

**COURSE AGLS6004 [AL60D]:
ADVANCED RUMINANT PRODUCTION
[Semester I &II: 2012-2013]
Group e-mail:**

Website: www12.brinkster.com/ostasp/index.aspx

IN

**THE M.Sc. IN TROPICAL ANIMAL SCIENCE AND PRODUCTION
PROGRAM**

**DEPARTMENT OF FOOD PRODUCTION
FACULTY OF SCIENCE and AGRICULTURE,
THE UNIVERSITY OF THE WEST INDIES,
ST. AUGUSTINE CAMPUS,
TRINIDAD & TOBAGO, WEST INDIES.**

By

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[OTF-APL]**

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**AGLS6004 [AL60D]
ADVANCED TROPICAL RUMINANT PRODUCTION**

MODULE: I Introduction

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1.1.1 UNIT OBJECTIVES :

1. To get an understanding of how this course is organized.
2. To be able to relate this course to the others within the M.Sc, Programe.
3. To be able to generally describe the types of ruminants existing in the world.

1.1.2 COURSE DESCRIPTION:

Improved techniques for improvements in and increased production of meat, milk and hides from sheep, goats, dairy and beef cattle, including water buffalo. The design of sustainable ruminant production systems for the tropics, from feeding to marketing.

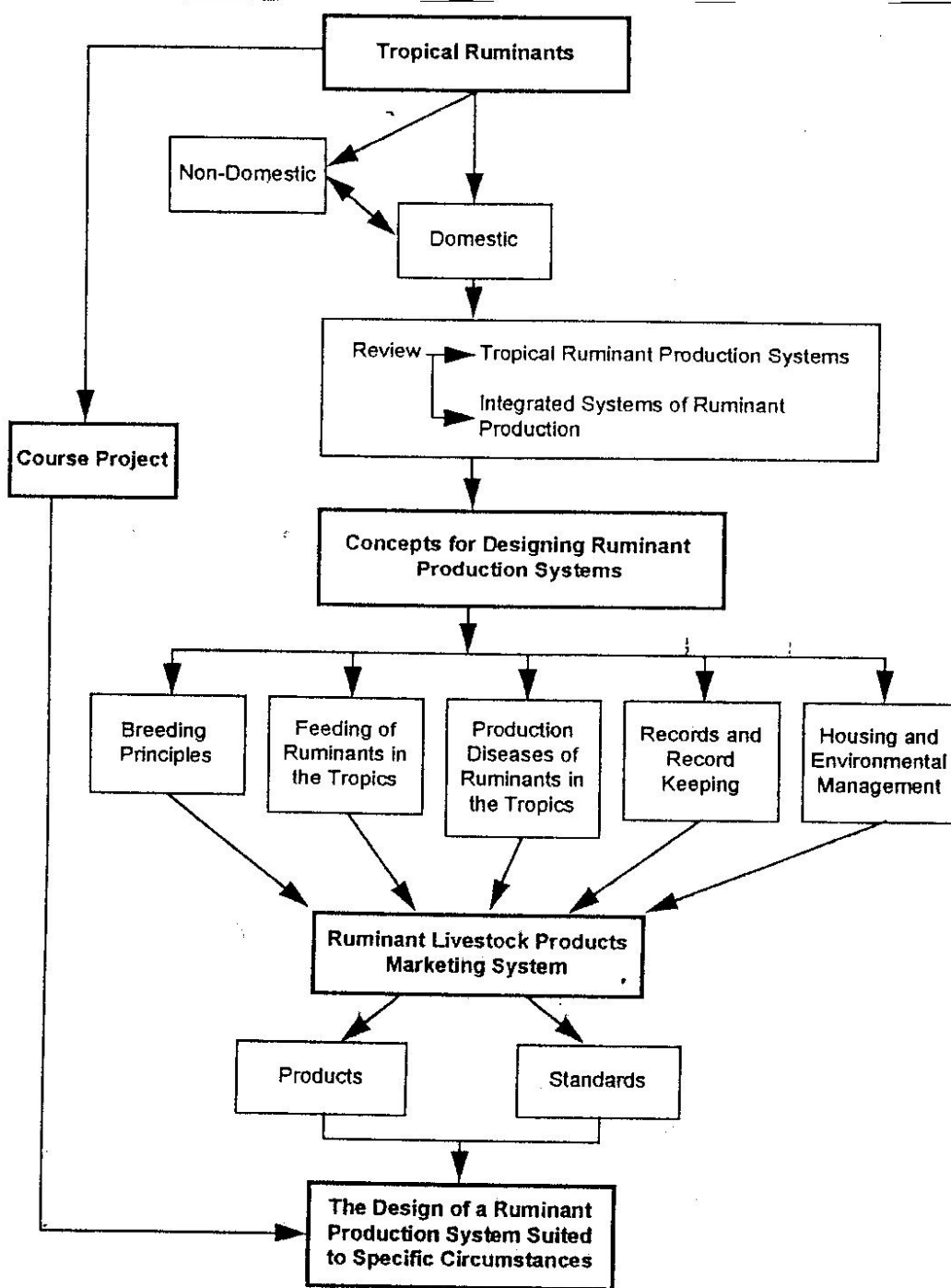
1.1.3 COURSE OBJECTIVES:

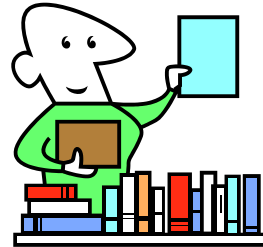
- * To review the Tropical systems of ruminant production.
- * To highlight integrated ruminant production systems.
- * To highlight breeding principles and methods which are of importance to tropical ruminant production.
- * To highlight ruminant breeding successes in the tropics.
- * To discuss issues relating to ruminant production and reproduction diseases of the tropics.
- * To highlight advances in ruminant record-keeping.
- * To outline standards for ruminant livestock products.
- * To outline the concepts for designing ruminant production systems - from production to marketing.

1.1.4 LEARNING OBJECTIVES

- * To know the acceptable range of performance coefficients for ruminants in the tropics, and to be able to apply these coefficients for the improvement of the production of the desired product or products within production systems.
- * To know the components of ruminant production systems.
- * To explain the design and operations of intensive and integrated Ruminant Production Models:
 - The SFC Model - Trinidad & Tobago - Meat , milk , and mutton production using Sugarcane Derived Feeds (SDFs) ;
 - The St. Stanislaus Model - Guyana - Milk production using intensive pasture rotation in a wetland environment;
 - The Centro Inter-institucional para la produccion Agropecuaria en el Valle del Rio Cauca (CIPAV) Model - Colombia - Milk, Mutton, Meat and Pork production using SDFs while at the same time generating useful Biogas as a by-product.
- * To know and apply reproductive principles of ruminant livestock production and to be familiar with successful breeding programmes.
- * To know the phenotypic traits measured in Dairy cattle breeding and improvement programmes.
- * To be familiar with breeding projects and successes of Tropical breeds of Dairy cattle, Beef cattle, sheep and goats.
- * To understand the contents and use of the Ruminant Nutrition Tables available
- * To explain the implications of tropical ruminant diseases on production.
- * To become familiar with at least one method of computer recording for a ruminant species.
- * To be aware of the types of standards for ruminant products.
- * To be able to design a ruminant production system.

1.1.5 Course Logic :





IMPORTANT TO NOTE!!!!!!!!!!!!

- ⇒ **This course would be offered over Semesters I and II and the Final Examination will be at the end of Semester II.** AGLS6003 Livestock Development would also be taught over Semester I and II. **AGLS6004 Advanced Ruminant Production will be taught in the EVEN weeks [4,6,8,10,12]** while AGLS6003 will be taught in ODD weeks [. However, both courses would be introduced to you in weeks #1 and #2.
- ⇒ The course will be conducted for the second time using the **“Future Vision Game Simulation”**. This Game uses the techniques developed by NEXT [Nick Marsh and Ian Ivey of the NEXT Cooperation of New Zealand]. The activities involve the use of **“Sector Foresighting”/ “Future Vison”/ “FutureSim” techniques.**
- ⇒ The Sector that we shall be looking at is the **“RUMINANT LIVESTOCK INDUSTRY/SECTOR”** of Trinidad and Tobago. The Sector would be similar in the other Caricom Countries.
- ⇒ **The Class would be divided into companies representing different components of the Ruminant Livestock Industry. The Companies would be**
- 1] An Intensive Integrated 2ha. Tropical Hair Sheep Farm
 - 2] An Intensive Integrated 2 ha. Goat Farm
 - 3] An Intensive Integrated 5 ha. Tropical Hair Sheep Farm
 - 4] An Intensive Integrated 5 ha. Goat Farm

- 5] An Intensive Integrated 10 ha Tropical Hair Sheep Farm and
- 6] An Intensive Integrated 10 ha Goat Farm.

The details on the game to be played and the brief on the companies will be given in the Game Manual.

1.1.6 COURSE MODULES AND UNITS

Module I Introduction

Unit 1 Introduction.

How is this course organised?

- How does this course relate to the other courses in the M.Sc. in Tropical Animal Science and Production.
- General Introduction to Ruminants: Domesticated and Non-Domesticated.

Module II Review of Tropical Ruminant Production Systems

Unit 2 Buffalo, Beef and Dairy Cattle.

- Production Systems of Buffalo, Beef and Dairy Cattle.
- Performance Coefficients for Buffalo and Beef Cattle.
- Performance Coefficients for Dairy Cattle.

Unit 3 Sheep and Goats.

- Production Systems for Hair Sheep in the Tropics.
- Performance Coefficients for hair sheep in the Tropics
- Production Systems for Goats (Meat and Dairy) in the Tropics.
- Performance Coefficients for Goats (Meat and Dairy).

Module III Integrated Ruminant Production System

Unit 4 Integration and Intensification.

- The Concept of Integration.
- The Concept of Intensification.
- Designs of Intensive and Integrated Production Systems
 - The Sugarcane Feeds Centre (SFC) Model : Trinidad.
 - The St. Stanislaus Dairy Model : Guyana.
 - The CIPAV Model : Columbia.

Module IV Concepts for Designing Ruminant Production Systems

Unit 5 Elements of Ruminant Production.

- Breeding and Reproduction System.
- Nutritional Programme and Feeding System.
- Disease Prevention and Control Programme.
- Housing and Environmental Management.

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- Record Keeping and Information Retrieval System.
- Marketing System.

Unit 6 Concepts for Designing the Systems.

Module V Breeding Principles for Tropical Ruminant Production

Unit 7 Reproductive Performance Parameters for Ruminants in the Tropics

- Breeding and Selection Principles for Buffalo and Beef Cattle and their Applications to Production and Productivity.
- Breeding and Selection Strategies for Dairy Cattle.
- Breeding and selection principles for Dairy Buffalo.
- Phenotypic Traits Used in Dairy Breeding Programmes and Quantitative Measurements of these Traits.

Unit 8 Breeding and Selection Strategies for Tropical Hair Sheep and Goats

- The Blenheim Experience (Multiple Crossbreeds).
- The South African Experience (The Dorper Breed).
- The Hair Sheep of Mexico
- The Barbados Experience (The Barbados Blackbelly).
- Breeding and Selection Strategies for Tropical Goats.

Module VI The Feeding of Ruminants in the Tropics

Unit 9 Characteristics of Tropical Feed Resources and Feeding.

- The Characteristics of Tropical Feed Resources.
- The Composition of Feed Intake.

Unit 10 Tabular Nutrient Needs of Ruminants.

- Dairy Cattle.
- Beef Cattle.
- Buffalo.
- Sheep.
- Goats.
- Non-Domestic Species.

Unit 11 Feeding and Ration Formulation in the Production Environment.

Module VII Production Diseases of Ruminants

Unit 12 Disease Prevention and Control.

- Methods of Preventing Production Diseases.
- Methods of Preventing Reproduction Diseases.
- Methods of Preventing Spoilage of ruminant products.
- Other Disease Prevention and Control Considerations.

[This would not be focused on this year]

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Module VIII Records and Record Keeping

Unit 13 Manual Records.

Unit 14 Computerised Records.

[This would not be focused on this year]

Module IX Ruminant Livestock Products

Unit 15 Products from Ruminants.

Unit 16 Meat and Milk.

- Meat Standards, Cuts and Classification.

- Milk Standards and Quality.

Unit 17 Cheese Production.

1.1.7 COURSE EVALUATION:

Coursework	50%
Final Examination	<u>50%</u>
	100
	<u>%</u>

1.1.8 COURSE PROJECT:

The project is worth 50% of the final course mark; which will be allocated as follows:

Group Presentation	10%
Student Participation	20%
Group Write Up	20%

You will be assigned to work in a group of no more than four (4) students. Each Group will be assigned a different Case/Problem. **The Group will be called a Company. The Group will do a common presentation and a Group or Company Report.** The partitioning of the marks for the Company Report will be as follows:

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Table of Contents	5%
Executive Summary	5%
References	5%
Language and Writing Style	15%
Content	50%
Originality	10%
Layout	10%
TOTAL	100%

This would be then weighted out of 20 percent (20%). The Group Presentation would be for thirty (30) minutes with a further ten (10) minutes for questions and answers. Each group will therefore have 40 minutes allocated for their presentations. The presentation would be made to an Open University audience and would be evaluated as follows:

Content	50%
Visuals	10%
Clarity and Diction	10%
Response to Questions	20%
Time Utilisation	10%
	<u>100%</u>

This would then be weighted out of 10%.

The Project Presentation would take place at the end of Semester II. The Project Report would be due on the 13th week of the Semester II.

It must conform to the writing style and methods of referencing as outlined for the Journal of Tropical Agriculture. The layout should conform to the guidelines for Post Graduate Theses and Reports of the University of the West Indies:

Title Page
Abstract
Table of Contents
List of Figures
List of Tables
List of Appendices

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Glossary of Terms or Abbreviations

Text

References

Appendices.

The report should be no longer than fifty (50) typed pages including appendices.

1.1.9 PURPOSE OF THE GAME

Objectives

1] to develop a 1, 3 and 10 year Development Plan for the Company to which you belong and
2] to suggest Focus Group Research to address the present and future needs of your company with respect to:

- i. The TERMS of REFERENCE [TOR] of the Focused Groups and
- ii. A Listing of Projects and the order of Priority.

The details on how to conduct the game would be given in the Game Manual.

1.1.10 RECOMMENDED READINGS

Key: B	-	Breeding;	C	-	Commodities;
D	-	Development;	F	-	Forages;
G	-	General;	H	-	Health;
N	-	Nutrition;	P	-	Production;
R	-	Ruminants.			

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Journals

Animal Production

Indian Veterinary Journal

Journal of Animal Feed Science and Technology

Journal of Livestock Research for Rural Development (Computerized Journal from CIPAV)

Cali, Columbia) Website <http://www.utafoundation.org/>

Journal of Dairy Science

Livestock Research for Rural Development Website <http://www.utafoundation.org/>

University of Tropical Agriculture/ UTA Foundation Website <http://www.utafoundation.org/>

Tropical Annual Production 1976 – 1985 found at the UTA Website

Tropical Agriculture

World Animal Review

World Review on Animal Production

Archivos Latinoamericanos de Producción Animal [ALPA] <http://www.alpa.org.ve/revista.html>

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1.1.11 SEMESTER II SCHEDULE (September 2012 to May 2013)

In Semester I all classes will be 2.00 to 4.00 p.m. on Tuesdays [every other Tuesday all EVEN weeks, 2,4,6,8,10,12].

In Semester II all classes will be 5.00 to 8.00 p.m. on Tuesdays [every other Tuesday all EVEN Weeks].

If an activity is scheduled on a Saturday it would be from 9-12 noon.

Semester I

<p>Week #1 Tuesday 4th September :</p> <p>Saturday 8th September</p>	<p>[I] Introduction to Courses AGLS6003 and AGLS6004 Unit 1 – Dr. Gary Garcia</p> <p>Future Simulation Game Company Formation</p>
<p>Week #2 Tuesday 11th September</p> <p>Saturday 15th September</p>	<p>Future Simulation Game Company Activity #1</p> <p>[II] Review of Tropical Ruminant Production Systems Unit 2 - Buffalo, Beef and Dairy Cattle Unit 3 - Sheep and Goats Dr. Gary Garcia</p>
<p>Week #3 Sunday 23rd September</p>	<p>Field Trip</p> <ul style="list-style-type: none"> - 5:30 am UFS Dairy - Centeno Livestock Station
<p>Week #4 Saturday 29th September</p>	<p>Field Trip</p> <ul style="list-style-type: none"> - 5:30 am UFS Dairy - Centeno Livestock Station
<p>Sunday 30th SEPTEMBER</p>	<p>Field Trip 6:30 am Marylisa Farms Penal</p>

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<p>Week #6 Tuesday 9th October</p> <p>Saturday 13th October</p>	<p>Future Simulation Game Company Activity #2</p> <p>[III] Integrated Ruminant Production Systems Unit 4 - Integration and Intensification SFC [Eugene Donefer and Gary Garcia] CIPAV [T. R. Preston] UTA [Lylia Rodriguez]</p> <p>Dr. Gary Garcia</p>
<p>Week #8 Tuesday 23rd October :</p>	<p>[V] Breeding Principles for Tropical Ruminant Production Unit 7 - Reproductive Performance Parameters for Ruminants in the Tropics Unit 8 - Breeding and Selection Strategies for Tropical Sheep and Goats.</p> <p>Dr. Nandakumar Puliyath</p>
<p>Week #10 Tuesday 6th November</p>	<p>[IV] Concepts for Designing Tropical Ruminant Production Systems Unit 5 - Elements of Ruminant Production</p> <p>[IV] Concepts for Designing Tropical Ruminant Production Systems Unit 6 - Concepts for Designing the Systems</p> <p style="text-align: center;">Dr. Gary Garcia</p>
Week #12	
<p>Tuesday 20th November :</p> <p>Saturday 24th November</p>	<p>[VI] The Feeding of Ruminants in the Tropics Unit 9 - The Characteristics of Tropical Feed Resources and Feeding Unit 10 - Tabular Nutrient Needs of Ruminants</p> <p>Dr. Victor Mlambo</p> <p>[VI] The Feeding of Ruminants in the Tropics Unit 11 - Feed Formulation in the Production Environment</p> <p>Dr. Victor Mlambo</p>

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Week #13

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Week 6 to 12 January Activity on Excel Spread sheet

2008:

Future Simulation Game

Company Activity #4 & #5

SEMESTER II 2013

Week #1

<p>Tuesday 22nd January :</p> <p>Week #2 Tuesday 29th January</p>	<p>Future Simulation Game Company Activity #6</p> <p>[IX]Ruminant Livestock Products Unit 15 - Products from Ruminants</p> <p>[IX]Ruminant Livestock Products Unit 16 - Meat and Milk unit 17 - Cheese Production</p> <p>Gary Garcia</p> <p>[VIII]Records and Record Keeping Unit 13 – Manual Records</p> <p>[VIII]Records and Record Keeping Unit 14 – Computerised Records</p> <p>[VII]Production Diseases of Ruminants in the Tropics Unit 12 - Disease Prevention and Control</p> <p>[Directed Readings]</p>
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Week #4

<p>Tuesday 12th February</p>	<p>Carnival Tuesday</p> <p>Future Simulation Game Company Activity #7</p>
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Week #6

Tuesday 26th :	
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Week #8

Tuesday 12th March	Future Simulation Game Company Activity #8
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Week #10

Tuesday 26 th March :	
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Week #12

Tuesday 9 th April	Project Presentation All Projects Due 5.00 p.m. Thursday
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Examination will be held sometime between Monday 22nd April and Friday 17th May 2013, during 9.00 a.m. to 5.00 p.m.

1.1.12 ACTIVITIES:

1. To divide the class into the project groups.
2. To assign the cases to the respective groups.
3. To discuss the cases.

1.1.13 HOW DOES AGLS6004 [AL60D] RELATE TO THE OTHER COURSES IN THE M.Sc.

The M.Sc. Degree in Tropical Animal Science and Production has been designed to achieve the following general objectives:

- (i) to provide the graduate with a deeper knowledge and sensitivity of the needs for the science of Livestock Production in Developing Tropical Environments;
- (ii) to provide the graduate with a deeper knowledge of the needs of the science of Tropical Ruminant and Non- Ruminant Production;
- (iii) to afford the graduate the opportunity to deepen his/her knowledge in a discipline or area of his/her choice; and
- (iv) to ensure that the graduate:
 - (a) develops individual research and reporting skills and
 - (b) is exposed to project proposal development and presentation.

In addition the learning objectives of this programme are as follows:

- (i) To be able to explain the status of Animal Science in the Tropics;
- (ii) To be able to describe the factors affecting Tropical Commercial Livestock Development;
- (iii) To be able to explain the advances in Animal Science in the Tropics and to show how these could further enhance future production;
- (iv) To be able to formulate diets and develop feeding and production systems for Tropical Livestock using available tropical feed resources;
- (v) To be able to present seminars; to conceptualize, propose and conduct an independent piece of research on an aspect of Tropical Livestock Production or commodity use;
- (vi) To be able to analyse a livestock production system, and to make practical recommendations for its improvement.

This course therefore attempts to fulfill general objectives #(ii) and (iii) and learning objectives (iv), (v) and (vi) as it relates to ruminant production in the tropics.

COURSE: AGLS6004 [AL60D]
ADVANCED TROPICAL RUMINANT PRODUCTION

MODULE: I Introduction

UNIT #1.2 Classification of Ruminants

1.2.1 Location of Ruminants in the Animal Kingdom

Ruminants, from an animal production standpoint, are animals which have four (4) stomach compartments and their digestive biochemistry is characterized by the digestion of fibre by microscopic organisms living within the first three (3) non glandular stomachs.

From the standpoint of animal taxonomy the following is the position of ruminants in the Animal Kingdom:

Phylum: Chordata
Order: Artiodactyla [(Even-toed Ungulates - Hoofed Mammals)]
Sub-order: Ruminantia

The order into which ruminants belong also contains animals with three (3) stomach compartments such as the camels. What is most characteristic about this order is that the animals herein have the ability to partially or completely survive off the digestion of forages. They have either a functional reticulo-rumens, caeca, or a multi compartment stomach wherein fibre is digested.

The Order according to Nowak (1991) is characterized as follows:

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Order: Artiodactyla [(Even-toed Ungulates - Hoofed Mammals)]

Sub-order Suiformes

Infraorder Suina

Family Suidae (Pigs)

Genus: Sus

Potamochoerus

Hylochoerus

Phacochoerus

Babyrousa

Family Tayassuidae (peccaries)

Genus: Gatagonus

Tayassu

Infraorder Ancodonta

Family Hippopotamidae (hippopotamuses)

Genus: Hippopotamus

Choeropsis

Sub-order Tylopoda

Family Camelidae (Camels, llamas)

Genus: Lama

Vicugna

Camelus

Sub-order Ruminantia

Infraorder Tragulina

Family Tragulidae (mouse deer)

Genus: Hyemoschus

Tragulus

Infraorder Pecora

Superfamily Cervoidea

Family Cervidae (Deer)

Genus: Moschus

Hydropotes

Manticus

Elaphodus

Dama

Axis

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Cervus
Elaphurus (Pere Davids Deer)
Odocoileus
Blastocerus
Ozotoceros
Hippocamelus
Mazama
Pudu
Alces
Rangifer (caribou or reindeer)
Capreolus

Superfamily Giraffoidea

Family Giraffidae (Giraffes)

Okapia
Giraffa

Superfamily Bovoidea

Family Antilocapridae (Pronghorn)

Antilocapra

Family Bovidae (antelope, cattle, goat, sheep)

The family Bovidae contains 47 recent genera and 138 recent species with a natural distribution covering all of Africa, most of Eurasia, North America and some islands of the Arctic and East Indies. The great majority of the genera are native to Africa and Central Asia. Wild living populations of some species have been introduced by humans into New Guinea, New Zealand, Australia and surrounding islands (Nowak, 1991). Only five (5) genera (which consist of about 10% of the genetic material grouping within this order) have been widely domesticated by humans. They are Bos, Bubalus, Bison, Capra and Ovis.

Subfamily Bovinae (Cattle)

Genus: Bison
Bos
Boselaphus
Bubalus
Syncerus
Taurotragus
Tetracerus
Tragelaphus

Subfamily Cephalophinae

Genus: Cephalophus
Sylvicapra

Subfamily Hippotraginae

Genus: Addax

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Alcelaphus
Connochaetes
Damaliscus
Hippotragus
Kobus
Oryx
Pelea
Redunca
Sigmoceros

Subfamily Antilopinae

Genus: Aepyceros
Ammodorcas
Antidorcas
Antilope
Dorcatragus
Gazella
Litocranius
Madoqua
Neotragus
Oreotragus
Ourebia
Procapra
Raphicerus

Subfamily Caprinae (Goats and Sheep)

Genus: Ammotragus
Budorcas
Capra
Capricornis
Hemitragus
Myotragus
Nemorhaedus
Oreamnos
Ovibos
Ovis
Pantholopos
Pseudois
Rupicapra
Saiga

Followup Reference:

Nowak, R. M. (1991): Walker's Mammals of the World, John Hopkins University Press, Baltimore, USA.

Why are ruminants important to mankind?

1.2.2 Review of the Make up and Functioning of the Ruminant Animal

Those students taking this course who do not have an Animal Production or Agriculture Degree are advised to purchase the following modules from AL21B: Livestock Production.

Module 2: The Make up and Functioning of the Ruminant Animal

Module 3: Sheep Production in the Tropics

Module 4: Goat Production in the Tropics

Module 5: Dairy Production in the Tropics

Module 6: Beef Production in the Tropics

Module 7: Buffalo Production in the Tropics

Module 8: Forage Production and Utilization .

This would be the basis of your production information on ruminants.

Modules are available from the website:

www12.brinkster.com/ostasp/index.aspx

- Undergraduate Courses