent antibody test.	**General skills and knowledge** · Compliance with health and safety prevention measures when performing tasks · Acquisition of necessary resources for the task · Analysis of the purpose and significance of relevant tests · Receipt and handling of samples · Proficiency in pre-test operating procedures · Preparation of materials and reagents before the test · Experimental procedures and precautions during the process · Determination of test results · Organization of experimental materials and reagents after the test

DUTIES	TASKS	ENABLERS
		· Handling of samples and disinfection of the laboratory after the test **Tools and equipment** · Test tube and test tube rack · Micropipette · Beaker · Alcohol burner · Scissors · Capillary pipette · Autoclave · Plate · Glass slide · Perforator · Syringe and needle · 96-well V-shaped coagulation plate · Micro-oscillator · Centrifuge and centrifuge tube · ELISA plate · Antigen-antibody reaction plate · ELIASA · Measuring cylinder · Constant temperature incubator · Fluorescence microscope **Materials** · Standard antigen · Standard positive serum · Standard negative serum · Test serum · Saline · 0.5% phenol saline · Agar powder · 8.5% NaCl solution · Artificial particle antigen (sensitizing particles) · Anticoagulant

DUTIES	TASKS	ENABLERS
		· 1% red blood cell suspension · Known antige · Complement · Sensitized red blood cell · ELISA antibody detection kit · Deionized water **Requirements for employees** · Conscientiousness and meticulousness professionalism, honesty and trustworthiness, and reasonable time management
8.0 Preparation of breed improvement and breeding plans	8.1 Breed improvement plan. 8.2 Breeding plan.	**General skills and knowledge** · Utilization of breeding software and databases to simulate and optimize breed improvement schemes · Analysis of breed improvement results using breeding software and databases · Application of biotechnologies such as genetic engineering in breed improvement · Determination of animals' performance · Selection criteria for breeding animals on the farm · Reproductive performance of breeding animals on the farm · Determination of the number and age of breeding animals in the breeding plan · Determination of the reproductive cycle and breeding frequency of breeding animals · Determination of appropriate breeding techniques based on the reproductive capacity of breeding animals, and rational arrangement of the farm's breeding plan · Determination of feeding techniques for breeding animals based on the actual situations of the farm to ensure the healthy development of breeding animals · Implementation of breeding management measures based on the actual situations of

DUTIES	TASKS	ENABLERS
		the farm to ensure the reproductive performance of breeding animals **Tools and equipment** · Computer · Breeding software · Measuring rod · Weighing scale · DHI equipment · Mask and disposable latex glove · Protective clothing · Protective mask **Materials** · DHI special preservative for milk sample detection **Requirements for employees** · Conscientiousness and meticulousness professionalism, honesty and trustworthiness, and reasonable time management
9.0 Operation and management of farms	9.1 Production management. 9.2 Talent management. 9.3 Fund management. 9.4 Marketing management. 9.5 Intelligent control of farms.	**General skills and knowledge** · Work safety management on the farm · Establishment of production positions, and formulation of job responsibilities · Development and implementation of production plans · Design and optimization of production processes · Statistics and analysis of production data · Employee recruitment · Employee training · Employee performance appraisal · Fundraising · Formulation of project investment plans · Financial accounting and financial management

DUTIES	TASKS	ENABLERS
		· Material procurement and management · Marketing · Interpersonal communication and exchange · Use of office automation equipment and software Network architecture: installation of a unified network architecture on the farm to allow all control systems to connect to the network and communicate with each other, enabling intelligent control · Control system: installation of control systems on the farm to enable intelligent control of environmental parameters, such as temperature, humidity, and lighting · Sensor: installation of sensors on the farm to collect real-time environmental parameters and transmit them to the control systems, enabling intelligent control · Automation equipment: installation of automation equipment to enable intelligent control of environmental parameters on the farm, such as automatic feeders and temperature controllers · Database: installation of databases to store environmental parameter data from the farm and the operational status of control systems, enabling intelligent control **Tools and equipment** · Office and office desks and chairs · Conference room and conference tables and chairs · Document cabinet · Computer · Integrated printing, scanning and copying machine · Projector · Signboard or large display screen · Farm production management software

DUTIES	TASKS	ENABLERS
		· ERP enterprise management information system · Intelligent control system of farms · Farm automation equipment **Materials** · File box and folder · Stapler and staple · Paper · Toner cartridge · Powdered carbon · Marker · Meeting book · Recording pen · Laser pointer (for PPT demonstration) · Removable hard disk or USB flash drive · Tri-color permanent marker · Corporate rules and regulations, and management manuals **Requirements for employees** · Conscientiousness and meticulousness professionalism, honesty and trustworthiness, and reasonable time management