LESSON 1 INTRODUCTION TO FEEDING ANIMALS AND INDUSTRY OPPORTUNITIES

Some animal's primary source of feed is plant-based, such animals are referred to as herbivores. Animals whose diet consists primarily of other animals are referred to as carnivores and animals whose diet consists of both plant and animal based sources are known as omnivores.

Animal feeds, much like human food, is composed mainly of protein, carbohydrates, lipids (fats), minerals, vitamins and water. All feeds are different in their composition. Some have more protein than others, for example legumes or animal muscle tissue, whereas others may contain relatively high levels of carbohydrate and lower levels of protein, for example, barley.

Naturally some feed types which are suitable for feeding one animal species, may be totally inappropriate for a different animal. Learning about feed composition and animal nutrition requirements is fundamental in any aspect of animal care.

This ebook is designed to provide the reader with knowledge of animal function relating to diet. It will give a comprehensive guide to the composition of feed with a detailed exploration of types of feeds and how humans work to manage and improve feed supply and production for animal health or, as we see most often in the case of livestock, for financial gain. This book offers the reader insight into how to effectively and appropriately feed animals in their care with three Lessons dedicated to feeding pets, livestock and wildlife. The final Lesson is designed to provide information on both eating and nutritional disorders – vital for providing adequate nutrition when feeding animals.

EATING AND DRINKING ANATOMICAL ADAPTATIONS

Different feeding behaviours have developed through evolution. For example, the earliest forms of land-based vertebrates were piscivores - large amphibians. These amphibians continued to feed on fish and insects, but some began to eat alternative feed types such as other vertebrates. In other words they became carnivorous. Later we know they also consumed plant sources and so also became herbivorous. As such we see the appearance of the omnivore. The way that an animal adapts towards a specific feed source is one of the main reasons underlying evolution in terms of their form and function.

It is widely understood and accepted that all animals must feed in order to replenish stores of sugars and fats which are converted into energy, even though some can hibernate for long periods of time their body utilises energy stores to survive during periods of hibernation. Naturally some animals can survive longer than others between meals, some animals are considered grazers and tend to eat relatively small quantities over long periods of time. Some animals gorge and binge – perhaps on a recent and, in some cases, infrequent kill – in the case of predator animals. Larger animals need to consume greater amounts of feed whereas smaller animals need to eat more frequently. Smaller body masses are simply not able to store as much energy.

Example of evolutionary adaptations:

Beaks – the development of the beak in specific species such as hawks, woodpeckers, pelicans and humming birds has become specialised for specific feeding tasks like tearing flesh, tunnelling for insects in (dead) trees, scooping up fish and probing flowers for nectar.

Mouth components and teeth - in animals these have also evolved differently to match different types of feeding behaviour, for example in vampire bats, whales, leeches, cats and fish.

Claws - these have developed in some animals as a way to catch and kill prey, such as the retractable claws of cats.

Camouflage - this allows some animals to change colour in order to surreptitiously snare prey, for example the blue ringed octopus or chameleon. Others use camouflage to avoid becoming a feed source, for example certain moth species.

Digestive system - some animals have developed specialised digestive systems to enable them to consume certain feeds. Ruminants, including sheep, goats, cattle, giraffes, llamas and yaks are an example of this. They are mammals which have a specialised digestive system. Feed is softened by bacterial action within their stomach's first compartment. They then regurgitate the semi-digested mass (known as the cud) this is then chewed again, which is known as 'ruminating', and swallowed.

Beak adaptation of birds.

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Suggested Tasks

Compare the different types of claws used to catch prey for one example from each of the following animal types:

a) one reptile

b) one mammal

c) one bird.

You may need to do some research on the Internet for this. Try typing in key words such as "claw catching prey".

Spend no more than 20 minutes doing this.

CLASSIFICATION OF ANIMALS – MODE OF FEEDING OR FEED TYPES

MODE OF FEEDING CLASSIFICATION

In this classification system, we see animals classified or categorised depending on the strategy they employ to consume feed.

Deposit Feeding	Nutrients are obtained from particles suspended in soil.
Filter Feeding	Nutrients are obtained from particles suspended in water.
Ram or Suction Feeding	Nutrients are obtained by ingesting prey via the fluids around it. The animal moves whilst engulfing its prey.
Bulk feeding	Nutrients are obtained by eating another organism or animal. This is the most common strategy for feeding.
Fluid feeding	Nutrients are obtained by consuming the fluids of an organism.

Feed Type Classification

We see that some animals have the ability to consume a variety of feed sources – these animals are known as **polyphagous**, the ability is referred to as **polyphagy**. Certain animals are restricted often by their anatomical and physiological make up that are able to consume one particular feed source – these animals are known as **monophagous**, the ability is referred to as **monophagy**. **Oligophagous** animals feed one particular type of food usually within a taxonomic group.

Animals can be classified according to the type of feed they consume. The following list shows the types of sources of nutrition for each classification.

- **Carnivores** – animal based diet
- **Herbivores –** plant based diet
- **Avivores** – bird based diet
- **Insectivores** – insect based diet
- **Bacterivores** – bacteria based diet
- **Frugivores** – fruit based diet
- **Folivores** – leaf based diet
- **Omnivores** – plant and animal based diet
- **Piscivores** – fish based diet

What source of food an animal chooses, it's feeding behaviour and the biomechanical method which it engages to feed, have developed over extremely long evolutionary periods. This has enabled animals to adapt to their environment and survive. Many species of animals are known to have become extinct because their feed supply

changed dramatically and they were either not able to adapt or there were no alternative options.

DIGESTIVE SYSTEMS – GENERAL AND SPECIALISED

Herbivores and Omnivores

Animals eating lots of plant materials have evolved mechanisms for digesting large amounts of fibrous material. This includes rumen stomachs.

Ruminants have a much larger stomach than non-ruminants. An example of a ruminant is a cow and of a non -ruminant is a pig. The ruminant stomach is divided into four compartments and feed travels slowly through them so that a tough feed can be thoroughly digested. By contrast, the non-ruminant has a single (mono-gastric) or simple stomach. Examples of monogastric animals are dogs, pigs, humans, horses etc. Monogastric animals can include carnivores, herbivores and omnivores.

Basic Anatomy

In very simple terms, the digestive system is a muscular tube extending from the mouth to the anus. Its function is to digest food reducing feeds to compounds which are simple (small) enough to be absorbed via the lining of the intestinal tract and utilised by the animal for energy and all cellular process. The digestive system eliminates waste products which cannot be digested.

Mouth: The mouth is a cavity that has several functions. Some of the functions of the mouth are to:

- Gather food.
- Grind food into small pieces.
- Mix food with saliva and mucous to form a slippery ball (called a bolus) that can be easily swallowed by the animal.
- Can be the start of chemical break down of food, as some enzymes are added to the food here.

Tongue: The tongue helps in the grinding of food, the formation of the bolus, and in the swallowing of the bolus. The surface of the tongue contains glands and taste buds which play an important part in the selection of food. In grazing animals, the tongue is also covered with a layer of small, stalk-like structures called papillae, which help the animal to grip the blades of grass.

Teeth: An animal's teeth play an important part in the biting, tearing, and grinding of food. There are three types of teeth:

- Incisors - the sharp cutting teeth at the front of the mouth
- Canines - the conical, pointed teeth used for ripping
- Molars and Premolars - the blunt, irregularly shaped teeth used for grinding food into small pieces

Farmers and veterinary surgeons look at an animal's teeth to estimate its age.

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Suggested Tasks

The type of a teeth an animal has varies according to food type and to how that animal feeds.

List three differences between the teeth of a cow (herbivore) and teeth of a domestic cat (carnivore) and explain how these differences are related to their respective feeding.