**THE FEDERAL UNIVERSITY, KASHERE**

 **FAULTY OF AGRICULTURE**

 **DEPARTMENT OF ANIMAL SCIENCE**

Course Code: ANS: 5203

Course Title: Cattle, sheep and goat production

No of unit: Two

Course Duration: Two hours

Status Compulsory

Prerequisite: Nil

Course instructor: Sadiq M.S and H A Umar

Department of Animal science

Phone: 08036954296

Email: msskumo@gmail.com

**Course description**

This course is very important for profitable animal production. This stems from the fact that a

Good understanding and judicious use of knowledge acquired from this course would lead to

Good management in livestock production.

**GRADING SYSTEM FOR THE COURSE**

This course will be graded as follows:

Class Attendance In form of random quizzes 10%

Assignments 10%

Test(s) 20%

Final Examination 60%

**TOTAL 100%**

***Attendance:*** It is expected that every student will be in class for lectures and also participate in all practical exercises. Attendance records will be in the form of random quizzes to determine each person’s qualification to sit for the final examination. In case of illness or other unavoidable cause of absence, the student must communicate as soon as possible with the instructors, indicating the reason for the absence.

***Academic Integrity:*** Violations of academic integrity, including dishonesty in assignments, Examinations or other academic performances are prohibited. You are not allowed to make Copies of another person’s work and submit it as your own; that is plagiarism. All cases of Academic dishonesty will be reported to the University Management for appropriate sanctions in Accordance with the guidelines for handling students’ misconduct as spelt out in the Students’ Handbook.

***Assignments and Group Work:*** Students are expected to submit assignments as scheduled. Failure to submit an assignment by certain student as at when due will earn such student zero for that assignment. Only under extenuating circumstances, for which a student has notified the instructor in advance, will late submission of assignments be permitted.

***Code of Conduct in Lecture Rooms:*** Students should turn off their cell phones during lectures. Students are prohibited from engaging in other activities (such as texting, watching videos, *etc*.) during lectures.

**Beef and dairy production industry**

**Introduction:** A great deal of indigenous tropical cattle (zebu humped) animals were imported through north east Africa. It is believed that the immigrant cattle like the haematic first longhorn and the second short horn, which were considered as the ancestor of Bos Taurus and Bos indicus mixed again to give ‘‘**sanga’**’ cattle which are known to be dominant type of cattle in Africa today, Cattle represent a valuable asset in both traditional and modern agriculture, they provided meat, milk skin and drought

**Importance of Cattle, Sheep and Goat Production**

1. Production of hide and skin
2. Meet production
3. They convert fibre to manure
4. Uses as a farm power
5. Because of their small size they are handle for experimentation
6. They are value during cultural ceremonies
7. Sheep and goat are important in converting grasses to meat
8. Goat are very prolific
9. Contribute to clothing and other non-food product
10. For recreation, entertainment

**Beef industry:** include breeding, feeding and marketing beef cattle with eventual processing and merchandizing of retailed products to consumers. The process involves many people and utilization of numerous biological and economic resources in each segment of this operation time is important. Compressive knowledge of the beef industry. The beef industries involve many people i.e. producer, processor, consumer. In Nigeria there is hardly an organised structure presently that can be refer to as beef industry, however a complex system has evolved as an institution which involve the flow of livestock animal feed, health care input and selected services from initial part of production to consumer.

**Dairy industry:** it involve animal husbandry purposely for milk production in large quantity there is specific breed that are managed for milk production ie Holstein jersy, Ayshire

**Type of cattle**

**Beef types:** These are characterized by great depth and width of the body i.e. The meat carrying part of the frame work is well developed into a blocky conformation; tropical beef cattle are capable of converting large quality of easily obtained fodder.

**Dairy Types:** These are characterized by the following placed disposition, a well formed udder, an overall wedge or triangle shaped appearance of the frame resulting from a fine narrow shoulder, moderate girth, a deep belly and broad quarters. Exotic breeds such as jersey, Friesian. Brown Swiss are examples. Most tropical breeds used for milk production are dual or triple purpose types.

**Dual Purpose Types:** These are intermediate between dairy and beef types in conformation and production.

**Work or Draft Types:** Its great length, free moving limbs and sound feet as well as quiet temperament and submission to discipline characterize good work type of cattle. The demand for work type cattle in Africa is still maintain on light land operation and for several farm works. The small more active type is general preferred because they are thrifty and can be maneuver easily in restricted space, Sokoto gudali is a good example.

**Characteristic of major indigenous breeds**

1. **White Fulani:** The animals are a ranged type i.e. would graze over extensive grass land. It is the most numerous and widely distributed in Nigeria. It is large white animal with black erect ears and medium size horn curved outward and inward, the coat colour of white Fulani is commonly white on a black skin with black ears, eyes, muzzles, hooves, horn tip and tip of tails. They are big animals averaging 129.5cm at withers and weigh about 340 kg for premature Cow and 525kg for premature bull. The average birth weight is about 27.3kg and average calving age is 3.5 years .
2. **Sokoto gudali:** This are found around northern areas they are less resistant to trypanosomiasis than white Fulani. It is a big animal with uniformly grey or cream colour with darker spots around the shoulders. It is short legged cattle with short horn that is sometimes effectively absent, dewlap skin fold are well developed they are docile hence can be adapted for work or draft. They are known to be beef animals but could also be a dairy animal when properly fed.
3. **Red Bororo:** They are a long horn breed of cattle found in the north eastern parts of the country where average annual rainfall is 63.5cm.It is very large bodied breed of cattle with deep burgundy coloured coat; it is characterized with pendulous ears and by thick horns, they weigh about 408kg at maturity, they poor milk producer and matures late
4. N’Dama: It is brown humpless cattle with little or no dewlap from Sierra Leone, Guinea, and Senegal. The bulls may weigh up to 600kg. They are not docile but resistant to trypanosomiasis and this attribute is responsible for their successful keeping in tsetse fly endemic areas. it has compact body on a short legs and a broad straight back, the cattle being beef type are easily maturing but poor milker.
5. **Muturu:** it is a small bodied animal with blocky conformation and compact body. It’s a humpless animal with a straight back as a broad head. Muturu is generally pure black or black as white and dark brown.i.e. Mean height is about 1 metre,it matures in 3-4 years, it weight up to 200kg at maturity.

**Characteristic of major exotic breeds**

1. **Brahma: -** it’s native of Indian its good for cross breeding purpose, its good beef animal. The colour of the coat is normally a very bright red but may be black. It is exotic humped cattle that can weigh up to 1,200kg. The hump is large in male and smaller in female, the dewlap is large horn are widely spaced, thick in female than males.

2. **Brown Swiss:** exotic bread weight 600-900kg, birth weight of heifer is average 42.3kg while the bull weight is 46.0kg. They are solid brown and could be from light to light to dark.

3. **Hereford:** Native of England, white face, body colour varies medium to rich red.it is distinctly a big breed and individuals of the breed are rather rectangular in form,it has foraging ability.

4. **Holstein Friesian**: exotic good dairy and good for crossing local breeds to enhance milk production of local breed, it is resistant to trypanosomaisis. At maturity, cows weigh about 550kg and the bulls weigh up to 900kg**.**

 **Feeding and management of cattle**

**Feeding of Cattle**

The feed consumed use for a number of different purpose the exact usage varying somewhat with class, age, and productivity of the animal, a certain part of the feed is use for the maintenance of the body function aside from any useful production this is known as **maintenance requirement** in addition various classes of animal use feed to take care of the function for which they kept; the young animal need nutrients suitable for building muscle tissue, bones ,finishing animal need a surplus of energy, feed for the formation of fat, breeding animal (female) required feed for the development of their foetuses and prepare for parturition, for the production of milk, where as work (draft animal) use feed to supply energy for work, other classes required feed for production or egg and wools.

Feed are substance voluntary eating by animals to provide nutrient such as energy ,protein and vitamin metabolisable in body to produce and maintain the body tissue fluid and product e.g. milk and meat, most of feed are made up natural substance which are commonly of organic matter and little component of inorganic matter, the organic matter component consist of carbohydrate , protein, lipid and vitamin ,inorganic matter is made up mineral, feed stuff are classified base on their type of nutrient content, those that are high in nutrient density and easily digestible by ruminant animal are term **concentrate,** those that are poorly digestible and lower in nutrient content are refer to as **roughage** both concentrate and roughage are to provide protein and energy, it is therefore noted that any feedstuff with crude protein content greater than or equal to 16% is classified as **protein** source, while feed material with less than 16% is term as **roughage,** protein and energy feed contain some vitamin and mineral but may not be adequate to meet animal requirement supplementary vitamin and mineral are given and such mineral and vitamin are refer to as **Additive**.

 **Feed is consumed for:**

**Maintenance Requirement:** It may be defined as a ration which is adequate to prevent a loss of tissue in the body, a mature animal must eat to maintain body temperature, sufficient energy to cover the internal work of the body and the minimum movement of the animal, small amount of protein, vitamin, and mineral for the repair of the body tissue. No matter how quietly the animal is, it still required a certain amount of feed which it can exist it called basal **maintenance requirements** for economic reason finishing animal (fattening) should eat and lay down as much as possible even under the best condition about ½ of the all the feed consumer is use in meeting the maintenance required.

**Growth:** Growth may be defined as a increase in size of the muscles, bones, internal organ and the other part of the body, growth refer to as foundation of animal production, young animal will not make the most economical finishing unless they have raise vigorously, likewise breeding female may have their productive ability seriously impaired, if they have raised improperly. No one can expect the most satisfactory yield of milk from dairy cow unless they were well develop. The horses do not posses desire speed and endurance if their growth have been stunted and their skeletal is not well develop.

**Reproduction and Lactation:** Regular and normal reproduction is the basis for profit of a farmer or rancher, certainly there are may cause of reproduction failure, many scientist are agreed that inadequate nutrition is the major problem with all species, the growth of foetus occurs during last third of pregnancy, thus making the reproduction required most critical, during this period the ration of the pregnant female should supply sufficient amount of carbohydrate, vitamin and mineral. In the case of young growing pregnant female additional protein, mineral and vitamin above the ordinary requirement most to be provided.

**Dual Purpose Production:** For the most part of the nation dual purpose production is normally confined to the small farmer who lives upon the land. In this type of production an attention is made to obtain simultaneously as much beef and milk is possible. One of the important of dual purpose production is the flexibility which it affords. When labour is available and dairy product is high in price the herd may be mange for milk production, on the other hand when labour is scarce and dairy product is low in price calve may be left with their dam and emphasize may be place for beef production, basically when established of caw-calf system, a farmer and rancher need to give consideration to the availability of the fallowing resources, Land, labour, capital and management skill. The most successful cattle man would put these together as to maximize profit, followed by increase cow number.

**Management of cattle**

1. Extensive system
2. Intensive system
3. Semi intensive
4. **extensive System:** This system of production entails keeping of animals on the open range, the system is mostly practice by Fulani, the animals are left to search for feed on their own, while they came back home at night to sleep under any available shed as no special housing unit is usually provided. Under this system the Fulani moved with their livestock from North to South in search of feed and water. The system is cheap as there is little or no cost of establishment, feeding, medication and housing, but loss due to accidents, predators and theft is high under this system.
5. **Intensive System:** This is types of system of animal production in which the environment is controlled and animals are properly monitored when confined. Housing is well constructed animal health, performance, productivity, quality of animal product and economic benefit are main point of this system of animal production. The population of livestock under this system is about 3%. Animals go out to graze on pasture in the morning and evening however they return to their housing, there are provided with concentrate, feed, water and salt leak. Animals are protected from environmental hazards and inclement weather, but it involves very high financial outlay for housing, feeding, medication and provision of equipment.
6. **Semi-intensive System:** This system is partly extensive and intensive, the animal are allowed to roam, a suitable housing is provided at night while the farmer provides, some feed in form of kitchen wastes and grains milling by product, some animals are kept under this system by what is known as mixed farming, some livestock owners might take their cattle out during the day and bring back to their pens in the evening.

**Breeding in cattle**

**Age at puberty**

The normal age of puberty of cattle is 8 to 12 months. The age at which puberty attained however varies according to breeds, smaller breed attained earlier than the larger ones, also environmental and nutritional factors affect maturity.

**Age to breed heifers**

The age at which to breed heifer will vary with growth and development. However when heifers are reasonable well grown, a safe rule is to breed at the first breeding season after they are fifteen to twenty months old., and should attained two thirds of their expected mature weight. If they are bred before that it may limit their growth and future production. The gestation period is nine months

**Heat period**

This is the period during which the cow will accept the bull for mating and conception and this period usually lasts for 16 to 20 hours. Cows tend to have a pattern of external behaviours. The heat period can be very short. More than half the heat periods in the herd will be less than 12 hours long. About half heat periods are Likely to happen at night, increasing the difficulty of detection. Observation is the key to heat detection. watch the cows quietly at least three times a day for about 20 minutes each time. The best time to watch the cows are:

1. early morning before milking
2. early afternoon
3. as late at night as possible

Early warning signs that a cow is about to come on heat are:

a. Licking or sniffing

b. chin resting

Sign of heat, the cow is on heat when:

a. she stand willingly to be mounted by another cow and does not try to escape.

b. she mount another cow from front; watch her to see if she also stands to be mounted.

c. temporary drop in milk yield;

d. restlessness.

e. Swollen and reddened vulva lips.

g. a clear, thin, mucous discharge hanging from the vulva or sticking to the tail.

**Care and management of bull**

Outdoor exercise throughout the year is one of the first essentials in keeping the bull virile and in a thrifty condition. Many valuable sires have been ruined through close confinement in a small stall or more likely yet through being kept knee deep in mud within a small filthy enclosure. in addition to the valuable exercise obtained in the grassy paddock, the animal get succulent pasture, an ideal feed for the bull.

**Care of the pregnant cow**

The nutrient requirements of the pregnant cow are less rigorous than those during lactation. In general, pregnant cows should be provided as nearly year round pasture as possible. During time of inclement weather or droughts, supplemental feed such as dry roughages and silage are necessary. No shelter is necessary expect during periods of inclement weather. Normally, the cows will prefer to run of doors. This desire is to be encouraged in order to provide exercise, fresh air, and sunshine. For two months before calving, feed the heifer 2 kg per day of concentrates, in addition to her normal grazing .

**Calving**

Normal single presentation; the back of the foetus is directly towards that of the mother, the forelegs are extended towards the vulva, and the head rests between the forelegs. Calving normally occurs without any difficulty. However when the following signs are noted a veterinarian should be called:

a. If the is any long delay between the breaking of the water in the uterus and the first sight of part of the young.

b. If there calving takes more than three hours after some part the young is seen or if the cow is obviously in distress;

c. If the calf is not emerging in the normal position.

**The Cow-calf System:** The cow-calf system refer to the breeding of cow and rising of calf (production factory) in this system to calve runs with their dam usually on pasture until are weaned and the cow are not milked. The important of the cow-calf system (production factory) in animal agricultural are:-

* Production is cheaply and conversion of coarse forages and grasses into palatable and nutritious food for human composition.
* The production of calve is the first and most important target of the cow-calf system

The cow-calf operator has several options, he may choose to:

1. A mixed farming or a range herd

2. Running a commercial or pure bred cattle

3. Selling weaner for stocker

4. Dual purpose production

**Housing and Equipment in Cattle**

The farm or ranch are different in type and size, so buildings will vary accordingly, among the factor to be consider in building cattle housing are:-

1. Size of the farm
2. Available market
3. Types of production e.g. beef or dairy
4. Personal preference
5. Climatic condition
6. Storage requirement

There is general requirement of animal building, these most be consider during establishment, it is important that very careful consideration to be given for the initial design, the general requisite which livestock building should meet are:-

1. Flexible design
2. Reduce labour
3. Have utility value
4. Provide protection from weather condition
5. Durability
6. Well ventilated
7. Provide direct sunlight
8. Easily to clean and manure disposal
9. Provide adequate space
10. Source of water
11. Keep proper humidity
12. Adopted to present and future need

**Space requirement of Building**

One of the most difficult problem confronting a farmer or Rancher in constructing a housing is that how to arrive at proper size or dimension. In general little space will result in poor health and well being of the animal, where as more space is good but it is more expensive. Building for housing cattle should include, forcing pen, veterinary crushes, feed stall, holding yard, crouch, young stock shed, calve and cow shed, exercise shed and sick bay, a dip and crouch are essential on a cattle farm.

**Livestock Equipments:** Modern equipment has practically eliminated pitch cork, bucket and basket. Equipments such as chores and watering, bedding and barn cleaning have been or are being mechanised. But in using the local equipments regardless of the kind of equipment or size this must be consider:

1. Simple in construction
2. Durable
3. Movable
4. Accessible
5. Save feed
6. Reduce labour
7. provide protection

**Calf rearing**

Calves are the foundation of the future herd therefore they should be selected carefully and reared well. If calving had been normal, the cow could usually take care of the new born calf, and it is best not to interfere. However in unusual cases, it may be necessary to wipe the mucus from nostrils to permit breathing.

**Goal for a successful calf management system**

1. Building the immune system of the calf as soon as possible after birth
2. Reduce stress and microbial challenges to the calf
3. Provide adequate nutrition
4. Provide proper treatment for sick calves

**Immediate care of the calf after birth**

1. Clean away mucus from the nose and the mouth

2 .Make sure breathing is initiated, especially after difficult birth. This can done by tickling the nose or pouring cold water on the calf’s head, which causes the grasping reflect in the calf.

1. Feed ample amounts of colostrums as soon as possible within the first hour after birth.
2. Separate the calf from the within the first 12 hours of birth after the cow has dried the calf and the calf has nursed.

6 .Dip or cut the navel with 7% tincture of iodine.

1. Make sure the calf is properly identified.

**Feeding colostrums**

Colostrums it is the first secretion produced by the mammary gland of cows after calving. It is a rich source of protein, fat, minerals and antibiotics. Make sure the calf receive colostrums within the first three days of live from three to eight day after calving, the milk is thick enough for human consumption, after three day removed the calf from the dam and introduce the calf to bucket feeding thus leaving most milk for human consumption, as from three day fed whole milk at the rate of 10% body weight. (Milk replacer).

**Growing and finishing operation**

**Finishing (Fattening)** is the process offeeding animals to put on weight within a period of time; the exercise is carried out in a feed lot. During which there is lying of fat especially in the tissue of abdominal cavity and in the connecting joint just under the skin and between muscles (Marbling fat). The composition of the ration for finishing may be the same as for maintenance, but it must be supply in large quantity. In practical sense finishing animal is usually obtained through increasing the allowance of feed high in carbohydrate and fat, also allowance of grain and surplus of protein may also serve for the production of fat but usually such feed is more expensive and are not use for economic reason, in fattening matured animal very little, or more protein, vitamin and mineral are required than for maintenance. In young growing animal it is essential that, in addition to supply more carbohydrate and fat, ample protein, mineral and vitamin be provide. In general the more feed a growing finishing consumer, the more weight it gains. Feed lot animals are usually fattened on both concentrate and roughage in a ration of 60:40.it is more profitable to graze fatteners beef animals on pasture during wet season and then finish them in the feedlot. Example of breed for fattening are Azwak, Bunaji, sokoto gudali and wadara are good animal in tropical Africa.

**Selection criteria for profitable Fattening**

 To make profit and produce good meat, the following are considered.

1. **Age of the Animal:** Two of three years old, need less for every unit of weight gain, in that they digest more efficiently and consume large volume of feed in proportion to body weight. Younger animals cost less because of lesser weight. They requires longer period of feeding and higher feed quality to reach the desired finish. Older feeder stock (4years and above) need less time in the feedlot and will eat a wide variety of feed and roughage then young stock. If nutritious feed is abundant, younger animal are generally more economical to fatten.
2. **Breed:** Improved breeds and crossbreds gain weight faster than native animals; tropical breeds are more adaptable to local climatic and feed condition than temperature breeds. In Northern Nigeria farmers prefer Bungi Rahaji and Sokoto Gudali as the animals respond faster to improve feeding during fattening.
3. **Sex:** Steers (castrated males) are preferred to heifers (inbred female) in that, they are easier to manage. Steers also gain weight and grow faster than heifers in general males gain weight faster than females’ animal.
4. **Health Condition:** Look for healthy animals, a healthy animal is alert and active, has bright eyes, smooth hair coat and moist muzzle. Avoid animal with rough skin, blood and lame.

**Assignment**

1. Write on feed resources used for beef fattening operation in your area.

**Health Management of Ruminants:**

A good stock man will institute a programme design to a sure herd health, disease prevention, and parasite control, when there is disease problems do not attain to diagnosed but call upon a veterinarian. A good producer will be in a better position to institute a programme design to:

1. Assure Health.
2. Readily recognised a serious outbreak of disease and promptly call a veterinarian.
3. Prevent a necessary suffers of sick animals.
4. Would be able to assist the vetenarinian in administering drugs.
5. More competent in carrying out a programme designed to control disease which minimum spread of the infection.

**Sign of Good Health**

 Knowing sign of ill and sign of good health is important in order to known when disease struck your herd these should consider:

1. **Contentment:** The cow will stretch on rising, the sheep will stand or lay quietly, the pig will curl his tail and horse will look completely unworried when resting.
2. **Alertness:** Healthy animal are alert, have bright eye and would pick their ears up.
3. **Eating:** which relish and cuddling (rumination) by ruminant (cattle, sheep and goat) is assure sign of good health and is one of the first thing to disappear in sickness.
4. **Good Coat Scoring:** A healthy animal has good skin condition.
5. **Bright Eyes and Pink Membrane:** In healthy animal eyes are bright, when lower lip bent down is whitish pink in colour and moist.
6. **Normal Faeces and Urine:** The consistency of the faeces varies which diet for instance when animal are first turned to lush-grass, the faeces will be loose, also the consistency and dryness of the faeces vary with species, the faeces and urine should be pass without effort and should be free from blood, mucus and pus.
7. **Normal Temperature:** pulse rate and breathing rate, in general any mark and persistence to deviate from the normal pulse rate and breathing rate, the farm animal may be suspect of sign of abnormal

**Milk production, processing and handling**

**Milk:** Milk is obtained from lactating animals; milk is produced from the mammary glands. The numbers of mammary glands vary from one farm animal to another, the cow has four (4), and sheep and goat have two (2). The mammary gland is known collectively as the **udder.** Colostrums are the first milk secreted by the mammary gland after parturition. It contains essential nutrients as well as antibiotics to protect the new born offspring against diseases.

Milk is an important dietary need for the young, milk has PH 6.4 – 6.8. Milk supplies energy (lactose), milk fat and protein. Milk of cow is the most widely accepted and widely distributed of all other milk produced by mammals. Milk from goat is more nutritious and believed to be medicinal too. It is tolerated by people who an allergic to cow milk. It is also easily digestible.

**Table (1.1) Composition of Milk from Different Mammals (%)**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Livestock Spaces  | Water | Fat | Lactose | Protein  | Ash  |
| Cow (cattle) | 87.5 | 3.3 | 4.6 | 3.5 | 0.90 |
| Ewe (Sheep) | 83.0 | 6.5 | 4.3 | 5.8 | 0.40 |
| Doe (Goat) | 87.0 | 4.5 | 4.3 | 3.8 | 0.40 |

Milk from the cow is very important to humans. In dairy breed of cattle, a lactating period of about (9) month usually follows parturition. In order to produce a calf every 12 month a cow must be served or inseminated 85 days after calving although some farmers serve their cow 40-60days after calving.

**Milking:**

Objectives for efficient and effective milking are to:-

1. Produce high quality milk free from dirt.
2. Remove all the milk that is reasonably obtainable after normal milk let-down.
3. Avoid injuring the dam.
4. Prevent transfer of pathogens from infected dam.

**Milking Procedure:**

1. Let the dam be calm and avoid agitating her.
2. Wipe the udder with appropriate cloths dipped in warm water containing sanitizer the warm solution will trigger oxytocin which promotes milk let-down.
3. Remove 1 or 2 steams of milk and observe the milk and dam’s disposition.
4. Dip the teats in effective sanitizing solution after milking

**Method of milking.**

1. **By Hand: -** This is done by squeezing gently on the cow’s teats using the thumb and the fore finger. Cow should be restrained after which the udder is cleaned and sanitized before making commences. For local cows, it may be necessary to tie the calf to the cow to encourage milk let-down.
2. **Milking Machine:** - This mimics the sucking calf by creating a pulsating vacuum around the teat causing the milk to be released from the udder. The milking machine consists of a pump to remove air from the vacuum pipe, a vacuum regulator, for regulating the amount of vacuum and a tank for collecting milk that comes from the teat cup s during milking.

**Factors Affecting milk Yield:**

1. **Physiological State of the animal:**  A cow on heat will let down her milk for a day, Pregnant cows tend to yields less milk, also yield of milk drops as lactation advances.
2. **Age of animal:** A mature animal yield more than a young one.
3. **Health of the animal:** A sick animal (dam) produces less milk e.g. cow having mastitis
4. **Diseases:** A diseases dam will produce less milk.
5. **Nutritional Status of the animal:** Quality and quantity of feed determine the amount of milk to be produced.
6. **Breed of the animal:** Exotic breed tend to yield more than the local breed.

**Processing and handling of milk**

 There are numerous reports of diseases outbreaks associated with consumption of raw milk. The most common organisms are the *Salmonella spp.* Pasteurization is highly effective in destroying most pathogenic (disease causing) vegetative organism.

**Sources of contamination in milk**

 Milk from healthy cows, does and ewes under hygiene conditions contain relatively fewer micro-organisms, milk is vulnerable to contamination are as follows:-

1. Udder : State of the udder determines level of contamination, udder should be exposed to:-
	1. Mud and other sticky dirt’s.
	2. Bedding materials
	3. Feedstuffs
	4. Dirt’s from pipelines, tanks, valve and the filling machine.
2. Cleaning and washing equipment provide direct means of entry of microbes into milk.
3. Milk handling: Proper procedure for milking to be followed, examples of harmful contamination in milk are stones, pathogens, urine, dirt from tools straw etc.

**Measure to reduce contamination in milk:**

1. Cleaning and sanitation of;
	1. Udder and the teat
	2. Surrounding udder
	3. Utensil
	4. Milking equipment
2. Cooling milk after storage: Rapid cooling is essential especially to 20C.
3. Addition of carbon dioxide, to milk enhances production of bicarbonate which has antimicrobial activities.
4. Pasteurization thermal treatment/heat treatment.
5. High pressure treatments centrifugation and micro filtration.
6. Sterilization of milk.

**Precautions take to produce clean milk**

1. Thorough clean of animals before milking.
2. Provide the cow with ration they prefer during milking.
3. No distraction during milking e.g. smoking, eating.
4. Milk animals in a clean environment.
5. Observe hygiene or sanitary rules during milking.
6. Handle milk carefully.

**Pasteurization:**

 This is a process of heating a food, which is usually liquid e.g. milk to a specific temperature for a specific length of time, Sterilization it kills all micro-organisms in the food while pasteurization is done to reduce the number of micro-organisms. Drinking raw milk i.e. milk not pasteurization or sterilized causes health risks and therefore should be avoided.

**Importance of Milk Pasteurization**

1. It is aimed at reducing the number of viable micro-organism e.*g. brucella, salmonella, listeria, mycobacterium bovis* etc.
2. It slows spoilage caused by microbial growth in the milk.
3. It improves consumer safety
4. It also improves the quality.
5. It improves shelf life.

**Milk Products**

1. **Butter:** This is essentially the fat of the milk; it is made by churning cream until the fats separate from the liquids.
2. **Ice Cream:** This is made from whole milk, sugar, flavor are added and iced.
3. **Yoghurt:** This is curdled milk; it is made by adding acid forming bacteria in commercial production, but on a small scale yoghurt is obtained by heating fresh milk and keeping it at about 1000C. If kept for a few hours, it will naturally turn yoghurt as there are bacteria already in the raw milk.
4. **Cheese:** It is also product of milk ten kg (10kg) of milk gives about, 1kg cheese.
5. **Powdered Milk:** It is making from fresh pasteurization skin milk (non-fat).
6. The milk is concentrated in an evaporator until 50% of solid remains.
7. Concentrated milk is sprayed into a treated chamber where water evaporates instantly leaving behind tiny dry particles.

Assignments: write on Cheese making using manual method.

**Animal judging**

**Herd operation/ Recording:**

 Record Keeping is the documentation of activities on livestock farms in a concise and comprehensible manner usually in a table format. Records are important to farmers for meaningful, they must be accurate, reliable and up-to-date. Badly kept records may therefore be misleading and make famers take wrong decision.

**Importance of Keeping Records:**

1. Records can be used to access the performance of the animals.
2. Records will show if progress is being made on the farm by comparing production, returns, profit and mortality death, sales.
3. Profitability of the farms can be access through record keeping.
4. Management activities can be access through record keeping.
5. Keeping of proper records enables proper supervision of farm workers.
6. To access the work of a farm at any point in time.

Example of record sheets:

1. Animal breeding record sheet
2. Animal identification record card
3. males Performance record
4. female Performance record
5. Treatment card
6. **Breeding Record:** This includes dam, cow, does, tag, breeding date, calving/lambing and kidding date, litter size, offspring tag, sire tag, birth weight, weaning date and weaning weight.

Performance Record (Males)

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Male No | Dated Mated  | Sire No | Date of females mounted  | No of parturitions  | Letter size | Remarks |
|  |  |  |  |  |  |  |

Performance Record (Female)

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Female No | Date mated | Sire No | Date of parturitions  | Letter size  | Remarks  |
|  |  |  |  |  |  |
|  |  |  |  |  |  |

**2. Treatment Record:** Health record gives the history of any diseases diagnosed in an animal or flock, the prognosis, treatment administered, control measure taken, response of the animal to treatment/measure and other relevant remarks.

**Health Record Sheet format**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| S/No | Date  | Tag No | Sex | Age | Case History | Diagnose  | Treatment  | Remark  |
|  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |

**3. Fattening Record:** Fattening in livestock should give the account of fattening of the Bull, Ram and bucks in the feedlot. It should contain information on the date rams/bucks and bulls enters or leaves the feedlots, in initials and final weights, the regular weighing dates, weight obtained and the amount of feed offered. With fattening record, the efficiency of the meat production (kg feed intake per kg weight gain) can easily be determined.

**Fattening Record format**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| S/No | Bull, Ram, buck date in  | Initial weight  | Quality of feed offer ( kg )  | Cost of feed offer( N ) | Final weight (kg) | duration (days) | Remark  |
|  |  |  | Hay  | Concentrate | Hay | Concentrate  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |

**Identification:**

|  |
| --- |
| Animal Identification Record Card |
| Animal No: |
| Sex: |
| Date of Birth: |
| Date of Purchase: |
| Dan No: |
| Sire No: |
| Withdrawal: |
| Date: Sold died other |
| Remark: |

**Some simple livestock management practices**

 Livestock management practices vary widely between areas and individual farmer and rancher, however the principle of good management of farmer, ranch herd, pure breed, and commercial calf are much alike.

 **Identification**: All cows should be identified as soon as after birth not later than three days of age, a combination of flexible ear tags and tattoo number is recommended thereby ensuring both ease of reading and performance.

1. **Dehorning**: Dehorning is necessary because horned calves usually bring low price, in addition dehorned and naturally polled animal do less damage to facilities and other animal than cattle that has horn. All naturally horn animal should be dehorn preparable before they are 2 mouth old in order to maximize the effect of the operation (trauma), at that time the blood vessels in the horn are very small, which minimize blood looses and shock, dehorn may be accompany by one of the following:-

a. Mechanical i.e. cutting with a dehorner

1. Electrical .i.e. electrical heated iron
2. Chemical i.e. liquid paste apply on horn
3. **Castration:** Castration is recommended for all bull cow intends to be sold as feeder or finisher in feedlot. Castration time will vary according to method employed and management programme and it will be different for a commercial than for a pure breed operation. Some cattlemen use elastrator bands, when calve are only few day old other use knife or Burddizzo (clamp) when the calf are 4 - 5 month old. It is important to wait until weaning time to castrate. Bull calf will weigh more at weaning than steer calve, however younger are easily to restrain for castration and suffer less shock.
4. **Weaning:** Cow should be wean when they are 7 - 8month old, weaning early than this may be necessary in season when pasture are short or when calf are first calf heifer, the best way to wean is to remove the calf’s from their dams and kept them in separate site, the cow and calves should never turned together (put together) once the separation has been made such a practices will only prolong the weaning process and it may cause digestive disorder in the calf. Provide feed with plenty of water at the time of wean, free choice hay and some grain per day during the weaning process. Calves should be confining to small area to cut down on walking and shrinkage. In bad weather, they should have access to a shed to protect them from cold, wind and rain,

When dealing with high of milking breed (strain) stocker will have the same concern

Does not fed milk stimulated feed at weaning; put the cow on poor pasture, fed non-legume forage. Let “bag pressure” in the udder build up, examine the udder at interval but do not milk it out. If the bag full up and get tight, rub an oil preparation (such as camphorated oil or a mixed lard and spirit of camphor).

**Production and lactation in sheep and goat**

**Classification of Sheep and Goat**

Kingdom - Animal

Sub-kingdom - Vertebra (barebones)

Class - Mammalian (suckle milk)

Order - Artiotyla (hooves)

Family - Bovine (hollow horn)

Sub-family - Couprinal (sheep and goat)

Genus - Ovis (Sheep)

 - Coupra (Goat)

**Adult Male Female Young**

 Male Female

Goat Buck Doe Kid Kid

Sheep Ram Ewe Ram/lamb Ewe

**Sheep and Goats Production System**

1. Fulani
2. Hausa
3. Nomadism
4. Transhumant (sedentary)
5. Agro pastoral
6. Shepherding
7. Ranching

**Feeding of Sheep and Goat**

Feeding of small ruminant is important for economic reason, for intensive and semi intensive feeding has to be schedule in accordance to productive function under this production function animal are categories in to five (5).

1. **Dry Ewe/does under 3 month of Pregnancy:** Ewes and does that are not pregnant or pregnant under 3 month are classified as dry animal these anima need to be feed just above maintenance requirement, as a guide the daily dry matter in take for sheep and goat vary from 1.5 to 3 % body weight depending of the quality of the feed. So it is common practice to flush the animal in breeding time. Flushing is to increase the level of nutrition shortly before mating, flushing help to stimulate the shedding of ovals and ovulation which increases the chance of twining.
2. **Feeding of female more than 3 months Pregnancy:** When the female goat/sheep mate, it is likely that sheep/goat are pregnant, the gestation period of sheep and goat is about 5 month and after 3 month is possible to fed foetus. To detect pregnancy rub your hand under side of ewe or does by gently palpating the abdomen, about 10 cm in front of the udder, furthermore watch out for considerable enlargement of the abdomen and udder as the pregnancy advancing, but with advancing in technology pregnancy and sex of foetus can be determine via the use of ultra-scanning. Feeding of animal at this physiological stage is very important since addition nutrient are required for the development of the foetus. While udder development as preparation for milk synthesis increases in order to attain the desirable level of feeding required animal must given 25-50% of their daily feed, required as their feed concentrate and 25-50% as high quality forage. Concentrate ration consist of 200-300gram of maize offal, sorghum offal, wheat and some dry deep litter (poultry waste). if it’s an oil seed cakes such as cotton seed cake, groundnut cake and soybean cake each will be supplemented with 100-200gram daily during the wet season and in the dry season give 300-500gram of cereal by product, sundry poultry litter or 200-500gram oil seed cake along with 0.5% salt and 0.5% bone meal.
3. **Lactating animal and their Offspring:** Lactating animal will usually refused to eat large quality of solid feed for three to four weeks after birth, it therefore normal for lactating animal to lose weight as a result of decrease in feed and stress of nursing. Dams should fed high energy with an increase amount of protein feed for the maintenance and lactation requirement, during this period lamb and kids depend on milk, in the first week of the life, milk produce by the mother is important for the survival of the young once, young animal should receive colostrums during the first 18 hrs (up to 3 days) of their life. Colostrums is said to be digestive source or enzymes contain antibiotic and laxative which all protect the young one from disease, there are instancing which the mother is incapable of lactating the milk in such a situation the young one should fostered or artificial colostrums should formulated and given the artificial colostrums consist of 0.5 litre of fresh milk, castor oil 5ml, cod liver oil 125gram, broad spectrum antibiotic such mixture should be given twice a day, lamb and kids could also be bottle feeding and 3 day of age whole cow milk can fed to the lamb and kid in combination of 5ml of castor oil or 5ml cod liver, such mixture should be fed 3 time a day, the kid and lamb can be survive on diluted milk for first four weeks of age, from four week the young one start to nibble on the solid concentrate. The consumption will not be appreciate until eight week of age, good diary ewe or does produce about 1 kg of milk daily for the first 3 month of lactation and outstanding dam can give 2-3 kg daily while the non-dairy type given 0.5 litre per day however milk production increase in parity and decline when maximum voluntary intake is achieved, the requirement for lactating sheep and goat increase and should therefore be double relative to weight of dry animal on the other hand animal should be fed 6 to 8% of their body weight and the fed should comprise up 40% concentrate and 60% roughage, it is recommended to keep newly lamb or kidded ewes or does in individual pen for the first 2 days then in small group for two week where enough space is available. It is better to have separate pen for singles, twin, and triplet separately.
4. **Feeding the weaners:** Lamb and kids should be wean at 16 kg of weight, in any case where the use of weight is not practice by most native farmer, however by three month of age weaning should be done by separately the young one by their dams, gradually weaned animal should be fed good quality hay and concentrate ration containing all the nutrient required by growth and development. The crude protein content of the diet should 16% and introduced gradually. Feeding of breeding flock,this group of animal should be fed ration good energy to maintain their body.

**Housing and equipments**

Small ruminant they are very easier to manage because they are hardy and tolerant to tropical weather condition, under the traditional production system elaborated housing is not providing. In the case of pastoral system only open-end closure are provided the animal often tethered in most cases, under the extensive production system, rain, draught, intense sunshine drive the animal to take shelter under an available roof, or trees in surrounding areas however the required for housing is important as it protect animal against adverse whether condition particularly the kids and lambs which required some care during the early stage of life housing when ever provide make management easier. In an extensive system of production which resources and better attention are required housing is unavoidable. Site for housing sheep and goat should be dry not muddy, should be accessible to staff and vehicle , close to source of water and proper drainage, if drainage is not available you have to provide it, the floor should be dry, the design should be in such a way that the urine and dropping can be clean away easily. The floor should be sloping or furrow so that urine and faeces drain away. Use of slated keep the floor in good condition. Materials used in slate include wood, Concrete, slabs, wire-mesh/metal, Bamboo, where slab should be used, the space should be enough to allow manure to drop and small enough not allow the feet not to pass to spacing between the slab, in the few of the adult use 15mm as the young one use 10-12mm.

 The floor can be cemented or rammed in designing the house, for sheep and goat floor space of 0.3-0.4m2 (30-40cm) can be provided per adult animals, for bigger breed or those with big horn 0.7m2 is recommended the wall should be 1.5m high or just half of a normal building. It could be made from cement blocks, mud, Bamboo stem, cereal stalks, whatever material is use, it should be able for provide protection, against predators, rain, excessive heat the housing should provide adequate ventilation, which have to removed heat, pollutant, the roof can be made from corrupted iron sheet, grass thatched (zana mat), the eave of the roof should be about 1.5m, and the ridge at 1.8m

**Management House**

The management is important for the production of the animal, the floor must be clean daily expect when wood shaving or straws are used as bedding, in this case the cleaning should once in every two weeks, the sprays of hot wood ash on the rammed floor it helps to control pathogen, particular eggs and larva of worms, rammed floor should be clean weekly in raining or wet season. Once in every week in dry season, fleas and mite are common in sheep and goat housing it therefore controls by fumigation of wall and floor at about 2 weeks interval. Facilities required at sheep and goat housing are animal are:

Feeder and drinkers, dipping pit, salt leak, handling face, shovel, weighing scale, the basic facilities of feeding and watering in goat and sheep housing are feeding and watering trough in intensive system of production there are runs for some excise , handling face for routine operation in the farm are required. this include catching individual sheep, isolation of sick one, dipping etc. feeding trough can be made up cement block, curved wood ,moulded block or longitudinal cut drum, in situation where longitudinal drum are used, the edge should be smoothing to prevent injury such feeder are adequate to concentrate supplement, For roughages racks should be used for feeding trough for minimizing wastage and contamination, for animal that do not work on hard surface may have their hooves over grown may required trimming. Drenching facilities include drenching gum, coca cola bottle.

**Dairy Goat**

Milk is very important in human diets as a source of protein for body growth, tissue repairs and other vital function of the body. A part from cattle which is the predominant sources of the milk available in the market, goats also produce some considerable quantities of milk which vary from 10.02 – 3.8kg/animal/day.

**Table 2.Daily Milk yields and lactation length of some breed of goat**

|  |  |  |  |
| --- | --- | --- | --- |
| **S/No** | **Exotic breed**  | **Milk yield kg** | **Lactation length day** |
| 1. | Saanea  | 1.02 – 3.80 kg  | 130 – 300 day |
| 2 | Damascus  | 1.20 – 2.90 kg | 215 – 238 day  |
| 3 | Anglo-Nubian  | 1.20 – 3.20 kg | 129 – 237 day  |
| 4 | Sudanese Nubian  | 0.7 – 160 kg  | 120 – 147 day |
|   | **Indigenous Breed**  |  |  |
| 1 | Red Sokoto | 0.5 – 1.0 kg | 100day |
| 2. | Sahel  | 0.8 – 1.0 kg  | 120days |
| 3. | West African Dwarf  |  0.40 kg  | 126days |

 Despite the low level of milk yield by the Nigerian goat, it can still provide the populace with a cheaper source of milk to supplement cow milk which may be is costier because of the comparatively high cost of maintaining cattle.

**Why we need to keep goats for milk production:**

1. Goats are very friendly and can be kept and managed by all categories of people including women, children, and civil servant.

*2. Tubercle bacillus* infection rate is very low.

3. Goat milk has fat globules and protein which are smaller in size than those of cow milk.

4. Goat milk compares well with that of cow milk in terms of nutritional qualities.

5. Goat is cheap to acquire and maintain.

6. Goat milk is good for children or people allergic to cow milk.

**Factors affecting milk yield:**

Among the factors influencing goat milk production, breed, temperature, season and nutrition are very important. Other factors such as age, udder size and shape and body weight are variation among individual goat population that influence milk yield.

**i Breed:** Since different breeds have different yield potential (table 2). It is advisable to have breeds that will produce considerable quality for consumption by kids and humans. Our indigenous goats are apparently not diary breed as neither selected nor developed genotypically for dairy production, cross breeding with exotic breed may be desirable, this to upgrade and increase milk yield of the indigenous stock to meet the demand for goat.

**ii Temperature:** Temperature and season are important environmental factor that influence milk yield. Environmental temperature ranging from – 50C to 240C are a comfortable range for lactating animals. If the temperature is higher than 250C it affect the secretion of regulating hormones like thyroxin, growth hormone and insulin cooler environments therefore are necessary for lactating goats to express their potentials, but below 50C flow of mammary gland is affected.

**Management of Goats for high milk yield**

This deal mainly with the nutrition management of a goat for milk production, that is adequate feeding and good health status of lactating does synergistically enhance milk production. It is important, therefore, to maintain clean and hygienic environment and adhere strictly to vaccination schedules for the animals. While this practice ensures improved health status to enhance milk production it reduces dependence on the use of antibiotics for treating diseases caused by an otherwise poor and careless management practices.

**Nutritional management**

Nutritional management of goats for high yield should start during pregnancy from 4 to 6 week before kindling. At this stage, it is important and advisable to feed the pregnant doe good quality diet rich in protein and energy. This is ensure that the requirements of the developing fetus, for preparing the udder for lactation and building enough body reserve to support early lactation need are met..

**Feeding Lactating does:**

 The amount and quantity of feed to offer a doe in milk is dictated by the milk yield and the stage of lactation, it should be noted that during lactation, a doe requires more generous offer than it obtains during pregnancy for the purpose of meeting the requirements for maintenance, milk yield and growth. At whatever stage of lactation the doe organic matter digestibility (OMD) level of the diet is important therefore, the diet should be highly digestible with OMD of 77%.

 Immediately after kidding and until the end of early lactation, the doe is in negative energy balance as is usually evidenced by an apparent weight loss because of two things taking place concurrently. The doe always has reduced voluntary feed intake.

 It is pertinent to bear in mind that the weight loss at this stage is unpreventable. However, the degree of body weight loss can be reduced while feeding adequate good quality of diet to increase milk yield. The stockman should always strive to avoid under feeding of a doe in early lactation because it can impair the possible of achieving maximum yield and therefore affect total lactation yield.

 The following levels of feeding are recommended for does in early lactation.

* Legume hay , grass or chopped cereal stove free choice plus 0.3 – 0.4kg of concentrate for every liter of milk produced in addition to 150g for maintenance or 0.5 – 1.0kg of concentrate/head/day
* Where available and affordable, 25g of blood or 50g of fish meal per head per day is recommended for sufficient supply of bypass protein.

Lush grass during rainy season can sustain milk production even without supplementation; but for optimum yield supplementation with a protein which is limiting in the grass that is easily degraded in the rumen. When diet is fed is low in mineral level, supplementation with the 14 g of bone meal and 10 g of common salt per head/day is adequate for a lactation doe.

Goats have relatively flat lactation curve. The peak yield for goats elsewhere is attained at 8 – 12 weeks in 37-48week lactation, where as our indigenous breeds of goat peak at 2-5week post partum in 12-17week lactation.

**Milking Procedures:** Before discussing milky procedures, it is important to state that the more frequently the doe is milked, the more milk is produced, twice daily milking is ideal, morning and evening under commercial setting, but if the kids are left with dams once daily milking can be practicing;

* Before commencement of milking, the doe should be placed in a stanchion milking or raised platform provided with a concentrate and/or legume hay supplement to engage the animal in eating while being milked.
* The milker should wash his hand thorough with water and soap and dry clean.
* Use a clean container or bowl that had previously been washed and sterilized to collect the milk.

**Other hygiene precaution to take during milking**

* Milking equipment such as cup, milking paid, calibrated handling jug, should be practiced.
* Milk the animal in an environment clean and free of dust.
* People suffering from infectious diseases not allowed milking the doe.
* After milking wash all milking utensils with warm soapy water and rinse with clean water before being kept to dry.

**Protection of Milk (Pasteurize)**

 Milk is pasteurized by heating to a temperature sufficient to kill pathogenic or harmful bacteria but well below it boiling point.

Non-pathogenic bacteria are also killed and thus help extending the storage stability or shelf-life of the milk.

 Batch pasteurization is recommended where milk quantities are small. In batch pasteurization fixed quantities of milk are heated 680C and hold at this temperature for 30 minutes, the milk in then cooled immediately to 50C after which it can be package and ready for consumption. Pasteurized milk should not be kept longer than three days.

 Sequel to pasteurized, goat milk can be processing into yoghurt; chesses and butter the quality of each of those products depend on the composition of the milk which in turn is influenced greatly by the diet fed.

 **Marketing milk, beef, goat and sheep product**

 Marketing of farm animals involves a series of business activities associated with the transfer of farm animals and their products from the producers to the consumers. It includes selling of farm animal inputs to farmers or purchasing of livestock farm inputs and disposal of livestock and their products to the ultimate consumers or uses.

 Stage of marketing of farm animals and their products:

1. Farm level processing
2. Grading and sorting
3. Packing
4. Storage and ware housing
5. Transportation (précising, market survey etc)

**Agents of marketing**

1. **Wholesalers:** Stock large qualities of products and sells in large quantities to the retailer or consumer’s.
2. **Retailers:** Purchase in bulk from the wholesaler or producer and the sell’s in small units directly to the consumers.
3. **Middlemen:** They purchase from the producer or farmers and make produce easily available to the consumers. Wholesalers and Retailers are also regarded as middlemen.
4. **Marketing cooperatives societies**
5. **Livestock farmers**
6. **Government**
7. **Marketing and commodity boards**

**Marketing of Sheep and Goats**

The marketing channels for the sales of sheep and goats are shown in the flow chart below:-

Sheep/goat/cattle Individual buyer,

 Owner butcher

 Market

 Wholesaler

 Buyer

Wholesale

Buyer agent

Wholesale

Selling agent

Marketing Channel of Ruminant

**Marketing milk:** In West African raw milk is usually sold directly to consumer or processed to curd (wara) and hawked around. However, in other places, milk processed, canned and marketed or exported.

**Meat Marketing:** A large percentage of meats is from cattle ie. Beef which accounts for almost 40% of total meat consumed followed by poultry > 30% sheep and goat > 20% chart below shows a typical marketing channels for fresh meat.

Butchers Wholesalers

Retailers

 Consumers Processed or

 Canned

Marketing Channels for Fresh Meat

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