Penang Sangam High School
P.O. Box 44, Rakiraki
Year 12 Agriculture Lesson Notes Week 19

Strand	**AS 12.4 Livestock Production**
Sub-Strand	**AS 12.4.2: Cattle**
Content Learning Outcome	**The student will explore, discuss, practice and evaluate livestock concepts and relate them to practices in Fiji.**

Lesson 1: Introduction
Lesson Outcome: At the end of this lesson, the student will discuss the origins of domesticated cattle.

Family: Bovidae

Neolithic farmers began to herd wild aurochs10, 500 years ago because
easy access to milk and meat
dung was used as fuel and building material
hide, bones and sinew was used for clothing, buildings and tools
used as draft animals which pulled ploughs, carts and carriages

Lesson 2: History of Cattle in Fiji
Lesson Outcome: At the end of this lesson, the student will investigate and outline the history of cattle in Fiji.

Pre- Commercial Cattle Rearing in Fiji
-First indentured laborers could not find a source of milk.
-They imported the first cattle during the late 19th and early 20th century for provision of milk and leather as well as to pull their ploughs, sleds and carts.
-Animals also provided dung for fuel and building material.
-Cattle are also of religious significance to the Hindus.

Commercial Cattle Rearing in Fiji
The cattle industry grew out of small holder farms with farmers producing milk for family while selling excess milk and animals.

Twenty soldiers returning from World War One [1914 to 1918] were rewarded with 20 head of Shorthorn cattle and land to farm in Tailevu.

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1920 - skim milk was fed to pigs while cream was churned into butter in a factory in Korovou, Tailevu.
1930 - butter was being exported to Canada and England.
1924 - Rewa Co-operative Dairy Company Limited was established in Waila, Nausori
1958 - RCDC Ltd relocated to Nabua
1978 - installation of sterilizing facilities and bottling and sale of liquid milk. Excess cattle were sold or slaughtered for beef.

Government assistance in the development of dairy and beef sectors:
- setting up cattle research units at Koronivia and Nacocolevu Research Stations
- importing improved breeders and semen to upgrade herds
- subsidizing farm inputs including fencing materials and medications
- providing free testing and culling services for major diseases
- providing extension services which advice and train farmers in husbandry skills
- developing abattoirs and meat inspection for quality beef production

Lesson 1: Breeds of Dairy Cattle in Fiji
Lesson Outcome: At the end of this lesson, the student will investigate and discuss the breeds of dairy cattle raised in Fiji.

Breed	**Holstein Friesian**	**Ayrshire**	**Jersey**
Origin	Netherlands	Scotland	England
Characteristics	- black and white - docile & heat resistant - large animal - good quality meat	- red and white - vigorous animal - hardy and smaller animal	- fawn with black or white switch - aggressive bulls - hardy - smallest animal
Milk quantity	12,700L per lactation -highest of any breed	8,500L per lactation	7,260L per lactation
Milk quality	High	High	High
Milk butterfat content	3.6%	3.9%	4.9%
Milk protein content	3.2%	3.3%	3.7%

2019 – State one characteristic of Holstein Friesian breed of cattle which was introduced to improve the cattle stock in Fiji.

Lesson 2: Breeds of Beef Cattle in Fiji
Lesson Outcome: At the end of this lesson, the student will investigate and discuss the breeds of beef cattle raised in Fiji.

Breed	**Limousine**	**Hereford**	**Brahman**
Origin	Limousin, France **2017 – MC No. 18**	Herefordshire, England	Bred from Indian Zebu Cattle
Characteristics	-Golden red or black -Hardy -Docile -Naturally horned	-Red with white face, socks, underbelly and switch -Docile -Naturally horned	-Grey -Hardy and heat tolerant -Naturally horned
Birth weight	Low	Low	Low
Feed conversion efficiency	High	High	Very High
Dress weight	High	High	Medium
Meat quality	Lean and tender	Lean	Lean
Cross breeding	With Angus, Hereford and Shorthorn		Used to improve European Breeds

Lesson 1: Basic Requirements and Systems of Production
Lesson Outcome: At the end of this lesson the student will identify the basic systems in which cattle are raised and describe how each system provides the basic requirements of these livestock

Basic Requirements of Cattle

Space - pollution, disease and pest free
Shelter - protection from wind, rain and sunlight
Security - safe both day and night
Temperature - minimize fluctuations
Light - for feeding and security of calves
Water - clean and readily available
Feed - nutritious, fresh and readily available

Systems of Cattle Production

System	Extensive	Semi-intensive	Intensive	Tethered
Area of farm	Largest [browsing or foraging]	Medium sized	Smallest	Small
Animals/unit area	Low	More	Most	Lowest =10 animals/farm
Labor	Farmer or family members	Farmer and family members or few laborers	Farm manager and hired skilled laborers	Farm family members
Inputs used	-Minimal -From the farm	-Medium -From farm and bought	-Maximum -Latest -Mainly bought	-Animals moved to feed, medication and water
Housing	-Minimal or absent -Classes seldom separated	-Sheds for night and unsuitable weather -Classes separated	-Animals kept indoors -Kept in sheds -Classes separated	-Tethered in pasture during day and in safety at night
Capital invested	Low	More	Most	Low
Environment	-Minimal pollution -Wastes recycled	-More pollution -Wastes recycled	-Most pollution -Wastes recycled	-More pollution -Wastes recycled
Management level	Lowest	Higher	Highest	High individual animal care
Records kept	Few	More	Detailed	Seldom
Use of produce	Home use and occasional sales	Sales	Sales	Home use and sale
Number of farms in Fiji	Many	Many	Few	Most
Location of farms	Remote and outer islands	Areas where land is not limited	Areas where land is limited	Throughout Fiji
Tenure system	Freehold, Crown & Native land	Freehold & Native land	Freehold & Native land	Freehold, Crown & Native land

2018 – Differentiate between extensive system and tethered system of raising cattle in relation to the area of the farm.

Lesson 1: Challenges & Suggested Solutions
Lesson Outcome: At the end of this lesson the student will discuss the challenges facing cattle farming in Fiji and evaluate suggested solutions to each challenge.

Challenge	Solution
1. Land -tenure, area and topography	-Government has set up beef farming schemes -Intensive farming
2. Acclimatization	-Cross breeds which adapt and produce well in local climatic conditions
3 Feed -quality and cost	-Use local feed ingredients which will lower production costs and increase efficiency -Plant pasture, legumes, molasses, coconut meal, mill mix
4. Water availability	-Have reliable water supply at all times
5. Security	-Secure sheds, locked and safe for calves -Fences for cows and bulls
6. Adverse weather	-Practice semi-intensive and intensive farming during hot and wet season
7. Competition from imports	-Improve milk production per cow and beef carcasses quality to satisfy the consumers
8. Disease, predators and pests	-Minimizing visitors, frequent health checks, fencing out pests and drenching

*Acclimatization - to adjust or adapt to a new climate, place, or situation

Lesson 1: Housing Cattle
Lesson Outcome: At the end of this lesson, the student will discuss calf housing.

Cattle are seldom housed in Fiji except for calves weaned from dairy cattle. Calf housing should be:

warm
dry
well ventilated
shaded from sun and rain
protected from wind draft
secure from predators and thieves
have access to water and feed
cleaned daily

Calf housing is usually divided into pens so that calves can be kept separate especially if they are of different ages or are sick. Calf pens may accommodate only one animal or a number of animals of the same age.

- One-calf pens
- Pen for many calves

Lesson 2: Nutritional Needs
Lesson Outcome: At the end of this lesson the students will discuss the nutritional needs of cattle.

Cattle need balanced diet to thrive. The types and amount of feed given to individual animal depends on:
- age
- type
- intended purpose of animal

The main component of cattle diet is pasture made up of grass and legumes. However, concentrate feeds and mineral licks are also provided for certain classes of cattle.

Pasture - plants, usually a combination of grass and legumes, grown for feeding of grazing animals

Concentrate feed - a feed used with another to improve the nutritive value

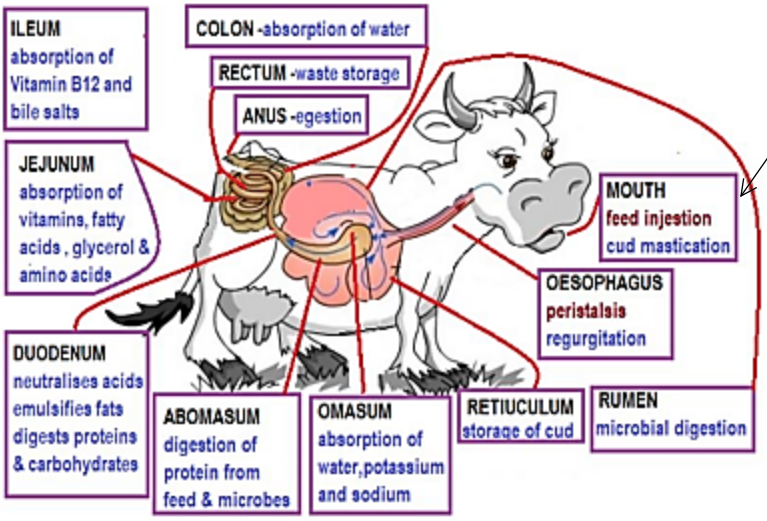
Fibre (roughage) - the indigestible portion of food derived from plants

Five Major Classes of Feeds Required by Cattle

1. Water
-cattle need large quantities of fresh, clean water
-farmers provide stream for day time and water troughs at night paddocks and milking parlors.

2. Energy
-required by cattle in the greatest amount
-primary sources of energy for are cellulose from roughage and starch from grains
-shortage of energy will result in
- weight loss
- low productivity
- reproductive failure
- increased mortality
- increased susceptibility to diseases and parasites
- ultimate death of animal

3. Protein
-one of the main building blocks of the body
-major component of muscles, nervous system and connective tissue
-essential for maintenance, growth, lactation and reproduction
-major source of protein are legumes, fresh pasture and concentrates
-shortage will result in
- slow repair of old and injured tissues
- poor skin and fur
- reduced milk and meat production
- poor body condition



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4. <u>Vitamins</u>

-active in extremely small amounts and fresh forage is a good source of Vitamins A, D and E

Vitamin	Function	Deficiency
Vitamin A	-normal growth, reproduction and maintenance	-lowered fertility in both bulls and cows
Vitamin D	-proper development of bone	Calves: bowing of the leg bones (rickets) Adults: bones become weak and easily fracture
Vitamin E	-proper development of muscle tissue	-nutritional muscular dystrophy (white muscle disease)

The level of B vitamins in cattle diets is not usually of concern. The rumen microbes manufacture large amounts of these vitamins, which are available for absorption by animal. The B vitamins are important in young calf which has not yet developed a functional rumen. Cattle which have been severely stressed have depleted rumen microbe population and may benefit from supplemental B vitamins.

2019 – Explain one reason why cattle farmers do not need to add Vitamin B supplement to the diet of grazing animals.

2018 – State one reason why a calf may develop rickets.

5. Minerals

-required for growth, bone formation, reproduction and many other body functions.

Mineral	Deficiency symptom
Calcium	poor growth bowed leg bones and brittle bones
Phosphorous	poor growth and poor conception rates craving for wood, hair, soil
Magnesium	muscle tremors staggering, convulsions (grass tetany)
Sodium	poor growth chewing or licking of wood
Selenium	weakness, inability to stand

Feedstuff

Cattle can utilize a wide variety of feedstuff. Feeds are classified into groups based on their nutrient content and physical form.

Feedstuff	Examples	Nutrient content
1. Forage crops	grasses and legumes grown in pasture	-high in protein, vitamins and minerals -low in fibre
2. Roughage	mature grass, sugarcane leaves, crop residues, grain hulls	-high in fibre (cellulose) -low to intermediate in energy
3. Grains	corn, barley and oats	-high in energy -low in fibre -moderate protein content
4. Oil seeds	soybeans, canola meal, coconut meal and cake	-high in protein and energy -variable fibre content
5. By-products	distillers grains, pollards and brans	-variable nutrient content -contains high level of moisture