

DEFRA EXEMPTION CERTIFICATE

REVISION NOTES

SCIENCE PAPER

Gastro-intestinal Tract

Begins in the mouth — digestion begins with mastication

Oesophagus — delivers food from the mouth to the stomach. Lined with fine hairs called cilia to prevent entry of pathogens and foreign particles. Surrounded by muscle which contracts and relaxes in order to move the food down into the stomach — called peristalsis

Stomach — size of a rugby ball — relatively small

Contains digestive juices which form acidic environment.

These digestive juices contain enzymes which act on CHO, fat and protein — breaks them down into smaller molecules

Small Intestine — divided into three sections

Duodenum — main site of digestion of CHO, protein and fat

Jejunum — proteins and sugars (non-structural carbs) digested

Ileum

Large Intestine — where most of the structural carbs are digested

Divided up into

Caecum — fermentation — bacterial digestion takes place

Large colon — faeces factory where water is reabsorbed and faeces formed

Small colon

Rectum

Anus

Learn diagram

Label

Mouth, Oesophagus, Stomach, Small Intestine, Large Intestine, Caecum, Large colon, Small colon, Rectum, Anus

NUTRIENTS REQUIRED

WATER

CARBOHYDRATES

Structural and non structural digested by enzymes in the stomach and small intestine Structural made up of plant material- cellulose. Fermentation in the caecum of the horse.

Non structural includes starch and sugars and is digested by enzymes in the stomach and small intestine, oats, barley, grains and molasses

PROTEINS

Chains of amino acids broken down in the stomach and small intestine by enzymatic action. Protein essential for growth and repair, not used by body for energy, needs to be increased in gestating mare

FAT

Lipids includes oils and solid fats. Broken down into fatty acids and glycerol in the stomach and small intestine. Bile is essential. Fat is a source of energy, aids with warmth and is stored in fat deposits.

VITAMINS

Divided into two categories

Fat soluble and water soluble. D, E, A and K are more likely to be toxic and are fat soluble

MINERALS

CA - CALCIUM

P - PHOSPHORUS

Mg - MAGNESIUM

Na - SODIUM

Cl- CHLORIDE

K - POTASSIUM

VITAMINS

2 CATEGORIES - FAT SOLUBLE AND WATER SOLUBLE

INTESTINAL DISTURBANCES AND DISEASES

CHOKER

Oesophageal obstruction

Signs — extended head and neck with food material and saliva from both nostrils Treatment — massage of oesophagus, stomach tube or use of relaxants

COLIC

Abdominal pain

Types — Spasmodic — spasms of the intestinal wall

Impactive — blockage commonly at the pelvic flexion of the large colon due to shape, u bend

Gaseous — may be due to an impaction or a feeding problem leading to fermentation in the intestines — out at grass — stuffs- overloads system — gas produced

Intestinal catastrophe — twisted gut — can be common in foaling; can be related to gaseous colic

Dry Matter

All feed values are expressed in terms of Dry Matter. Dry matter — dry content of feed, moisture content — burnt to 500degreesC — measurement for feed stuffs to make an accurate comparison

ENTERITIS

Inflammation of the intestines

Diarrhoea is the most common sign

Can be caused by parasitic infection or feed related problems

PERITONITIS

Inflammation of the lining of the abdominal cavities

Usually follows colic, parasitic infection, enteritis or surgery

HEART

Consists of — Four chambers with walls composed of muscle

Right Atrium

Left Atrium

Right Ventricle

Left Ventricle

Pulmonary Artery — takes blood from the heart to the lungs

Pulmonary vein — takes blood from the lungs to the heart - transports arterial blood not venous

Aorta — takes blood from the heart around the body

Vena Cava — takes blood back to the heart

Arteries — oxygenated blood away from the lungs

Veins — deoxygenated blood to heart and lungs

Tricuspid valve — as right ventricle contracts this valve closes to prevent the blood being pumped into the atrium, instead the blood goes into the pulmonary artery Bicuspid valve — as left ventricle contracts this valve closes to prevent the blood going into the atrium, instead the blood is pumped into the aorta

Septum — keeps the two sides of the heart separate

Chordinae Tendinae — strong fibres prevent the valve from opening under pressure

Label heart

Blood made up of:

Plasma

Red blood cells

White blood cells

Platelets

Functions of the CV system

Transport oxygen and carbon dioxide

Transport nutrients and waste

Control of body temperature

Disorders of the heart and CV system

Murmurs — abnormal sounds from the heart caused by turbulence, usually due to a leaking valve

Arrhythmia — an irregular heart beat — missing a beat

Parts of the cardio-vascular system

Heart

Veins

Arteries

Blood

The Respiratory System

Nostrils — large and mobile

Nasal Cavities — large surface area where heat and water exchange occurs

Pharynx — split into nasopharynx and oropharynx

Soft palate — divides two sections

Larynx — sealed by epiglottis when eating — flap of cartilage prevents food/air going down wrong tube

Trachea — windpipe about 70-80cms long surrounded by cartilage — flexibility Trachea splits into two bronchi into bronchioles into alveoli

Lungs are about 1% of body weight

Left lung has two lobes, Right lung has three lobes

Diaphragm — separates heart, lungs etc from guts

Intercostal muscles

The Respiratory System

Gas exchange takes place in the alveoli

Breathing consists of inspiration and respiration

This process of breathing occurs through the use of muscles — diaphragm and intercostals as well as abdominal muscles

Horses are OBLIGATE NASAL BREATHERS - only breathe through nose

In canter and gallop the horse is subject to RESPIRATORY LOCOMOTORY COUPLING — due to the movement of the diaphragm the horse can only breathe once per stride — inspire and expire once — when body comes up breathe in — when body comes down — breathe out

Disorders and Disease of the Respiratory System

EIPH — Exercise Induced Pulmonary Haemorrhage

This is a condition by which a haemorrhage occurs in part of the lungs due to exercise — bleeding from the nose

COPD – Chronic Obstructive Pulmonary Disease

The Nervous System

Composed of nerve cells and their fibres

It is this system which is responsible for the relay of messages, feeling, consciousness and action

2 main areas of central nervous system

Brain and spinal cord

Other peripheral fibres make up the Peripheral Nervous System Each nerve cell is called a neuron

Sensory neurons transmit messages from the point of stimuli to the brain

Motor neurons transmit messages from the brain to the muscles or organs to initiate a reaction

Spinal column extends through the vertebral canal with 42 pairs of spinal nerves emerging at interval between the vertebrae

Brain is a complex organ with three major segments;

Fore, mid and hind brain.

Each segment controls different actions, feelings and sensations

Messages or impulses are passed via the nerve cells by electrical stimulation

Conditions of the CNS and PNS

Causes:

Damage — falls

Viral Infection — equine herpes virus can cause paralysis

Bacterial Toxins

Haemorrhage

Trauma — thru damage — falls

Paralysis

Usually a sign of damage to the nerve cells

Facial nerve is particularly susceptible to injury as it crosses the back of the lower jaw

Radial paralysis is common after surgery due to weight on the radial nerve under the shoulder blade

Infections

Encephalomyelitis affects the nervous system

It can be caused by a strain of the EHV virus, rabies and tetanus (lockjaw)

It is an infection of the brain leading to paralysis signs and lack of co-ordination

It can lead to death as nerves serving the major organs become infected i.e. kidneys, heart, lungs

Laryngeal Hemiplegia

Commonly known as roaring is caused by paralysis of the muscles controlling the larynx due to damage — tie backs

Wobblers/Shivering/Stringhalt

All caused by damage to nerves resulting in loss of co-ordination and ability to move normally

Sedation and Anaesthesia

Sedatives and anaesthetic drugs all have an effect on the nervous system to either hinder or block the relay of messages to the brain and spinal cord. Slow down responses, movements, cardio-vascular system

Some drugs act by blocking receptors in the brain in order to block messages to the brain and spinal cord. Messages are blocked so that they can't get to their destination

Other drugs simply act on the nerve cells to delay or hinder the extent of messages being transmitted. These drugs will, therefore, slow the horse response and sensations to stimuli.

These are not stopping just delaying messages — hindering time taken from A — B

Common drugs for sedation, anaesthesia, analgesia

- Acepromazine
- Xylazine
- Morphine
- Phomifidine
- Detomidine

All of these drugs can be administered;

- Intravenously
- Intramuscularly
- Orally

Accidental intra arterial injection will commonly lead to convulsions and death

Most drugs have undesirable effects of some forms

Commonly drugs are combined to have the desired effect

ACP

Commonly used tranquiliser

No analgesic properties

Horses may be aroused easily and react adversely

Increasing dose, as with most drugs, will not increase sedative effect

Onset takes 20-30mins

Can be combined with other drugs to give desired effect

Long duration

Adrenergic agonists;

Xylazine, detomidine and romifidine produce dose dependant sedation analgesia and relaxing effect

These drugs give changes to CV function decrease in heart rate, effects on blood pressure and a decrease in cardiac output

Commonly used for colic pain as they have analgesic effect that is short lived

A drug is available that reverses the effects of these drugs

Microbes

Include beneficial and pathogenic organisms

Many classes of micro-organisms including

- Bacteria
- Virus
- Fungi
- Protozoa

Bacteria

Single celled organisms called prokaryotes

Spore forming producing heat resistant spores which are capable of causing disease

Anti-biotic sensitive

Not all bacteria are pathogenic- probiotic drinks- Lactobacillus

Some are essential for digestion i.e. caecal fermentation of cellulose

Found throughout the body

Examples of Pathogenic bacteria include:

Chlostridium tetani

Bacillus anthracis

Virus

Virus' are always disease causing or pathogenic to various extents

They can only replicate within a living cell (host)

As an independent organism they are not capable of replicating, growing or metabolising

Non sensitive to chemotherapy and anti-biotics

Smaller than bacteria

Some can mutate to avoid immunity or vaccines

Examples of virus'

Equine Influenza

EHV

African Horse Sickness

All of these are respiratory diseases

Other Pathogens include

Fungi – Ringworm – respiratory diseases COPD

Helminths – worms

Arthropods – mites, ticks, insects

Describe and recognise

Influenza

Caused by a virus – orthomyxovirus

Vaccinations and strict isolation procedures will control

Common in large groups of horses and in the young

Respiratory disease can lead to secondary bacterial infection or pneumonia

Recovery can take months

All horses should be vaccinated against flu. Initial 2 doses followed by a six monthly booster and then annually

Tetanus

Caused by anaerobic bacteria chlostridium tetani

Spores often found in the soil and can infect wounds etc.

On entry to the body the bacteria produces a powerful neurotoxin that blocks neurotransmission resulting in the symptoms of tetanus

Symptoms

'Sore Horse' posture

Muscle contractions

Spasms

Respiratory paralysis

Cl. tetani is found in faeces so soil is contaminated

Horses are vaccinated with a tetanus toxoid to induce active immunity – tetanus vacs

Cause horse to produce antibodies against disease

2 initial doses should be followed by annual boosters

Tetanus antitoxin should be given to injured or unvaccinated horses

Strangles

Bacterial — vaccine recently been developed

EHV — four strains- vaccine available 4 4Itn1

Botulism — bacterial — forage disease- neuromuscular paralysis

Contagious equine metritis — bacterial — venereal

The Immune System

Immunity means 'free from the burden of

Each specific microbe has an antigen attached which is capable of active stimulation of the immune system

The antigen stimulates the production of antibodies

Vaccination involve the artificial stimulation of antibody formation or the artificial entry of antibodies

White blood cells involved in immunity

Active immunity — is when the body produces its own antibodies

Passive immunity — is when antibodies are passed from the dam to the foal

Artificial immunity — vaccines — can be passive or active

Active produces anti-bodies

Passive puts in anti bodies so body doesn't have to fight

Vaccines

Modified live vaccines — reduced risk compared to live, effective — injecting micro-organism and antigen

Inactivated — no risk of virulence inactivate micro organism

Sub unit — no risk, only the antigen is injected — no micro organism present