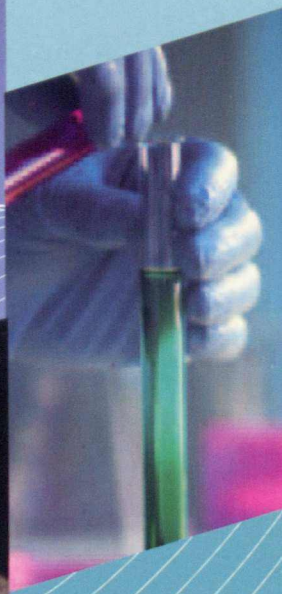
RUMINANT INDUSTRY



Md. Ruhul Amin

RUMINANT INDUSTRY

RUMINANT INDUSTRY

MD. RUHUL AMIN

Universiti Malaysia Kelantan

Cover design : Visual Print Sdn Bhd
Typeface : Adobe Garamond Pro/Helvetica
Typesize : 11/14

Printed in Malaysia by : Visual Print Sdn. Bhd
A-1-7A, No. 2, Jalan 12/144A,
Taman Bukit Cheras
56000 Kuala Lumpur

Contents

Preface

I eulogize my lord Allah swt, the omnipotent, the omnipresent and the omniscient at the begining who enabled me to accomplish writing the documentation and concomitant prevention from ostentation as well.

Livestock production particularly of small holder type has attained a focal position in the agriculture system of the current developing world. This has been in place because of fast growing demand for livestock products, its crucial role in eradicating poverty and generation of mass employment and magnificent contribution in GDP. Animal breeding and other technological advances achieved so far during the last five decades have revolutionized livestock productivity manifold. There has been a commensurated parallel growth of livestock education either as animal agriculture or veterinary science.

Notwithstanding the crying need there are not too many books on animal production as a study material. Heartily I beleive this book will be of some use to teachers, students, livestock entrepreneurs and allied professionals. This book does not contain in depth materials of different branches of animal science rather is only directed towards basic understanding and practices of animal agriculture. As the book has been written primarily to satisfy learners need in Malaysia, therefore, Malaysian perspectives appeared in this book very often.

I do not claim that this is an empirical output from my own. I have no reservation to admit that the facts and figures put in this book have largely been borrowed from other sources like books of different authors, journals, bulletins and plentiful literature in the internet. I have tried to gratefully refer the source(s) of information whatever or wherever might be. Despite utmost carefulness, it is not unlikely that some of them might still remain incomplete or escaped from mentioning for which I deeply regret. During my stay in University Malaysia Kelantan (UMK), Malaysia I have had to prepare the manuscript for this book within a couple of months only. So it is quite likely to find unwillful mistakes in various forms in this book.

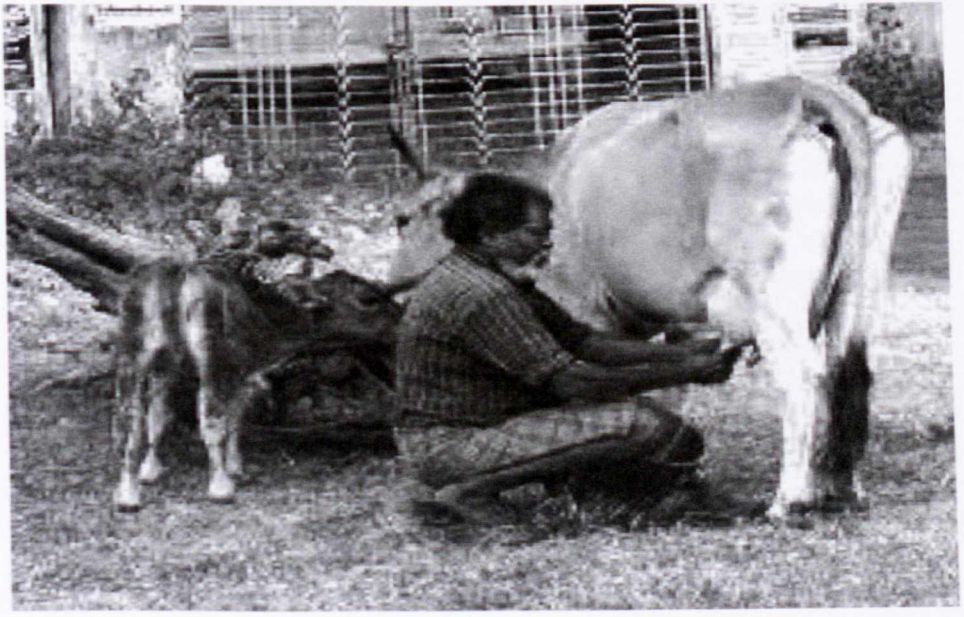
I will be immensly benefited if someone from the respected readers community can point out anything to modify, omit or incorporate in this book. Suggestions in order to emend this book for subsequent editions will fortify my endeavour and will be cordially welcomed.

Profound gratitudes are due to, whom I am truely blessed from, Professor Dr. Ibrahim bin Che Omar, former Dean Faculty of Agro Industry and Natural Resources Universiti Malaysia Kelantan, for his inspiration and generous assistance during the completion of this book.

The Author

The Author

"And verily! In the cattle, there is a lesson for you. We give you to drink of that which is in their bodies, from between the undigested food and blood, pure milk; palatable to the drinkers". Al-Qura'n 16:66



Dedicated to my beloved son

Engg. Md. Tanvir Ehsan Amin

Chapter **1**

Introduction to **Ruminant and Ruminant Industry**

1.1 RUMINANT VS NON-RUMINANT

Ruminants (poly-gastric) and non-ruminants (mono-gastric) are basically two divisions of domestic animals based on their structure and function of the stomach. Ruminants belong to the suborder Ruminantia of the order Artiodactyla characterized by having stomach divided into either three or four compartmets. Ruminants regurgitate and masticate ingested feed (called card) they swallowed before in resting time. The animals of ruminant group again subdivided into a) **Tylopoda** and b) **Pecora**. Tylopoda have 3-chambered stomach and includes camels, llamas and alpacas. On the other hand animals belonging to the subdivision Pecora have 4-chambered stomach. Actually Pecora represents the true ruminants and includes cattle, buffalo, bison, sheep, goat, antilope, giraffe and deer. Rumen, reticulum, omasum and abomasum are the chronological names of 4 chambers in the ruminant stomach. Rumen is the first and largest of the compartments that contain numerous kinds of rumen microflora. Rumen microflora are the microorganisms capable of digesting many kinds of fibrous feed and because of the absence of them in non-ruminants (simple stomached animals), non-ruminants can not digest the same. Tylopoda stomach consists of 3 chambers viz. rumen, reticulum and abomasum but does not have omasum. Each and every ruminant individual (particularly true ruminant, the pecora) is an industry in the sense that it has got the unique capability to convert low quality roughages into high quality food for human consumption.

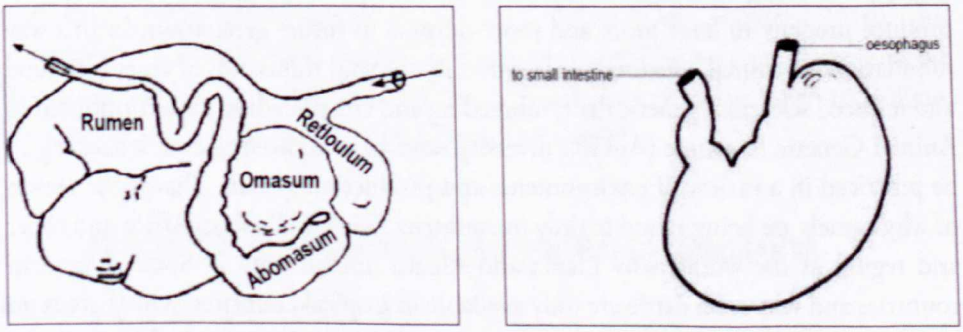


Fig1.1 Ruminant (left) and non-ruminant (right) stomach

(Source: http://www.google.com.my/search?tbm=...)

development of Nelore cattle (from India as Ongole to Brazil as Nelore), Brahman cattle (from India to USA), Etawah goat (from India as Jamnapari to Indonesia as Etawah), US Holstein (from Holland to USA), Boer goat (from south Africa to USA, Australia, Newzealand, Malaysia).

Cattle (*Bos taurus; Bos indicus*) : It is believed that cattle were first domesticated in the Neolithic Age (10,700-9,400 BC) which occurred 18,000 years ago. At least 4,000 years ago cattle were started to take place in records. Bovine animals that can be seen today have descended from ***Bos taurus*** and ***Bos indicus***. Bos taurus are humpless cattle originated in Near and Middle East and North East Africa while Bos indicus are humped and originated in Tropical Asia (FAO, 2007; Gillespie and Flanders, 2010).

Sheep (*Bovis aris*): Sheep are considered to be the first domesticated species and their domestication began in the Neolethic Age. Literature support that sheep and goats were first domesticated by 8000 BC (Damron, 2009). Archeological evidence shows that the Babylonians used wool for clothing around 4000 BC. Most of the present day sheep perhaps are descendents of Moufflons (wild sheep) and Asiatic Urial (Gillespie and Flanders, 2010). Near and Middle East /Turkey are considered to be the place of origin of the species (FAO, 2007).

Goats (*Capra hircus*): Age of goats as domesticated animal is similar to that of sheep (Damron, 2009; FAO, 2007). Of the present day species of domestic animals sheep and goats are thought to be the first two started domestication about 10,000 years ago (Simm, 2000). Western Asia is supposed to be the original site of goat domestication. According to what is stated in the 'The state of the world's Animal Genetic Resources for Food and Agriculture (FAO, 2007)' goat was originated from 3 subspecies of wild ancestor *capra aegragus* in Near and Middle East and in northern Indian subcontinent. They are said to be descended from the Pasang or Grecian ibex. Wild species Markhor and Tahrs might be the ancestors of some modern breeds of goats in the world (Devendra and Burns, 1981; Gillespie and Flanders, 2010). The mountains of Southwest and Central Asia are the original home tract of goats. Wild Bezor and Markhor are still available there. South Asia possesses over 20 million goats, one fourth of the world's population (FAO, 2007).

1.3 ZOOLOGICAL CLASSIFICATION (TAXONOMY) OF RUMINANTS

Phylum: Chordata (have back bone)
Subphylum: Vertebrata (have vertebral column)
Class: Mammalia (gives milk, hairy)
Order : Artiodactyla (divided hoof)

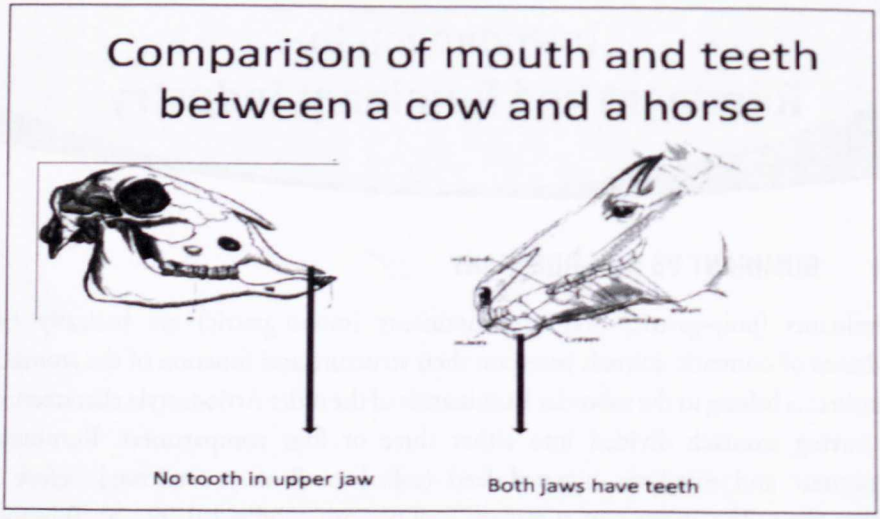


Fig 1.2 Difference in mouth parts between ruminants (left) and non-ruminants (right) (source: http://www.google.com.my/search?hl=en&biw...)

Non-ruminant stomach is of one unit called simple or monogastric stomach. Man, dog, pig, cat, primate, avian species all are the examples of non-ruminants. Ruminants do not have teeth in the upper jaw but non-ruminants do have (Fig 1.2).

1.2 DOMESTICATION

Domestication refers to the adaption of the behaviour of animal in order to satisfy human needs. During pre-historic period, human depended on wild animals for food and clothing materials. Later on, they started taming of some of the hunted animals to use afterwards. Gradually, man learnt how to rear, feed, behave and reproduce the animals under his care for his livelihood. Man possessed the experience of identifying better performing animal in his herd or flock. Superior individuals were used to produce progeny to have more and more outputs in future generation. In this way foundation for animal breeding was laid out. By the way, thousands of years of natural and induced selection, genetic drift, inbreeding and crossbreeding have contibuted to Animal Genetic Resource (AnGR) diversity and have allowed livestock keeping to be practiced in a variety of environments and production system. That is the reason of why camels are being raised mainly in countries like Middle East, Africa and other arid region of the world; why Llama and Alpaca inhabit only in South American countries and why zebu cattle are only available in tropical countries; why there is no buffalo in the Middle East and why temperate world is the homeland of Alpine goats and so on. Later on, domestic animals began to move from one region to another because of human preference. It explains the transboundary movement and further