

# **Animal Production**

## **Level - I**

**Based on March 2022, Version-4 Occupational  
Standard**



**Module Title: - Working on Animal Welfare**

### **Requirements**

**LG Code:     AGR APN1 M04 LO (1-3) LG (12-14)**

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## Introduction to the Module

This module covers the knowledge, skills and attitude required to comply with industry animal welfare requirements in the production of livestock that requires the ability to guide animal welfare practices, follow standard operating procedures and report problems that affect animal welfare.

The care of animals kept in the service of mankind, so that their wellbeing is provided for their natural need are not restricted and their worth and dignity as individual are recognized. Animal welfare concepts and practice extends to animals kept for food and clothing, for biotechnology products, research work, recreation and for sport. The welfare of an animal relates primarily to its ability to cope, both with its external environment, including housing, weather and the presence of other animals, and with its internal environment, such as specific pains, fever and nutritional status. An instantaneous assessment of the welfare of cattle would ideally concentrate on their feelings at the time, which would be influenced by their genetic predisposition, by recent experiences, by their environment at the time of assessment and by any anticipation of future events, such as feeding. However, feelings are difficult to measure and the assessment is more likely to concentrate on more easily quantified parameters, such as the strength of their preference for different environments.

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## LG #12

## LO #1- Participate in animal welfare practices

### Instruction sheet

This learning guide is developed to provide you the necessary information regarding the following content coverage and topics:

- Determining elements of animal welfare requirements
- Identifying animal welfare hazards
- Determining critical control points for work area
- Completing record keeping on animal welfare and quality products

This guide will also assist you to attain the learning outcomes stated in the cover page. Specifically, upon completion of this learning guide, you will be able to:

- Determine elements of animal welfare requirements
- Identify animal welfare hazards
- Determine critical control points for work area
- Complete record keeping on animal welfare and quality products

### Learning Instructions:

1. Read the specific objectives of this Learning Guide.
2. Follow the instructions described below.
3. Read the information written in the information Sheets
4. Accomplish the Self-checks
5. Perform Operation Sheets
6. Do the “LAP test”

## Information Sheet 1

### 1.1 Determining elements of animal welfare requirements

#### 1.1.1. Introduction

Welfare is the physical and mental well-being of an animal and can be influenced by the building in which it is kept. Animal welfare is denotes the desire to prevent unnecessary animal suffering. Animal welfare that is:

- whilst not categorically opposed to the use of animals
- wanting to ensure a good quality of life and humane death

Animal welfare comprises the state of the animal's body and mind, and the extent to which its nature (genetic traits manifest in breed and temperament) is satisfied. Animal welfare action or procedure designed to promote the basic physical and mental well-being of people in need.

Animal welfare includes not only the state of the animal's body, but also its feelings. Most would agree that animals have feelings (fear, frustration), and it has been proposed that animal welfare consists entirely in feelings & that these have evolved to protect the animal's primary needs. However, feelings are difficult to measure and the assessment is more likely to concentrate on more easily quantified parameters, such as the strength of their preference for different environments.



**Infographics 1.1: Animal welfare condition**

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Thus, if an animal feels well, it is faring well. A feelings-based approach to welfare research typically measures behavioral outcomes, such as willingness to “work” (pushing open a weighted door), and behavioral signs of fear or frustration. The physical, mental, and “natural-living” aspects of welfare are interrelated and are all of ethical concern. Animal welfare concepts and practice extends to animals kept for food and clothing, for biotechnology products, research work, recreation and for sport. Animal welfare relates primarily to its ability to cope/survive, both with its external environment (housing, weather and the presence of other animals) and internal environment (specific pains, fever and nutritional status)

Animal welfare means how an animal is coping with the conditions in which it lives. An animal is in a good state of welfare if it is healthy, comfortable, and well nourished, safe, able to express innate behaviour and not suffering from unpleasant states such as pain, fear, and distress.

Good animal welfare requires disease prevention and veterinary treatment, appropriate shelter, management and nutrition, humane handling and humane slaughter or killing.

### **1.1.2. Quality assurance**

Quality assurance is paramount in all food manufacture and handling. It involves a Coherent system of activities that assures (guarantees) that the products made meet a set of defined quality marks. Quality can be defined in various ways. A well-known definition is: “Quality is fitness for use.” This needs some elaboration. A product or a Service is fit for use if it meets the expectations of the user. However, it is far from easy to establish what these expectations are. This is because the expectations vary among consumers, often widely so and generally depend on conditions under which a product is purchased or used. Moreover, several quality marks are highly subjective and it is difficult to translate these into measurable product attributes. A high quality does not merely mean that the product complies with legal requirements or preconceived ideas of the manufacturer. Marketing specialists and technologists should cooperate in establishing the desired quality Consumers ask both for sensory quality and products that are safe to consume. They may also demand a range of other potential quality attributes such as nutritional quality which may itself be variously defined to include a range of effects on health (such as level of fat content). They may also include in their definition of quality how a product is manufactured, ranging from animal welfare standards and environmental impacts to product

composition and ingredients. Quality is defined by consumers according to their own personal preferences and goals

- **Quality attributes (QA)** to denote those quality features of the product perceived as important by the consumer marks.
- **Quality characteristics (QC)** to denote those quality features which are scientifically measurable.
- **Food safety** Food safety refers to the condition and practice that preserve the quality of food to prevent contamination and food borne illnesses (all measure taken to prevent food borne infection and in toxification) and, is the assurance that food will not cause harm to the consumer ,when it is prepared and /or eaten or is not spoiled.
- **Food borne disease** is harmful illness mainly affecting gastrointestinal tract, and transmitted or caused by consumption of contaminated food or drink.
- **Food borne infection** is an entry of infectious agent; capable of causing disease in the host bodies as a result of consumption of contaminated food of drink and multiplication of the same agent.

### 1.1.3. Applying animal welfare legislation and codes of practice

#### a) Animal welfare legislation

The western countries outline strict animal welfare regulations and organizations are fighting for animals' rights in a society where economics is often deemed the most important factor. In Ethiopia there are no animal welfare regulations or any constitution that protects animals from suffering.

However, there are few non-government organizations that work for animals' welfare, such as the Donkey Sanctuary Project, Homeless Animals Protection Society, and introduction of Animal welfare to the curriculum of animal science and veterinary medicine fields of study from the government side.

[https://www.youtube.com/watch?v=YQjR7Yy\\_740](https://www.youtube.com/watch?v=YQjR7Yy_740) /accessed date 08/2022/

<https://www.youtube.com/watch?v=Y5W3JAID52g> /Accessed date 08/2022/





**Figure 1.1: Farm animal welfare in the industrial system**

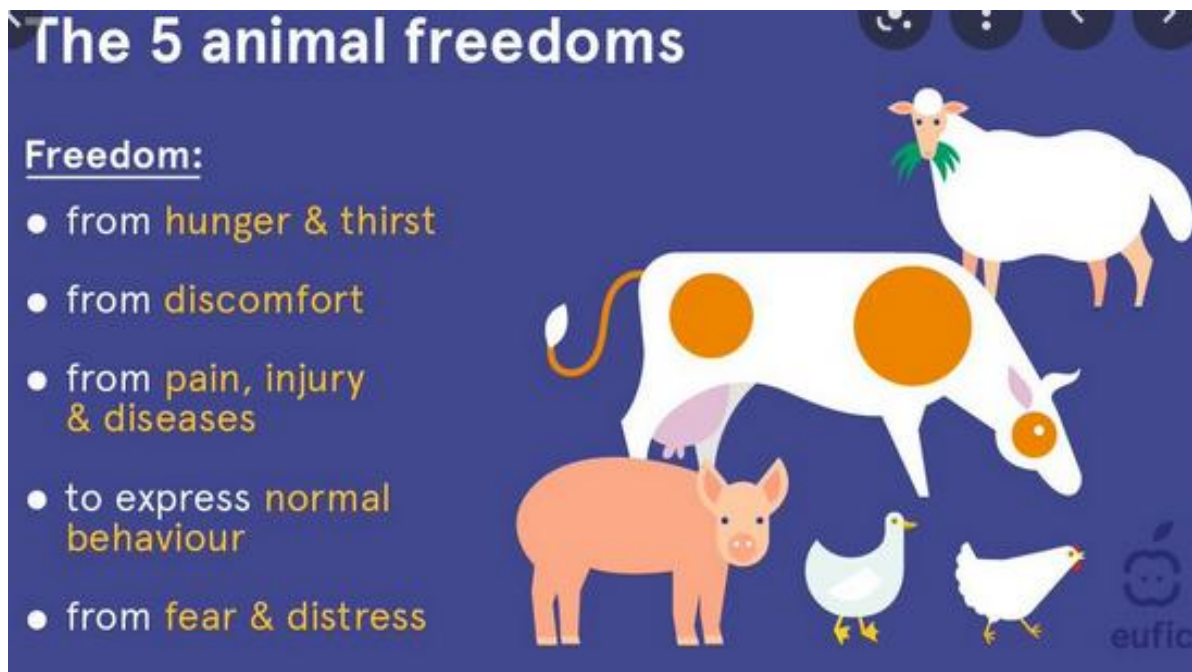
The regulation of animals and their activities as provided in this competency is necessary;

- To prevent and eliminate burden of animals.
- To insure that animals intended for use in research facilities
- For exhibition purpose or for use as pets provided humane care and treatments
- To assure the humane treatment of animals during transportation in commerce; and
- To protect the owners of animals from the theft of their animals by preventing the sale or use of animals which have been stolen.

The five freedoms fundamental bases for animal welfare all over the world are;

- a. Freedom from Hunger and Thirst: by providing constant access to fresh water and a diet to maintain full health and vigor;
- b. Freedom from Discomfort: by providing an appropriate environment including shelter and a comfortable resting area;
- c. Freedom from Pain, Injury or Disease: by prevention or rapid diagnosis and treatment;
- d. Freedom to Express Normal Behavior: by providing sufficient space, proper facilities and company of the animal's own kind;
- e. Freedom from Fear and Distress: by ensuring conditions and treatment which avoid mental suffering.





**Infographics 1.2: Animal freedoms**

<https://www.youtube.com/watch?v=r1-sd9JUoIE> /accessed date 08/2022/

#### **b) Animal welfare codes of practice**

Model codes of practice for the welfare of animals (animal welfare codes) cover the main considerations to achieve a desired animal welfare outcome. For a particular type of livestock, the animal welfare codes includes guidance on feed and water, housing, health, management practices, breeding and emergency slaughter.

Animal welfare codes usually contain a mix of general and prescriptive statements. They are not comprehensive manuals on how to care for animals. They do not contain detailed animal care information, such as diets, plans for building animal accommodation or animal health regimes.

If you intend to keep animals, especially ones that you have little knowledge or experience about, you should:

- Get detailed animal care information
- Be aware of the Animal care and protection
- Read and comply with any relevant animal welfare codes that are adopted

- Read about your duty of care, and the relationship between that duty of care and adopted codes of practice.

<https://www.youtube.com/watch?v=iO74rrDTXDA> /accessed date 08/2022/

#### **1.1.4. Elements of animal welfare requirements**

Animal welfare describes how an animal is coping mentally and physically with the conditions in which it lives. Such as;

##### **A. Physical wellbeing**

- encompasses basic health and functioning
- concept addresses the physical fitness of the animal (good health, normal body function, and normal growth and development)
- This element relates to the freedoms from:
  - ✓ hunger and thirst (Freedom 1)
  - ✓ discomfort (Freedom 2)
  - ✓ pain, injury and disease (Freedom 3)

##### **B. Mental wellbeing**

- encompasses the mental and emotional state of an animal
- concept requires that animals should feel mentally well and should not be subjected to excessive negative emotions
- Negative emotions include unpleasant states (pain, hunger and distress)
- In addition to avoiding negative emotions, animals should be able to experience positive emotions in the forms of pleasure or contentment (e.g. rest, play or social contact).
- This element relates to the freedom from:
  - ✓ hunger and thirst (Freedom 1)
  - ✓ pain, injury and disease (Freedom 3)
  - ✓ fear and distress (Freedom 5)

##### **C. Aspects of naturalness**

- encompass natural living

- This includes being able to perform important, normal behaviors (e.g. dust bathing for chickens or grazing for horses) and to have some natural elements in their environment (e.g. sunlight, fresh air or social contact for herd species).
- This element relates to the freedom to express normal behavior, including social interactions with members of their own species (Freedom 4).
- Finally, any use of animals for human benefit should minimize suffering of the animals involved.
- 



**Diagram 1.1: Elements of animal welfare**

Building design, construction and maintenance should all address the five freedoms that have come to define the ability of a system to provide good welfare.

Good design will support good health and welfare to the financial benefit of the farm business. Adequate stocking densities for feeding, drinking, loafing or lying down will all impact on positive health and performance. Surfaces and materials that provide adequate drainage, control wind speed, minimize sharp edges, provide non-slip floors, and are easy to clean, will all contribute.

### **1.1.5. Animal welfare requirements**

#### **A) Protection**

- A good house protects the birds from the elements (weather), predators, injury and theft.
- Animals require a dry, draft-free house.
- This can be accomplished by building a relatively draft free house with windows and/or doors which can be opened for ventilation when necessary.

- Build the coop/house on high, well-drained areas.
- This prevents prolonged dampness and water saturation of the floor of the coop and outside runs.
- Face the front of the coop, the windows and outside run to the south which allows the sun to warm and dry the coop and soil.

#### **B) Adequate Space**

- Animals need adequate space for movement and exercise as well as areas to nest and roost.
- Space requirements vary with the type of animal you raise.

#### **C) Easy access to Feed and Water**

- Feeders and waterer should be placed conveniently throughout the pen for birds' access.
- Place the bottom of the waterers and top lip of the feeders at the birds' back height. This will keep the feed and water clean and prevent wastage.
- When possible, place the waterer in the outside runs, especially for waterfowl. This helps to keep the humidity level lower inside the coop.

#### **D) Source of light**

- If you wish to produce eggs from your flock year-round, you must have a source for electric light.
- Most small poultry houses do very well with one light above the feeding and watering area.
- Windows placed on the southside of the coop will also be a good source of light and warmth in winter and a good source of ventilation in summer.

#### **E) Ventilation**

- Ample air movement without a draft is essential. Fresh air brings in oxygen while excess moisture, ammonia or carbon dioxide are removed the stale air moves out of the house.
- Ventilation including fresh air, dust filters, humidity and noxious gases
- Well-ventilated houses must also have plenty of insulation and a good vapor barrier.
- Failure to insulate or ventilate properly causes moisture to accumulate on the walls and ceiling in cool weather. However, cool and humid conditions can create many health

problems. Locate openings on the side away from prevailing winds. The south or east side is usually best.

#### **F) Appearance**

- The appearance of any animal house or outside run that is visible to the neighborhood should never detract from the over-all appearance of the surroundings.
- Exteriors of structures should be kept painted and well-maintained.
- Weeds and trash should be removed from around all facilities.
- Proper landscaping can provide screening and also help muffle sounds from the animals.

#### **G) Use Common Sense**

- When building animal house, use common sense in designing the structure.
- Build the roof high enough and situate such permanent structures as nests, roosts, and feeders for easy access and to make it easier to clean all areas of the house.
- Install doors so that they open inward.
- Use building materials which will be easy to clean and disinfect.
- Slightly slopping the floor toward the door can help prevent paddling in the building and will make the building easier to spray out and dry between uses.

### **1.1.6. Principles of Hazard Analysis Critical control point (HACCP)**

HACCP focuses on preventing hazards in the livestock production, not on catching them when it's too late

The seven principles of HACCP adapted to livestock production are as follows (Cullor, 1997):

- a) Draw detailed descriptions of the production process using flow charts. (Figure 2)
- b) Identify and evaluate potential hazards and risks related to the hazards during the production process.
- c) Determine critical control points (CCPs) in the production process where such risks can be controlled.
- d) Specify when the CCPs are under control by setting standards, criteria, and tolerances (limits).

- e) Design an on-farm monitoring system involving CCPs to check whether all specifications are being met.
- f) Determine corrective actions for events where CCPs exceed their tolerances (limits).
- g) Verify the plan using additional information or actions.

### 1.1.7. Work instruction

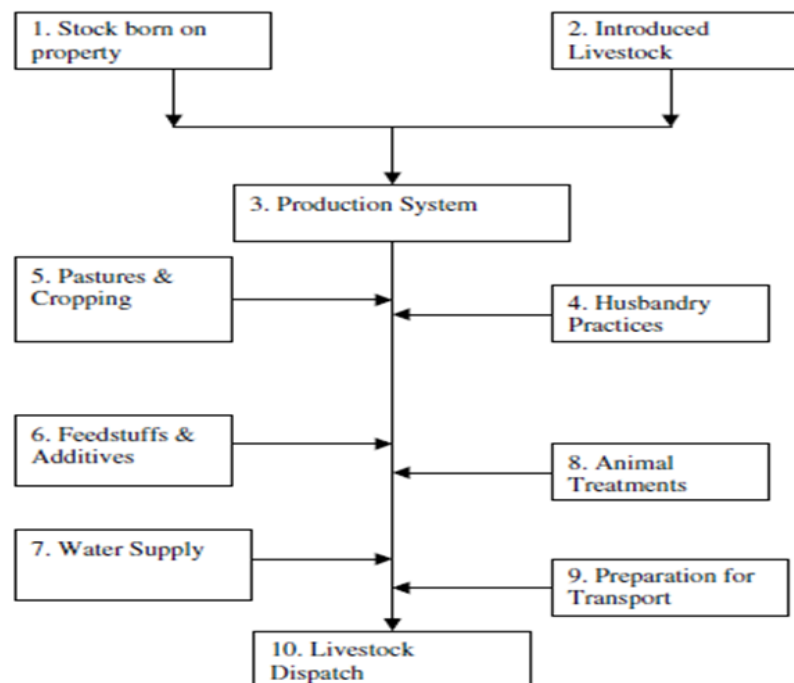
Work instructions are an important component of an effective management system.

Work instruction:

- provide detailed written task instructions
- reduce risk and serve as an effective training tool
- leading to improved animal welfare outcomes, product quality and operator safety

The methodology adopted in the development of the work instructions was based on identifying and addressing the critical components of the standard operating procedures (SOPs).

Work instructions that include the use of pictures with fewer words provide a very effective solution to potential problems with language and lead to more consistent training and assessment. The agreed format was a series of pictures used to depict a specific task, with documented steps listed alongside



**Diagram 1.2: Overview of livestock production processes chart**

### **1.1.8. Good management practices in animal welfare**

The following provides on the good management practices, including genetics and breed selection, husbandry practices and housing system

#### **a) Genetics and breed selection**

- Breeds should be selected for good skeletal and cardiovascular health, low aggression, and suitability for the environment/ climate and the system in which they are bred.
- Breeding objectives should be assessed not only by production characteristics, but also by rates of injury, disease, and mortality in both breeding stock and offspring. It remains important to discourage breeding selection targets dominated by production traits.
- Animal breeds or strains chosen should be adapted to the local climate, diseases, parasites, and nutrition

#### **b) Animal Health**

- Animals must be maintained in good body condition and remedial action (veterinary attention, improved nutrition, or husbandry) taken when in poor condition, or when there are signs of significant distress, ill-health, disease, or injury.

Signs of ill health in livestock may include:

- ✓ reduced food and water intake
- ✓ reduced production
- ✓ changes in the nature and level of their activity
- ✓ abnormal condition, or
- ✓ changed physical features (such as lameness)
- Animals should be periodically checked for the presence of parasites, and any corrective treatment deemed necessary to prevent distress and suffering should be administered as soon as possible.
- Any sick or injured animals should be treated or cared for to alleviate pain and distress as soon as practically possible, including being isolated or humanely destroyed if necessary.
- Animals should be confirmed dead before disposal, and any still alive should be euthanized immediately. Dead animals should be removed promptly and disposed of appropriately.



- Veterinary care should be available at all times and medications and treatments given in accordance with advice and instructions. Good record keeping will assist with managing health and disease problems. A preventative health program should be established in consultation with a veterinarian. External audits on animal health are encouraged

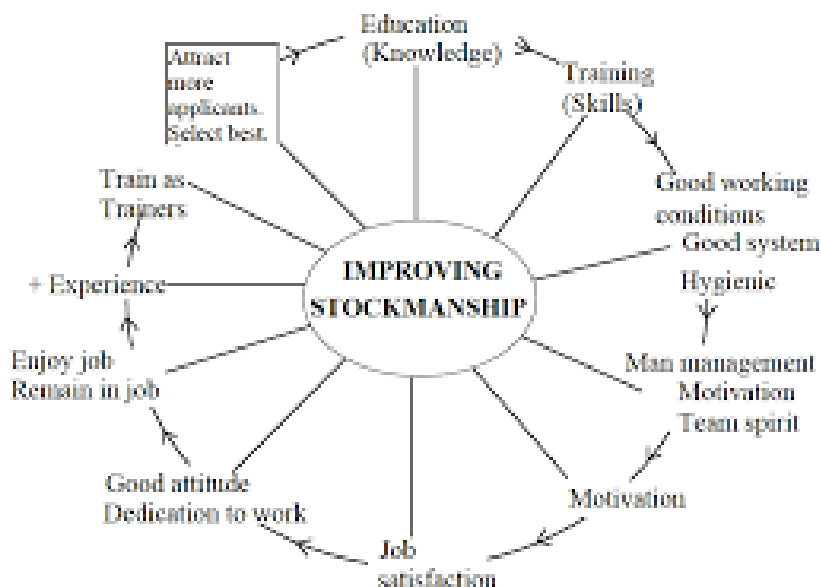
**c) Husbandry practices**

- Animals should be handled using low-stress methods, equipment, and facilities that facilitate calm animal movement.
- Alternatives should be used to routine management practices that cause pain (e.g., dehorning/disbudding, branding, castration, tail-docking, beak trimming), or effective pain relief should be provided. Successful alternatives to painful procedures include, for example, providing straw or other manipulable materials to fattening pigs to reduce tail biting. Where painful procedures cannot be avoided, they should be carried out by a competent and trained operator.

**d) Stockman ship**

- Stockman ship is the art and science of properly handling cattle or other farm animals. Stay calm, quiet and avoid quick movements while handling cows. By using good stockman ship practices you can improve animal comfort, provide safety for people and animals, and improve your bottom line.
- There should be a sufficient number of trained and well- motivated personnel proficient in good stockman ship to maintain animal health and welfare, and ensure that the physical, health, and behavioral needs of animals are met. Stock personnel should not be cruel and should at all times endeavor to avoid causing pain, suffering, or distress to animals.
- Stock personnel should be skilled at handling, preventing, and treating illnesses and diseases, and caring for affected animals, including minimizing aggression. Knowledge of the normal behavior and function of stock is essential and individuals should be able to recognize early signs of ill-health, injury, disease, or distress requiring prompt remedial action
- Staff should be properly trained in humane destruction methods and when to apply them, and should be supplied with the required equipment.

- Animals in intensive systems should be inspected at least daily, or more regularly under circumstances that could affect welfare (e.g., dietary changes, disease outbreaks).
- On-farm surveillance needs particular attention. Its adequacy should be assessed by reviewing the frequency and duration of the checks performed, as well as the level of attention given to individual animals.
- Ongoing professional training programs should be available to stock personnel, and the development of such programs should be encouraged so that a culture of caring and responsible planning and management is developed.
- Stock managers and handlers should have access to a disaster response and recovery plan (e.g., failure of feed or water supply, electricity supply, structural damage, fire or flood).



**Diagram 1.3: Improving stockman ship through training and motivation**

#### e) Feed and water

- Animals should receive a daily diet adequate in composition and quantity, and containing appropriate nutrients to maintain good health, meet their physiological requirements, and avoid metabolic and nutritional disorders. Feed should be palatable and free of contaminants, molds, and toxins.
- Food and water requirements vary with feed composition, physiological state, stage of growth, size and body condition, pregnancy, lactation, exercise and activity, and climate. Access to feed should be at intervals appropriate to the physiological needs of the animals,

and at least once daily. Animals should have an adequate daily supply of water that is palatable and not harmful to their health.

- Food and water, including automated feeding and watering systems, should be provided in such a way that all animals have an opportunity to feed or drink without undue competition (including intimidation, bullying, and aggression) likely to cause injury or distress. Feeding and watering systems should be designed, constructed, placed, and maintained to prevent contamination or spoiling, and to minimize spillage.
- Animals on highly concentrated diets may also require access to bulky or high fiber feed to satisfy hunger. Medicated or enriched food and water should only be used on professional advice.
- Reserves of food and water should be maintained to allow for interruption to supply

#### **f) Housing systems**

- Animal accommodation should be designed and constructed to allow all animals space to stand, stretch, turn around, sit, and/or lie down comfortably at the same time.
- Accommodation should allow all animals to directly interact with herd or flock mates, unless isolated for veterinary or nursing reasons.
- Stocking densities should be low enough to prevent excessive temperatures and humidity; competition, stress, aggression between animals, and abnormal behavior; and to enable good litter management.
- Each operation should have strategies to prevent overheating and excessive cooling.
- Animals should be protected from abrupt temperature fluctuations and cold drafts.
- All animals should have access to a clean and dry place within the confinement area.
- Floor litter must be kept free of excessive moisture and be loose and friable in the case of broiler chickens
- All surfaces and flooring should be non-slip, without sharp projections or edges likely to cause injury, and provide for the animal to bear weight on the entire sole of the foot
- Housing should be constructed of fire-resistant materials and electrical and fuel installations planned and fitted to minimize fire risk. Firefighting equipment and smoke detectors should be installed with sufficient exits to enable evacuation of the building in an emergency

- There should be sufficient drainage to protect animals from flooding
- All automated systems supplying food and water, removing waste, and controlling temperature, lighting, and ventilation should be checked and maintained regularly, and backup systems should be available in case of failure.
- Natural or artificial light (of an intensity of at least 20 lux) should be available in all buildings for a minimum of eight hours daily, and there should be a period of darkness sufficient to allow proper rest.
- Air quality should be maintained by minimizing transmission of airborne infectious agents and preventing the buildup of noxious or harmful waste gases, and minimize dust particles.
- Effluent and waste should not be allowed to build up to the extent that accumulation leads to discomfort and compromised welfare.
- Animals should be protected from predators, vermin, and excessive noise.
- Animals with access to, or living outdoors should have access to shade and shelter.

#### **g) Transport**

- Facilities for loading, transporting, and unloading should be designed, constructed, and maintained to permit proper handling of animals and minimize risk of injury.
- Catching, handling, and loading should be carried out quietly and confidently by trained and competent personnel, and animals should not be inverted when handled.
- Electric goads or prods should not be used when catching, loading, unloading, or moving pigs. Pigs should be moved with a flat “pig board” rather than with a stick.

#### **h) Slaughter**

- Prior to slaughter, proper handling techniques, and lighting, space, and ventilation should be used to keep the animals calm.
- Holding facilities should protect animals from adverse weather, have adequate and uniform lighting, sufficient space to allow animals to stand up and lie down, be well ventilated and drained, and be free from smooth floor surfaces and sharp protrusions

## **1.2 Identifying animal welfare hazards**

Many aspects of animal production are at risk from biological, chemical (including radionuclide) and physical agents. These agents may enter food-producing animals or animal products through a wide variety of exposure points in the food chain, with consequent potential risks for consumers.

Hazards may include:-

### **a) Physical hazards**

Physical hazards are physical objects introduced into livestock production that may cause injury, but seldom death. Physical hazards such as retained, broken needles, welding rods, nails etc.

### **b) Chemical hazards**

Chemical hazards resulting from residues such as antibiotics, pesticides, etc.

A wide variety of chemicals may be used in livestock production. On the farm, chemicals of concern are:

- organophosphate pesticides,
- growth-promoting hormones,
- antibiotic residues, additives, and
- naturally occurring toxins (i.e., aflatoxins)

### **c) Biological hazards**

Contamination from other animals (e.g. mice, rats cats), poor housing /transport condition, & dirt water affects animal health & food quality.

Animal health hazards resulting from poor handling of animals, unhealthy diseased animals, extreme weather conditions, poor loading and transport conditions, and time off feed.

Biohazards include:

- pathogenic bacteria,
- fungi,
- viruses,
- parasitic agents, and
- infectious materials

**Food safety** refers to the condition and practice that preserve the quality of food to prevent contamination and food borne illnesses (all measure taken to prevent food borne infection and intoxications) and, is the assurance that food will not cause harm to the consumer when it is prepared and /or eaten or is not spoiled. Food can transmit disease from person to person as well as a growth medium for bacteria that can cause food poisoning.

Hazards in food can be due to biological/microbiology or non –microbiological

#### **A) Biological or microbiological Parasite**

- **Bacteria** -bacillus, clostridia, staphylococcus, salmonella, TB, etc.
- **Virus** - hepatitis and polio
- **Poisons animals** -fishes, craps
- **Poisons plant** - alkaloids, glycosides, saponine, gossip

#### **B) Non microbial food contaminant**

Residues	chemicals
preservative	Hormone
pesticides	colorant
additives s	antibiotics

### **1.3 Determining critical control points for work area**

HACCP stands for hazard analysis/**critical control points**. It is a method to establish for an existing production process what control measures are essential to assure the safety of the products made. The same method can be applied for other quality characteristics, but the emphasis generally is on safety.

It establishes specific control measure at each identified critical control point of production, from harvesting to process and to consumption of final product. The term **critical control point** is a point, step or procedure in food process at which control can be applied and as a result of which, a food safety hazard can be prevented, reduced or eliminated at acceptable level.

A typical **CCP** can consist of the following:

- Heat process where time and temperature relations must be maintained to destroy a specific pathogen
- Freezing and time to freeze before pathogens can grow
- Maintenance of a certain pH at a level that prevents pathogen growth
- Employee hygiene

Overall, two types of CCPs are recognized:

- to ensure controlling a hazard
- to minimize a hazard

HACCP should be applied separately to every manufacturing process actually in operation; this means a separate system for every product or group of closely related products. The main features of the method are what the name says: make an analysis of the potential hazards, identify critical points in the process, and establish criteria for control. HACCP is also a control system applied after the analysis has been made. It involves corrective measures where needed, e.g., via feedback or control loops that adjust process variables if needed; a simple example is adjustment of a heating temperature. An HACCP study may reveal that the process should be changed to allow efficient control.

Grandin (2004) has outlined some of the CCPs that may be used in monitoring animal welfare in the development of an HACCP-based animal-welfare auditing scheme that includes, for example:

- type of housing;
- quality and functionality of euthanasia equipment; and
- access to functional and well-maintained water and feeding equipment

Critical control points, CCP's, are the pivot of the HACCP-plan. They refer to the hazard of concern, should be measurable in the production process and ascertain that control of the hazard is feasible. It should also be coupled with standards and tolerance levels, while control should lead to elimination or reduction of the risk. An example of a CCP is the temperature of the rinsing water for the milking machine with the objective of cleaning the milking equipment without leaving risks for contamination of the system: standard level 80° Celsius with tolerance of 2 degrees.



For example, the CCP for purchasing cattle:

- do not purchase cattle with an unknown origin and unknown health status;
- purchase a cow ask for a health certificate or
- do a pre-test before entry into the herd

A table listing the main agents (hazards) that may have an adverse effect on a farming system and indicating the corresponding control points is presented in table 1

**Table 1.1:** Livestock welfare hazards and their control points

<b>Hazards</b>	<b>Control points</b>
<b>Biohazards</b>	
Introduction of pathogens and contaminants	<ul style="list-style-type: none"> <li>• Sources of animals (horizontal and vertical transmission)</li> <li>• Sourcing of breeding stock</li> <li>• Breeding procedures</li> <li>• Semen and embryo quality</li> <li>• Bedding</li> <li>• Feed and water</li> <li>• Records of acquisitions and animal movements</li> <li>• Health and hygiene of visitors and personnel</li> <li>• Contact with other animals (including wildlife/rodents/insects, etc.)</li> <li>• Vehicles/clothing/instruments/equipment</li> <li>• Infected/contaminated carcasses, tissues or secretions</li> </ul>
Microbial and parasitic infections on pastures and paddocks	<ul style="list-style-type: none"> <li>• Pasture management</li> <li>• Microbial/parasite diagnosis</li> </ul>
Airborne infections and contaminations	<ul style="list-style-type: none"> <li>• Farm location</li> <li>• Animal housing and ventilation</li> <li>• Population density</li> </ul>
Waterborne infections and infestations	<ul style="list-style-type: none"> <li>• Water quality</li> <li>• Effluent management</li> </ul>

	<ul style="list-style-type: none"> <li>• Watering equipment</li> </ul>
<b>Chemical hazards</b>	
Chemical contamination of environment, feed and water	<ul style="list-style-type: none"> <li>• Farm location</li> <li>• Animal movement</li> <li>• Use of agricultural chemicals</li> <li>• Feed and water quality</li> <li>• Equipment and building materials</li> <li>• Hygiene practices</li> </ul>
Toxins of biological origin (plants, fungi, algae)	<ul style="list-style-type: none"> <li>• Feed, pasture and water quality</li> <li>• Farm location</li> <li>• Animal movements</li> <li>• Feed production, storage and transport</li> </ul>
Residues of veterinary medicines and biological (incl. medicated feed and water)	<ul style="list-style-type: none"> <li>• Treatment of animals</li> <li>• Sales and prescription control</li> <li>• Record keeping</li> <li>• Residue control</li> <li>• Quality of feed and water</li> </ul>
<b>Physical hazards</b>	
Broken needles and other penetrating objects.	<ul style="list-style-type: none"> <li>• Treatment of animals</li> </ul>
Injuries	<ul style="list-style-type: none"> <li>• Farm location</li> <li>• Infrastructure</li> <li>• Population density</li> <li>• Animal handling</li> <li>• Construction and equipment</li> </ul>
Ingestion of dangerous/harmful objects	<ul style="list-style-type: none"> <li>• Farm location</li> <li>• Source of feeds and water</li> <li>• Record keeping</li> <li>• Construction and equipment</li> <li>• Infrastructure</li> </ul>

#### **1.4 Completing record keeping on animal welfare and quality products**

Records must be kept to demonstrate that the HACCP system is operating under control and that appropriate corrective action has been taken for any deviations from critical limits. This will provide evidence of safe product manufacture. When a problem arises in an enterprise, be it a disease, a chemical hazard issue or a physical safety matter, record keeping is central to any effort to trace the source of the problem and eliminate it.

Hence, as far as is practicable, farmers should keep records of:

- All animal populations on the farm (groups or individuals as relevant).
- All animal arrivals, including their identification marks or devices, origin and date of arrival, to ensure that movements of incoming animals are traceable to their source.
- Movements of animals around the enterprise.
- Changes to feeding or health regimes, and any other management changes that may occur.
- Origin and use of all feeds, drugs, disinfectants, herbicides and other consumable items used on the farm.
- Known diseases/infections, diseased/infected animals and mortalities, as far as possible giving details such as dates, diagnoses (where known), animals affected, treatments and results
- Area where they purchase
- Name of the owner of the animal or product
- Age of the animals
- Ante-mortem defect
- Behavior change
- Handling techniques
- Stocking density
- Types and quality of feed they fed
- Transportation ways
- Color and flavor of the product
- Microbial load of the product

<b>Self-check- 1</b>	<b>Written test</b>
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Name..... ID..... Date.....

**Directions:** Answer all the questions listed below.

**Test I: Multiple choices**

- Elements of animal welfare that encompasses basic health and functioning is (3 points)  
A. Mental wellbeing    B. aspects of naturalness    C. physical wellbeing    D. emotions
- Which one of the following is positive emotion? (3 points)  
A. pain    B. hunger    C. distress    D. play
- Which one of the following is **true** about protection (housing) in animal welfare requirements? (3 points)  
A. damp and draft house    C. doors always closed  
B. build at well drained areas    D. ventilation is not necessary

**Test II: Short Answer Questions**

- Explain animal welfare? (5 points)
- List the five animal freedoms? (5 points)
- What are the differences between physical, chemical and biological hazards? (6 points)

**Note:** Satisfactory rating -13 points      Unsatisfactory - below 13 points

You can ask you teacher for the copy of the correct answers.

## Operation Sheet -1

**Techniques** of providing basic animal health care

### **A. Tools and equipment's**

- I. Thermometer
- II. Stethoscope
- III. Syringe
- IV. Rope
- V. Recording Book

### **B. Procedures/Steps/Techniques**

- Wear PPE
- Restrain the suspected animals in considering animal welfare
- Identify suspected health problems
- Report to supervisor or Treat with recommended drugs
- Follow the progress after treating of animals

<b>LAP TEST-1</b>	<b>Performance Test</b>
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Name..... ID.....

Date.....

Time started: \_\_\_\_\_ Time finished: \_\_\_\_\_

**Instructions:** Given necessary templates, tools and materials you are required to perform the following tasks within **20 minutes**. The project is expected from each student to do it.

**Task:** Provide basic animal health care

**LG #13**

**LO #2- Follow standard operating procedures**

**Instruction sheet**

This learning guide is developed to provide you the necessary information regarding the following content coverage and topics:

- Implementing standard operating procedures
- Reporting non-conformance requirements
- Taking corrective action

This guide will also assist you to attain the learning outcomes stated in the cover page. Specifically, upon completion of this learning guide, you will be able to:

- Implement standard operating procedures
- Report non-conformance requirements
- Take corrective action

**Learning Instructions:**

1. Read the specific objectives of this Learning Guide.
2. Follow the instructions described below.
3. Read the information written in the information Sheets
4. Accomplish the Self-checks
5. Perform Operation Sheets
6. Do the “LAP test”



## Information Sheet -2

### 2.1. Implementing standard operating procedures

#### 2.1.1. Introduction

Standard operating procedures or SOP's are written guidelines that specifically describe how to complete various tasks on the farm. They make it possible for different people to always complete the same tasks consistently and safely. In addition, they make for better future decision-making or investigation in to how to improve the processes on the farm. SOPs should be developed based on fundamental principles of good management.

Equipments and devices should be operating in standard procedures in respect to animal welfare requirements and in accordance with enterprise requirements to reduce hazards.

This includes;

Apply safe operating procedures regarding

- electrical safety
- machinery movement and operation
- manual and mechanical lifting and shifting
- working in proximity to others and site visitors

Apply emergency procedures

- emergency shutdown and stopping of equipment's
- using extinguishing fire

#### 2.1.2. Importance of standard operating procedures

- A guide for relief workers filling in for vacations, illness or turnover.
- A reference for employee training, cross-training and retraining.
- Less chaos and confusion when employees leave.
- Consistency- A job is performed correctly every time.
- Approved procedures that reduce the risk of job failures and interruptions.
- A basis for effective performance evaluation.
- Improved acceptance of practices because people support what they help create.
- A means for everyone to think through the whole process of a task.
- A statement of who does what, where, when, why and how.

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- Legal protection since a detailed process is documented in print.
- Reference document in accident investigations.
- An opportunity to build unity around attainable standards and goals with procedures to achieve them.
- An evaluation of labor efficiency and procedural correctness.
- A checklist for co-workers to observe performance and reinforce it if it's correct.
- An aid in writing job descriptions and identifying skill requirements

### **2.1.3. Standards for animal welfare and other ethical issues**

The first European Union legislation on animal welfare was introduced in 1974 (Directive 74/577/EEC), laying down requirements for the stunning of animals before slaughter.

Since that time a wide body of animal welfare legislation has been introduced. The Treaty of Maastricht included a declaration on the protection of animals which called for EU member states to take proper account of the welfare requirements of animals when drafting and implementing legislation. Specific welfare standards have also been laid down for individual species.

### **2.1.4. Standards for food hygiene and safety**

This directive lays down general rules for hygiene control, covering meat processing though not primary production. Food hygiene is defined as ‘all measures necessary to ensure the safety and wholesomeness of foodstuffs’.

Standards for organic production methods can be regarded as combining both environmental and animal welfare standards. These regulations also cover other ethical and safety issues, like restrictions on the use of genetically modified organisms in agricultural production.

The guiding principle throughout will be that food operators bear full responsibility for the safety of the food they produce.

The implementation of hazard analysis and control principles and the observance of hygiene rules, to be applied at all levels of the food chain, must ensure this safety.

## 2.2. Reporting non-conformance requirements

Nonconformance is an activity, attribute or document that fails to comply with established requirements and may lead to a condition having an adverse effect on quality, food safety, environment, operations or integrity.

### Types of non-conformance

If non conformances are identified during the audits, they are documented and corrective actions implemented immediately. Minor non conformances must be addressed within 30 days from the receipt of the notice or within the time frame set by the farm manager.

Major non conformances must be addressed within 15 days from the receipt of the notice or within the time frame set by the farm manager.

- **Major nonconformance:** An activity or document that fails to comply with the livestock farm standard that affects product integrity. Examples include:
  - ✓ No state environmental permit
  - ✓ Not conducting internal and third-party audits annually
  - ✓ Willful abuse or neglect of an animal
  - ✓ Not giving vaccine or pharmaceutical injections in an approved location
- **Minor nonconformance:** An activity or document that fails to comply with the livestock standard that affects process integrity. Examples include:
  - ✓ Not correctly filling out logs
  - ✓ No documentation of completed training
  - ✓ No livestock quality assurance certification for employees

## 2.3. Taking corrective action

Establish the corrective actions to be taken when monitoring indicates that a particular critical control point /CCP/ is not under control. Corrective action procedures and responsibilities for their implementation need to be specified. This will include action to bring the process back under control and action to deal with product manufactured while the process was out of control

In organic sow herds an important animal welfare problem like piglet mortality has to be controlled by preventative measures. A major cause of pre-weaning mortality in organic piglets is crushing by the sow, and risk factors for this are related to the design and dimensions of the

farrowing hut, the quality of the bedding, disturbances from predators and other animals, sow condition as well as litter condition. Potential control points targeting piglet mortality could be related to the straw type and amount provided for bedding, timing of the introduction of the sow into the farrowing facility, litter size, and disease in the sow.

Corrective actions could be related to:

- The provision of more high-quality bedding material,
- Increased surveillance of sows with late introduction to the farrowing pen, and extra care to large litters and litters from sows with health problems.

Often CCP's are physical in nature, for which standards and tolerances can be defined, while in other cases such CCPs are more biological or managerial in nature for which strict standards and tolerances have not or hardly been defined. An example approach for the latter may be the CCP for purchasing cattle: do not purchase cattle with an unknown origin and unknown health status; if one desire to purchase a cow ask for a health certificate or do a pre-test before entry into the herd. The corrective action will be when the cow appears to be infected with disease X, either to treat the animal or to cull her.

Establish corrective actions to be taken when monitoring indicates a deviation from the established critical limits for each CCP. The actions should eliminate the hazard created by deviation from the plan. If the hazard cannot be removed and the product may be unsafe, the product should be removed. In general, the action(s) must show that the CCP was brought under control.

The corrective actions include:

- a. Determining the disposition of the non-compliant product;
- b. Fixing or correcting the cause of the non-compliant product;
- c. Maintaining records of the deviation and the corrective actions; and
- d. Assuring that no hazardous product enters commerce.

<b>Self-check – 2</b>	<b>Written test</b>
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Name..... ID..... Date.....

**Directions:** Answer all the questions listed below.

**Test I: Multiple choices**

- One of the following is not the regulation of animals and their activities; (3 points)
  - Prevent and eliminate burden of animals.
  - Insure that animals intended for use in research facilities
  - Assure the humane treatment of animals during transportation
  - Exposed the owners of animals from the theft
- One is not include under corrective actions of animal welfare? (3 points)
  - Determining the disposition of the non-compliant product
  - Fixing or correcting the cause of the non-compliant product
  - Maintaining records of the deviation and the corrective actions
  - Assuring that hazardous product enters commerce

**Test II: Short Answer Questions**

- What are non-conformance reporting activities? (2 points)
- Write the types of non-conformance reporting activities? (2 points)

**Note:** Satisfactory rating - 5 points      Unsatisfactory - below 5 points

You can ask you teacher for the copy of the correct answers.

## LG # 14

## LO #3 - Report problems that affect animal welfare

### Instruction sheet

This learning guide is developed to provide you the necessary information regarding the following content coverage and topics:

- Recognizing potential or existing animal welfare
- Identifying problems of animal welfare
- Reporting variation and potential problems

This guide will also assist you to attain the learning outcomes stated in the cover page. Specifically, upon completion of this learning guide, you will be able to:

- Recognize potential or existing animal welfare
- Identify problems of animal welfare
- Report variation and potential problems

### Learning Instructions:

1. Read the specific objectives of this Learning Guide.
2. Follow the instructions described below.
3. Read the information written in the information Sheets
4. Accomplish the Self-checks
5. Perform Operation Sheets
6. Do the “LAP test”

## Information Sheet-3

### 3.1. Recognizing potential or existing animal welfare

#### 3.1. 1 Animal welfare assessments and audits

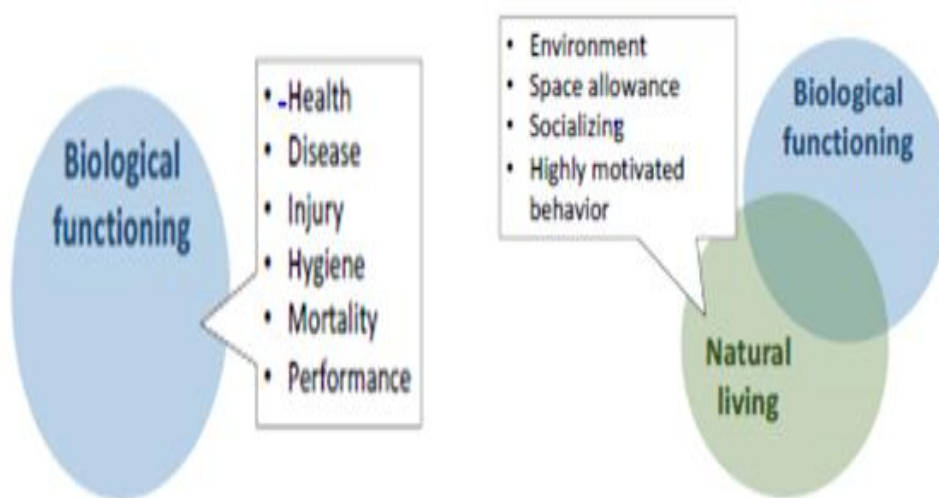
An animal is in a good state of welfare if (as indicated by scientific evidence) it is healthy, comfortable, well nourished, safe, able to express innate behavior, and if it is not suffering from unpleasant states such as pain, fear, and distress.

Welfare assessments and audits are:

- Programs developed to help assure the public that farm animals are well cared for.
- Used in the dairy, swine, beef and poultry industries etc.
- catered to measure specific animal welfare concerns for each species

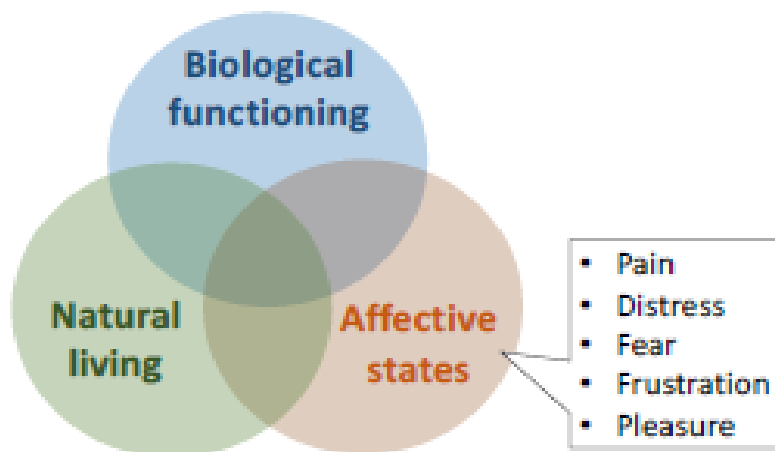
#### 3.1. 2 Audit vs. Assessment

- **Audit** = Often associated with certification and stricter criteria. Catered to niche markets.
- **Assessment** = Not usually associated with certification and less strict criteria.



**Diagram 3.1: Biological function and natural living**

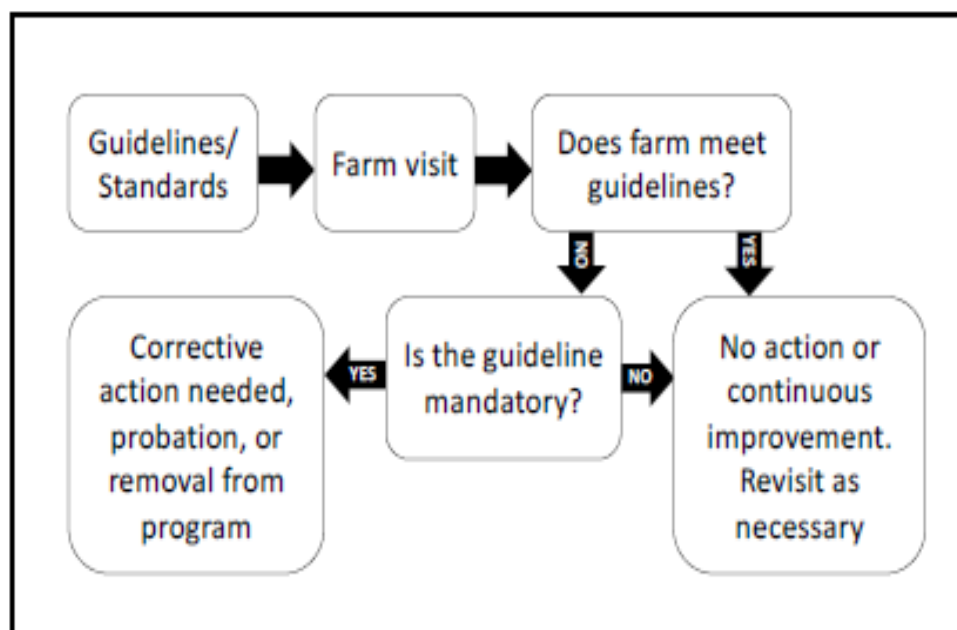




**Diagram 3.2: Affective states**

### 3.1.3 Work flow chart

The animal welfare assessments and audits work flow process



**Diagram 3.3: Animal welfare assessment and audit flow chart**

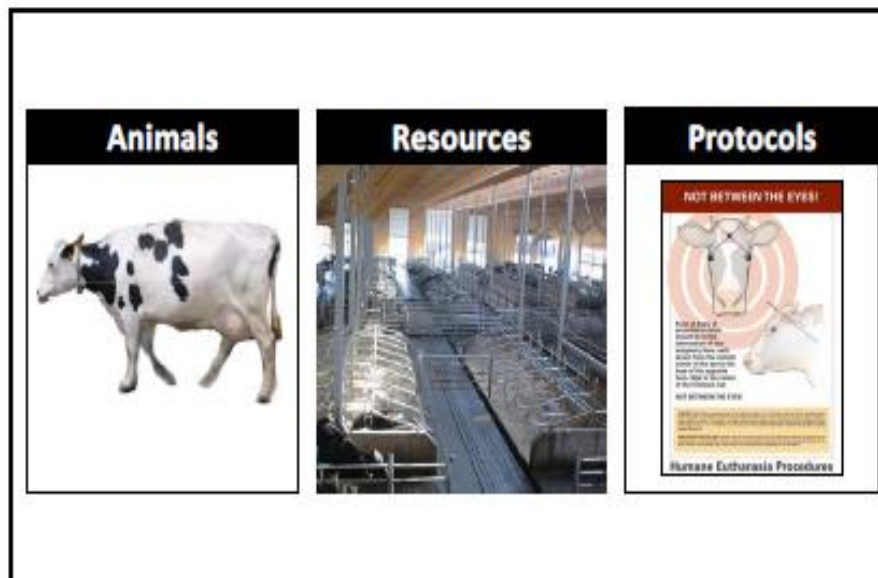
Animal welfare assessment and audit team members include;

- Producers
- Veterinarians
- Industry reps

- Scientists
- Animal advocacy groups

The team will undertake the following measures in livestock farm:

- Animal based measures
- Resources based measures
- Protocol based measures



**Figure 3.1: Welfare assessment and audit measures**

- Animal-based measures for welfare assessment and audit:
  - ✓ Lameness/locomotion score
  - ✓ Body condition score
  - ✓ Hock/knee lesion score
  - ✓ Hygiene score
- Resource-based measures for welfare assessment and audit:
  - ✓ Access to feed and water
  - ✓ Protection from heat and cold
  - ✓ Comfort and cleanliness
  - ✓ Special needs housing
- Protocol-based measures for welfare assessment and audit:

- ✓ Evidence of a Vet-Client-Patient-Relationship (VCPR)
- ✓ Evidence of stockmanship training
- ✓ Zero-tolerance policy for animal abuse
- ✓ Written herd health protocols

### 3.2. Identifying problems of animal welfare

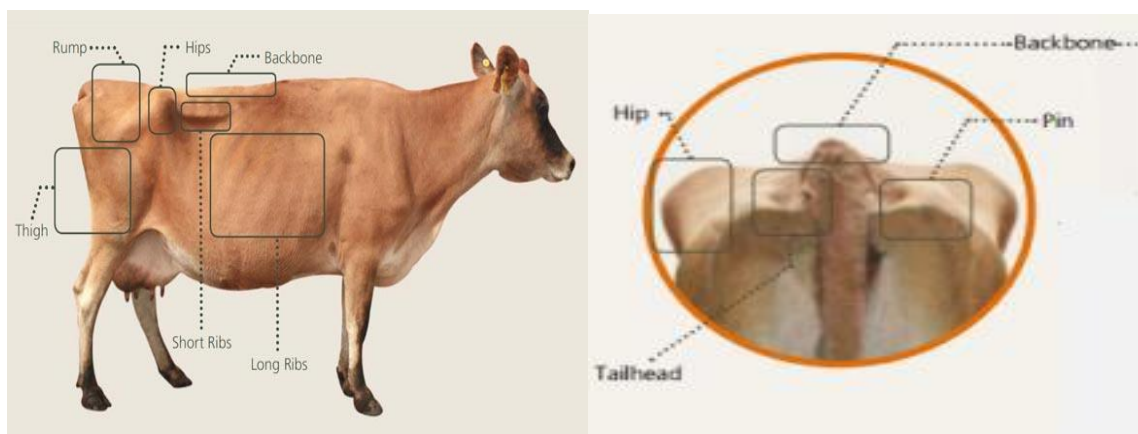
#### 3.2.1 Animal based welfare problems

The following animal-based measures indicate the problem of animal welfare

- Body condition score
- Lameness/locomotion score
- Hock/knee lesion score
- Hygiene score

##### a) Body condition score

- Body condition score for dairy cattle



**Figure 3.2(a): Labeled illustration of side view    Figure 3.2(b): Labeled illustration of back view**

During body condition scoring (BCS) illustrate areas in dairy cattle;

- Short ribs
- Backbone
- Hook and pin bones
- Thurl (area over pelvis)
- Tail head

BCS of dairy animals categorized under;

- 1) BCS 1: (Emaciated- Red Zone)
- 2) BCS 2: (Thin-Yellow Zone)
- 3) BCS 3: (Average- Green Zone)
- 4) BCS 4: (Heavy-Yellow Zone)
- 5) BCS 5: (Fat-Red Zone)

- Goals for body condition scores by stage of lactation:

- ✓ The dairy cattle code of practice provides recommended target BCSs during various stages of lactation:

**Table 3.1:** BCS during the various stage of lactation

<b>Dry off</b>	<b>3.25 - 3.75</b>
<b>Calving</b>	<b>3.00 - 3.75</b>
<b>Early lactation</b>	<b>2.50 - 3.25</b>
<b>Mid-lactation</b>	<b>2.75 - 3.25</b>
<b>Late lactation</b>	<b>3.00 - 3.50</b>
<b>Growing heifers</b>	<b>2.75 - 3.25</b>
<b>Heifers at calving</b>	<b>3.25 - 3.75</b>

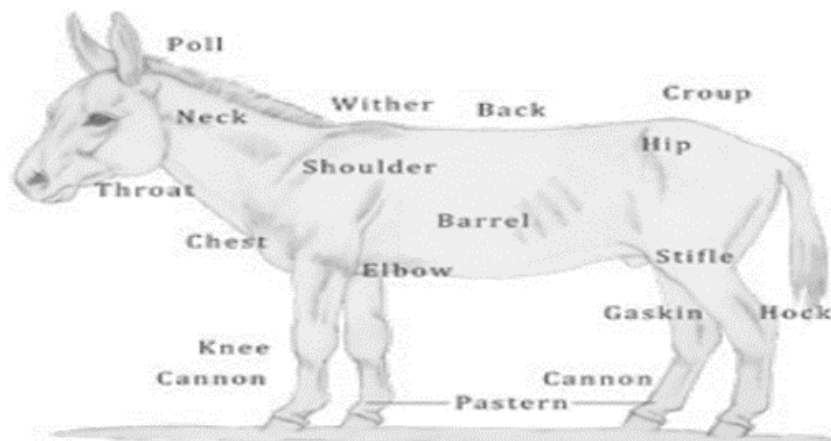
- ✓ Cows should be at an ideal BCS at dry off and should be fed to maintain this condition until calving.
- ✓ Post calving (calving to 120 days) cows can be expected to lose 0.5 to 1 unit of BCS. Cows should not lose more than 1 BCS at any time or within a very short period of time.
- ✓ BCS should remain constant or begin to increase during mid-lactation. During late lactation cows should gain back the BCS lost during the post-calving period.
- ✓ Cows that are too fat at calving (BCS>4) are more prone to reproductive and metabolic diseases (e.g., difficult calving, retained placenta, cystic ovaries, uterine infections, ketosis, displaced abomasum, milk fever).

- ✓ Cows that are too thin at calving (BCS<3.00) may not have sufficient body reserves to support high levels of milk production. Cows that lose more than 1 BCS experience reduced fertility, ketosis, particularly if the loss is too rapid.
- ✓ Keep records. Identify animals that are too thin or overweight and consult with the feed specialist and/or veterinarian to evaluate possible causes and take corrective actions to improve the BSC of those animals.

- **Body condition scores for sheep**

- ✓ categorized under;
  1. BCS 0: (starving)
  2. BCS 1: (very thin)
  3. BCS 2: (thin)
  4. BCS 3: (moderate)
  5. BCS 4: (fat)
  6. BCS 5: (very fat)

- **Body condition scores for donkey and mules**



**Figure 3.3: Labeled illustration of a donkey**

During body condition scoring (BCS) illustrate areas in equines;

- Neck and shoulders:
- Withers
- Ribs and belly
- Back and loins
- Hindquarters

BCS of equine categorized under;

1. BCS 1
2. BCS 2
3. BCS 3
4. BCS 4
5. BCS 5

**b) Lameness/locomotion score**

Lameness scoring scale

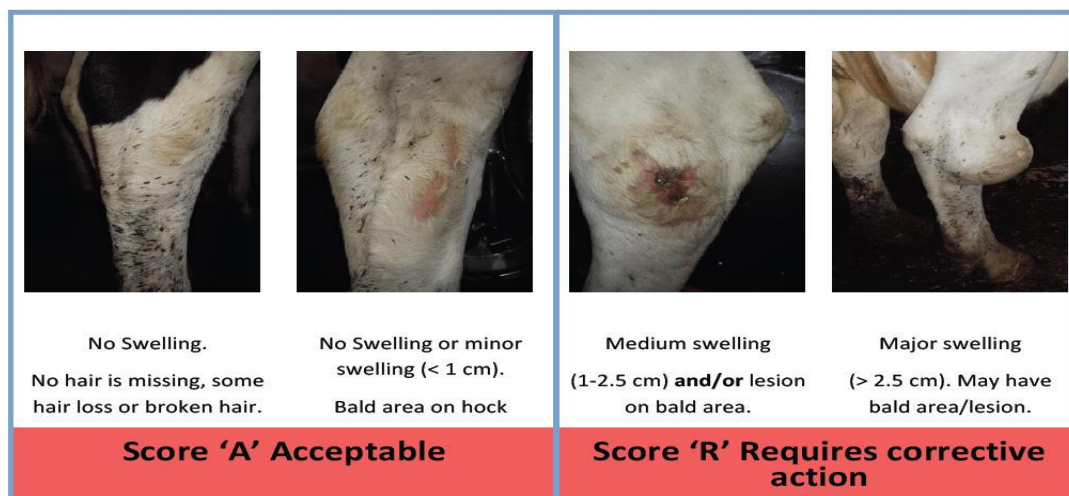
- 1 = Normal gait: no limping
- 2 = Moderately Lamé: limps, but places weight on limb
- 3 = Severely Lamé: definite limp does not place weight on limb

**c) Hock/knee/neck lesion score and hygiene score**

The injury scoring system is intended to simplify the evaluation of hock, knee and neck injuries of dairy cattle

• **Hock injury**

Condition of the hocks can be an important indicator of the abrasiveness of the resting surface, stall design, and cow comfort.



**Figure 3.4: Hock injury scoring char**

- **knee injury**

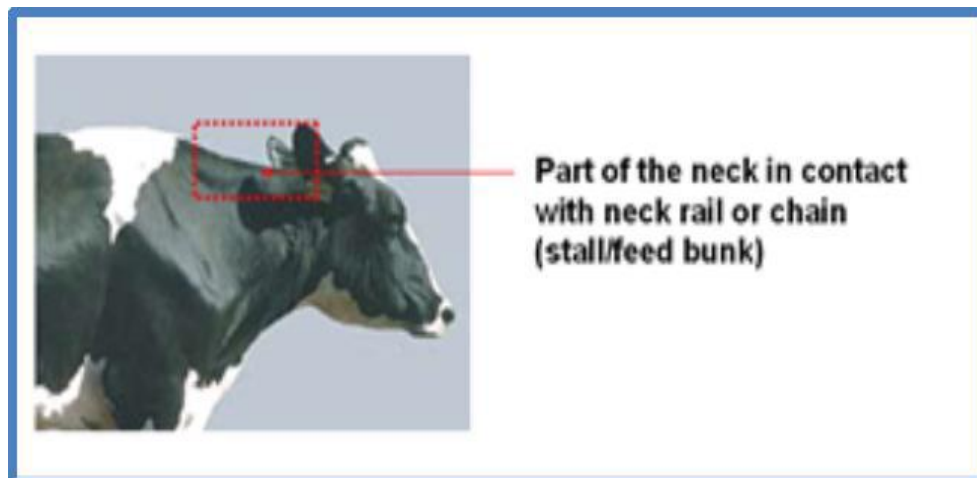
Knee health is an important indicator of cow comfort and the hardness of the resting surface floor.



**Figure 3.5: Knee injury**

- **Neck injury**

Neck injury is an important indicator of whether neck rail/chain is at the correct height/length and that the feed is consistently within easy reach for the animal.



**Figure 3.6: Part of the neck in contact with neck rail or chain**



Score 'A' Acceptable	Score 'R' Requires corrective action
 <p>No swelling. No hair is missing, some hair loss or broken hair.</p> <p>No swelling. Bald area visible</p>	 <p>Broken skin or scab and/or swelling. May have bald area</p>

**Figure 3.7: Neck injury**

### 3.2.2 Resource-based animal welfare problems

The lack of following resource-based measures indicates animal welfare problems

- Lack of access to feed and water
- Exposure to heat and cold
- Lack of comfort and cleanliness
- Lack of special needs housing



**Figure 3.8: Food and water**





**Figure 3.9: Protection from heat and cold**



**Figure 3.10: Comfort and cleanliness**



**Figure 3.11: Special needs housing**

### **3.3. Reporting variation and potential problems**

#### **3.3.1 Principles of good animal welfare**

The four principles which are essential to safeguard and improve farm animal welfare:

- Good housing
- Good feeding
- Good health
- Appropriate behaviour

These complement and extend the so-called five freedoms and provide the solid platform needed to build the welfare quality assessment system and reporting the potential variation.

### **3.3.2 Criteria of good animal welfare**

Within the above principles we highlighted twelve distinct but complementary animal welfare criteria.

These underpin the welfare assessment systems that are being developed for cattle, pigs and poultry in welfare quality

- Animals should not suffer from prolonged hunger, i.e. they should have a sufficient and appropriate diet.
- Animals should not suffer from prolonged thirst, i.e. they should have a sufficient and accessible water supply.
- Animals should have comfort around resting.
- Animals should have thermal comfort, i.e. they should neither be too hot nor too cold.
- Animals should have enough space to be able to move around freely.
- Animals should be free of physical injuries.
- Animals should be free of disease, i.e. farmers should maintain high standards of hygiene and care.
- Animals should not suffer pain induced by inappropriate management, handling, slaughter, or surgical procedures (e.g. castration, dehorning).
- Animals should be able to express normal, non-harmful, social behaviours, e.g. grooming.
- Animals should be able to express other normal behaviours, i.e. it should be possible to express species-specific natural behaviours such as foraging.
- Animals should be handled well in all situations, i.e. handlers should promote good human-animal relationships.
- Negative emotions such as fear, distress, frustration or apathy should be avoided whereas positive emotions such as security or contentment should be promoted.

Any welfare variation from above should be reported to the supervisor

Protocol noncompliance is the failure to follow terms and conditions of an approved protocol including, but not limited to:

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- Housing animals in unapproved facilities;
- Beginning research projects without concerned body approval;
- Wrongful/abusive physical or psychological treatment of an animal;
- Involvement of personnel not listed in an approved protocol;
- Changing analgesics or anesthetics without approval;
- Not following experimental timelines;
- Conducting unapproved procedures

<b>Self-check – 3</b>	<b>Written test</b>
-----------------------	---------------------

Name..... ID..... Date.....

**Directions:** Answer all the questions listed below.

**Test I: Short Answer Questions**

1. What are welfare assessment and audit measures? (3 points)
2. List animal-based measures for welfare assessments and audits (4 points)
3. List resource-based measures for welfare assessments and audits (4 points)

**Note:** Satisfactory rating – 6 points

Unsatisfactory - below 6 points

You can ask you teacher for the copy of the correct answers

### Operation Sheet -3

Steps of undertaking body condition scoring for dairy cows

#### 1. Tools and equipment's

- Recording book
- Pencils

#### 2. Procedures/Steps/Techniques

- Record the ID number of the animal on the cattle assessment record.
- Refer to the Body Condition Scoring Chart in the information sheet
- Assess cows or status by tabulating scores. In particular, cows with a BCS equal to, or less than 2, are too thin. Cows with a BCS equal to or more than 4 are too fat.
- Identify animals that are too thin or overweight. Consult with the feed specialist and/or veterinarian to evaluate possible causes and take corrective actions to improve the BCS of those animals
- Record the results of the assessment in the herd health scoring record

<b>LAP TEST-3</b>	<b>Performance Test</b>
-------------------	-------------------------

Name..... ID.....

Date.....

Time started: \_\_\_\_\_ Time finished: \_\_\_\_\_

**Instructions:** Given necessary templates, tools and materials you are required to perform the following tasks within **1** hour. The project is expected from each student to do it.

**Task:** Undertake body condition scoring for dairy cows

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- [https://www.youtube.com/watch?v=YQjR7Yy\\_740](https://www.youtube.com/watch?v=YQjR7Yy_740) /accessed date 08/2022/
- <https://www.youtube.com/watch?v=Y5W3JAID52g> /Accessed date 08/2022/
- <https://www.youtube.com/watch?v=iKgtWy8gf6M&t=78s> /Accessed date 08/2022/

## **ACKNOWLEDGEMENT**

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			<b>September, 2022</b>



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