



PIL A for Horses



1

PILA elements

- Principles of care and use
- Biology and husbandry of relevant species.
- Common diseases in the relevant species.
- Recognition of wellbeing, pain, suffering and distress in relevant species.
- Health monitoring and disease prevention and control.
- Handling and restraint of relevant species.
- Conduct of minor procedures.
- Introduction to anaesthesia and analgesia.
- Humane methods of killing

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Uses in research

Equine industry:

- Nutrition
- Anatomy and physiology
- Fertility and reproduction
- Sports injuries
- Infectious diseases
- Biosecurity
- Welfare

Human medical:

- Hyperimmune antisera
- Production of conjugated oestrogens


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Horses and ASPA

- Horses are not on the Schedule 2 list, meaning they can be obtained from sources which do not purpose breed them for use in research procedures
- However, horses, like dogs, cats and primates are considered a special species and must only be used if no other species will suffice

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Code of Practice (CoP)

Section 3 Chapter 8: Farm animals (including equines) 

Section 3, Chapter 8: Farm animals and equines
 This chapter must be read in conjunction with the Introduction and Section 3 Chapter 1: Advice applicable to all animals.
1 Advice applicable to all farm animals except equines
 In addition to the mandatory requirements covered in Sections 1 and 2 of this Code of Practice, in the case of farm animals, compliance with legislation relating to the identification, welfare, keeping, breeding, transport and slaughter of these species is necessary.

https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/388895/COPAnimalsFullPrint.pdf

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Taxonomic classification of horses

Phylum: Chordata
 Class: Mammalia
 Order: Perissodactyla
 Family: Equidae
 Species: *Equus caballus*

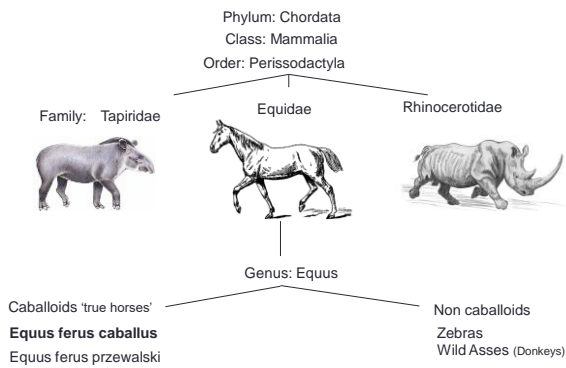


Equus caballus caballus (domestic horse)
Equus ferus przewalski (pictured)



Picture of a wild Przewalski horse

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Horse or Pony?

Height traditionally measured in hands and inches;

1 hand = 4 inches.

Animals measuring over 14.2 hands high (HH) or 1.47m at the wither are considered to be a horse



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LO: 3.1.7 9

Native horse breeds



Shire



Clydesdale



Suffolk

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LO: 3.1.7 10

Native ponies



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LO: 3.1.7 11

Horse breeds are divided into three groups based on shared characteristics

Warmblood	Coldblood	Hotblood
<p>Characteristics:</p> <ul style="list-style-type: none"> • Medium body weight • Athletic • Versatile • Even-natured • Used for equestrian sports <p>Breed examples:</p> <ul style="list-style-type: none"> • Hanoverian • Appaloosa • Dutch Warmblood • Cob • American Quarter horse 	<p>Characteristics:</p> <ul style="list-style-type: none"> • Heavier body weight • Strong and sturdy • Calm nature • Docile temperament • Used for hard labour, such as farm work <p>Breed examples</p> <ul style="list-style-type: none"> • Clydesdale • Shire • Belgian • Ardennes • Percheron • Heavy Cob 	<p>Characteristics:</p> <ul style="list-style-type: none"> • Light-bodied • Nervous or skittish • Excitable • Energetic • Often used for racing <p>Breed examples</p> <ul style="list-style-type: none"> • Arabians • Anglo-Arabian • Barbs • Thoroughbreds • Racing American Quarter horse

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Warmblood breeds



Dutch Warmblood

- Characteristics:**
- Medium body weight
 - Athletic
 - Versatile
 - Even-natured
 - Used for equestrian sports



Hanoverian

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Warmblooded breeds are versatile

Some horses may be in different categories based on size (Cob) or temperament (American Quarter horse)



Cob



American Quarter Horse

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Coldblood breeds



Clydesdale

Characteristics:

- Heavier body weight
- Strong and sturdy
- Calm nature
- Docile temperament
- Used for hard labour, such as farm work



Shire

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LO: 3.1.7 15

Hotblood breeds



Arab

Characteristics:

- Light-bodied
- Nervous or skittish
- Excitable
- Energetic
- Often used for racing



Thoroughbred

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Other equidae



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LO: 3.1.1

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External anatomy of the horse



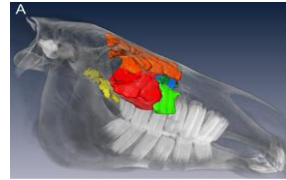
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LO: 3.1.1

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General features of the horse

- Herd animal, athletic with strong flight response
- Wide visual field
- Long facial bones, large sinuses and guttural pouch
- Obligate nasal breather



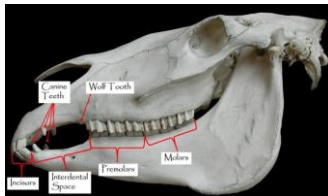
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LO: 3.1.1

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Dentition of the horse

Hypsodont (long crowned) teeth - grow continually



- 12 incisors
- 24 molar teeth
- 4 canine ('fighting teeth') present in males and some females
- "wolf" teeth may be present (remnants of previously existing premolars)

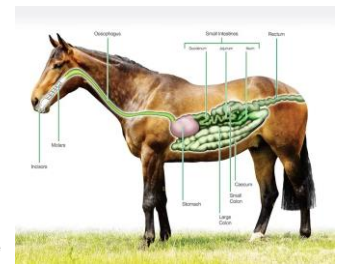
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LO: 3.1.1

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Digestion of the horse

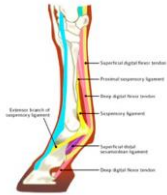
- Monogastric herbivore
- Oesophagus is 1.2 to 1.5m long
 - Food requires lubrication when swallowed
- Well-developed muscle (cardiac sphincter) prevents vomiting
- Hind gut fermenter
 - Digestion occurs in large intestines (caecum) in the right caudal abdomen
 - Large intestines are approx. 8m in length in total



Picture from: <https://www.horsehage.co.uk/nutrition/horse-digestive-system/>

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Locomotion of the horse



Functions of the ligaments in the lower leg:
 • Ability to 'spring'
 • Component of Stay apparatus



Body weight is supported by the tip of the coffin bone, third phalanx (P3)

Image from: <https://prebooks.umn.edu/farganimalanatomy/chapter/distal-imb/>

Equine Reproduction

- Seasonal breeder
- Mares in oestrus every 3 weeks
- Gestation 340 days
- One foal (2nd is 'pinched' before 16d gestation)



Types of breeding used by the horse industry

- Natural (requirement for thoroughbreds)
- AI with frozen, chilled or fresh semen
- Embryo transfer



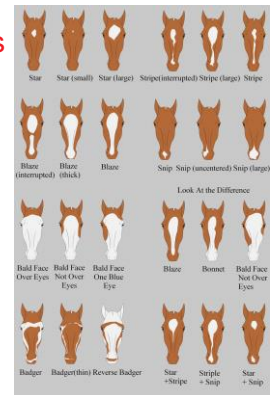
Care and management of horses

Routine management includes:

- Identification
- Handling
- Nutrition
- Housing
- Farriery
- Vaccination
- Dentistry
- Parasite control (esp. deworming)
- Fly control
- Grooming/clipping/rugging

Identification of horses

- Since 2009, an equine passport is a legal requirement in Northern Ireland, England, Wales and Scotland.
 - All horses must be microchipped
- Colour/markings most commonly used for identification
- Freezebranding/hotbranding

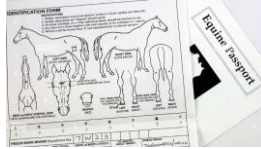


LO: 4.7 & 7.1

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Equine Identification Regulations UK

- Equine passports should be produced at the time of selling the horse or when it is treated by a veterinary surgeon. When being transported, the passport should always travel with the horse.
- Failing to identify horses in accordance with the legislation could result in a fine up to £5,000.
- Details kept in Central Equine Database (CED); DAERA/DEFRA initiative.



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LO: 4.7 & 7.1

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Handling horses

- Wear sensible footwear, a helmet and gloves
- Most horses accustomed to being lead from the left
- Tie up with a quick release knot
- Crouch, do not kneel!
- Stand same side if more than one person
- Twitch may increase compliance
- Use sedation or stocks if difficult



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LO: 3.1.5 & 4.6

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Nutrition

- Forage in the form of grass/hay/haylage and clean fresh water available *ad lib.* forms the basis of any horse's diet.
- However, avoidance of excessive intake of young fresh grass (fructans – associated with laminitis) – regulated grazing: strip grazing/grazing muzzles.
- Intake of hay/haylage can be controlled by using small holed haynets or hay boxes, if necessary.



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LO: 3.1.5

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Nutrition

- Fibre takes time to eat and chew. Horses naturally spend around 75 percent of their time eating and have a psychological need to chew.
- If these natural behavioural drives are not met it can be distressing to the horse and may lead to undesirable behaviours like weaving, crib-biting or damaging the stable.
- Chewing forage stimulates saliva production. A lack of saliva is associated with choke.



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LO: 3.1.5 29

Nutrition

- If a horse is receiving cereal feeds (straights, mix or nuts), it is best to allow the horse access to forage immediately beforehand. Chewing the forage will stimulate saliva production and this saliva will buffer the acidity in the stomach caused by the cereal feed.
- If insufficient forage is provided, it can disrupt the health of the digestive system leading to conditions such as acidosis and colic.
- The fermentation of forage in the large intestine produces heat. This heat is important to help the horse maintain the correct body temperature, particularly in winter.



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LO: 3.1.5 & 4.6 30

Water intake

- Clean fresh water should be available *ad lib*.
- Horses will drink ~5 litres / 100kg per day, when not working.
- This can double for horses in work or in hot weather.
- During freezing spells, the ice will need to be broken regularly.
- Where horses are group housed, ideally more than one trough should be provided.



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LO: 3.1.5 31

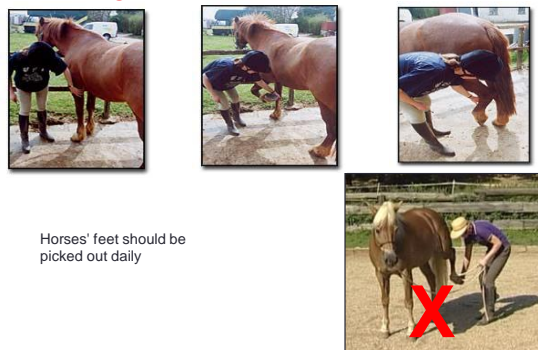
Poisonous plants



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LO: 7.1 32

Handling horses' feet



Horses' feet should be picked out daily

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Farrier

- Every 8-10 weeks, horses that are shoeless should have their feet trimmed / rebalanced.
- Horses can only be shod by a registered farrier.
- Every 4-5 weeks, horses that are shod, should have their shoes removed, their feet trimmed, rebalanced and shoes replaced/refitted.
- Horses that are group housed, should ideally have their hind shoes removed.



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Equine dentistry

- Only qualified professionals (e.g. licensed equine dental technician or Veterinary Surgeons) may examine mouths and rasp horses' teeth, ideally annually.



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Housing CoP

1.4 Equines being used in procedures Use animals

The shortest side shall be a minimum of 1.5 times the wither height of the animal. The height of indoor enclosures shall allow animals to rear to their full height.

Table 2-9-4 will replace table 1-9-4

Height at withers (m)	Minimum floor area for each animal held singly or in groups of three or fewer (m ² per animal)	Minimum floor area for each animal held in groups of four or more (m ² per animal)	Minimum floor area for foaling box or mare with foal (m ²)	Minimum enclosure height (m)
1.00-1.48	12.0	6.0	16	3.0
1.48-1.80	17.0	9.0	20	3.0
>1.80	20.0	(2 x With) ^a	20	3.0

^a To ensure adequate space is provided, space allowances for each individual animal shall be based on height to withers (WH).

https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/388895/COPAnimals/FullPrint.pdf (Page 58)

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Housing CoP

- **Temperature**
 - Rugs are appropriate for use to regulate temperature, especially if hair has been clipped in cool conditions or to prevent fly irritation during warm weather.
 - Proper consideration should be given to the weight and construction of the rugs so as they are appropriate to the conditions, and to the fit to the equine to prevent rubbing.
 - Rugs should be removed when horses undergo their daily check.
 - The mane and tail of equines provide natural protection from adverse weather conditions and from flies and ideally should not be removed or cut short. Where manes and tails need to be shortened or tidied it is advisable to achieve this by trimming rather than by pulling, and consideration should be given to providing additional fly protection if necessary
- **Lighting**
 - Sufficient light is essential for the inspection and safe handling of equines. All lighting should be sufficiently high or away from the equine so that the animal cannot injure itself on the fitting, or it should be constructed with a safety fitting.

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Housing CoP

- Housing
 - Some equines such as stallions, late-term mares and mares with foals at foot may require individual housing but should not be totally isolated from others.
 - Ideally, equines should be kept at pasture or have access to pasture for at least six hours a day.
 - Care should be taken to select groups that are compatible.



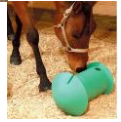
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Housing horses

- Social, herd, grazing animal
- Group housing allows for allogrooming



- If stabled need:
 - adequate forage
 - Some environmental enrichment
 - company appreciated



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Bedding

- Great choice of materials, all have their advantages and disadvantages
 - Straw bales – wheat, oat, barley
 - Chopped straw
 - Shavings
 - Flax/ hemp
 - Paper
 - Cardboard
 - Rubber matting
- Some are dusty
- Storage
- Cost
- Disposal, space for muck heaps



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Behavioural stereotypies in horses

Box walking



Weaving



Crib-biting & Windsucking



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Transport

- Vehicles used for the transport of horses must be designed, constructed, maintained and operated to avoid injury and suffering, and to ensure the safety of the animals.
- Keepers must carry a horse passport (equine identification document) for each animal transported.
- Horse must be accompanied by a competent person.
- Horse must be fit to travel.
- Horses must not be transported in a vehicle with more than one deck in operation.
- Minimum internal height must be 75 cm higher than the height of the withers of the highest animal.
- During long journeys, foals and young horses must be able to lie down.
- When transported in groups, horses older than eight months must wear halters (unless they are unbroken).
- Travelling can be stressful for horses, therefore time should be allowed for acclimatisation.



<https://www.gov.uk/keeping-horses/transporting-horses>

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LO: 5.2

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Assessing health in horses

Health

- Horses should be inspected a minimum of once a day if on pasture and twice a day if housed.

Temperature	99.5-101°F (37.5-38°C)
Respiratory rate	8-15 breaths/min
Heart rate	30-40 beats/min
Mucous membrane colour	pink
Capillary refill time	<2 seconds

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LO: 5.2

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Assessing health in horses

- Check limbs and feet including digital pulse and gait
- Check eating, drinking, urinating, defaecating
- Check skin
- Rectal examination if required
- Check weight or BCS



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LO: 5.3

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Body Condition Scoring (BCS)

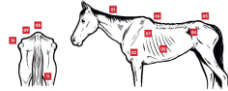
- Maintaining your horse at a healthy weight is a real challenge, a balancing act between providing the right diet, health care and exercise. Weight can change depending on the amount/type of food the horse is eating and how much exercise they are doing.
- Body Condition Scoring is an ideal way to assess your horse's overall fat covering to help determine whether they are a healthy weight (BCS 3).
- There are three key areas to consider; neck, body and hind quarters and you will need to look at and get hands on to help you determine between muscle and fat.
- Fat will feel spongy whereas muscle is firmer. However, dangerous crest fat can start to feel hard and become difficult to move from side to side.

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LO: 5.3

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0 - EMACIATED



- 01. Neck very thin with little muscle and no fat covering the top
- 02. No fatty tissue can be felt on the horse
- 03. Ribs easily seen and felt
- 04. Shape of each individual bone can be easily seen
- 05. Skin, tight over bones
- 06. Spine easily seen and felt
- 07. Very sunken and sloping from the spine to the ribs
- 08. Tail bone protrudes
- 09. Very sunken sloping hindquarters either side of the spine
- 10. Pelvis and hips are very easy to see and feel
- 11. Large gap in between top of back legs and under tail

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LO: 5.3

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3 - HEALTHY



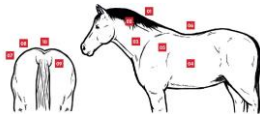
- 01. Shape of the neck muscles are less clear
- 02. No crest (no fat underneath the mane) except for stallions
- 03. Thin layer of fat covering the body
- 04. Ribs cannot be seen but easily felt with light pressure
- 05. Spine is covered but can still be felt
- 06. Hindquarters are beginning to become rounder in shape
- 07. Hip bones are just visible and can be easily felt

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LO: 5.3

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5 - OBESE



- 01. Wide and firm neck
- 02. Large amount of fat below the mane (known as the crest)
- 03. Neck muscles not visible
- 04. Ribs are buried in fat and cannot be felt
- 05. Pads of fat along body
- 06. Back is flat and broad like a tabletop
- 07. Hips are buried and cannot be felt
- 08. Hindquarters are a well-rounded apple shape
- 09. Large amounts of fat around tail head
- 10. A deep 'gutter' can be seen along the spine to the tail head

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Why is obesity an ever-increasing problem?

- Compared to Thoroughbreds; draught-types, cobs, native and Welsh breeds are more likely to be overweight or obese. These types of horses have evolved to survive harsh, cold and wet winters and make the most of poor-quality grazing by being naturally more efficient at utilising what they eat and converting more of it into fat. Modern day management means many horses have access to rich pasture, are rugged, stabled and potentially over-fed without adequate exercise. This results in any horse being prone to obesity and weight related health issues, such as:
 - Equine Metabolic Syndrome (EMS)
 - Laminitis, recent research has shown that **weight gain more than doubles the risk** of laminitis in horses and ponies - highlighting the importance of regularly monitoring your horse's weight.
 - Arthritis

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LO: 5.2

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Signs of Pain, Suffering, and Distress

- Increased respiratory and heart rates
- Change in temperature
- "Tucked up" posture
- Loss of appetite/ lack of droppings
- Uncomfortable when urinating
- Dull
- Lameness
- Diarrhoea
- Ocular or nasal discharge
- Sweating
- Restless/ pacing/ pawing ground/ rolling
- Teeth grinding
- Recumbent

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LO: 5.2

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Common equine diseases

- Lameness (OCD, OA, laminitis, tendonitis, foot conditions)
- Colic (abdominal pain, various causes)
- Respiratory disease (COPD/RAO, strangles, virus infection)
- Choke (oesophageal obstruction)
- Gastric ulceration
- Ocular injury/inflammation
- Sarcoids
- Mudfever/rainscald
- Sweet itch

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LO: 5.2

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LO: 5.2

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Notifiable diseases of horses

	Last seen in UK
West Nile Virus	never
Equine Viral Arteritis	2024
Equine Infectious Anaemia	2012
African Horse Sickness	never
Contagious equine metritis	2022
Dourine	never
Epizootic lymphangitis	1906
Anthrax	2015 (cattle)
Equine Viral Encephalomyelitis (EEE, WEE, VEE, JE)	never
Glanders and Farcy	1928

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Vaccinations for horses

- Equine influenza - annually
- Tetanus – every 2 years
- Strangles (Strep.equi)
- EVA
- EHV
- WNV
- Rotavirus (for pregnant mares)

Check vaccination and worming history of any incoming animals

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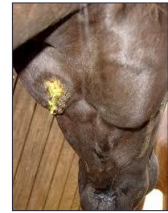


Photo Credit: The Minster Equine Veterinary Clinic

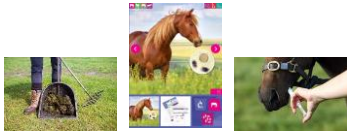
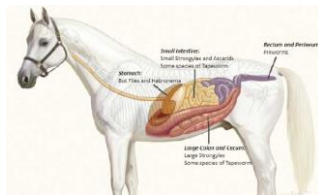


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Internal Parasites

Intestinal parasites can be broadly divided into:

- small strongyles/redworms (cyathostomes) whose larvae can encyst or overwinter in the intestinal walls.
- large strongyles and tapeworms which live in the large intestine and are shed in the horses' droppings.
- pinworms which lay eggs around the anus leading to irritation and rubbing.

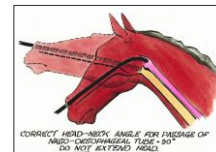


Pasture management, parasite monitoring (FEC), and appropriate control (dewormer)

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Administration of substances

- Orally in food/ water in paste via stomach tube
- Topically (on skin)



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LO: 8.1 57

Administration of substances

Calculate weight before dosing



$$\text{Dose} = \frac{\text{dose rate}(\text{mg/kg}) \times \text{horse's weight}(\text{kg})}{\text{drug concentration}(\text{mg/ml})}$$

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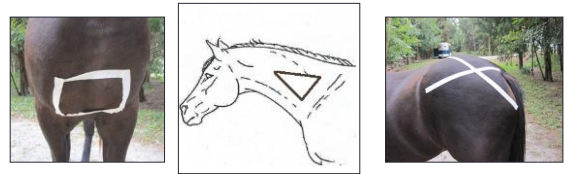
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Administration of substances

Subcutaneous injection



Intramuscular injection



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LO: 8.1 59

Administration of substances

Intravenous injection

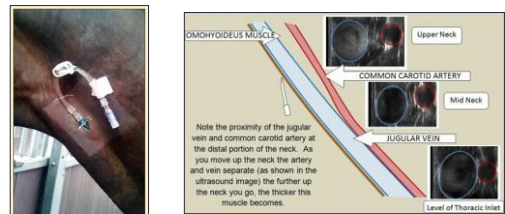


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LO: 8.1 60

Administration of substances

Intravenous injection



- Clipping hair may be required
- Cleaning of skin is advised

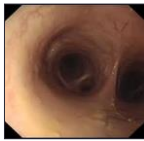
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LO: 8.1

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Taking samples

- Blood- jugular vein
(Total blood volume 500kg horse= 32.5 litres)
- Skin scrapes/ biopsies
- Faeces- as voided or during rectal examination
- Urine- as voided or via urinary catheter (use sedation)
- Respiratory tract (nasopharynx) swabs or tracheal wash or bronchoalveolar lavage (use endoscope)



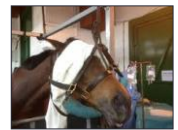
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LO: 20.6

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Sedation and anaesthesia

- Standing sedation commonly used
 - Oral paste or injection
- Take care! Horse may stumble and will still kick
- Quiet environment enhances duration of action drugs
- Use local anaesthetics to reduce response to procedure



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LO: 20.6

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Sedation and anaesthesia

- '5-legged stance' –closed eyes, drooped lip, head towards ground



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LO: 20.6

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Sedation and anaesthesia

General anaesthesia is complex

- induction in padded area
- nasotracheal intubation
- lift to table
- padding essential
- recovery unpredictable
- post anaesthetic myopathy (muscle pain/weakness)



64

LO: 20.8

65

Analgesia- NSAIDs

Injectables or oral formulations

- Phenylbutazone "bute"
- Flunixin
- Ketoprofen
- Meloxicam

- Duration of action is generally one day (24 hours)

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LO: 20.8

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Analgesia- Opioids

Usually only used for surgical interventions

- Buprenorphine
- Butorphanol (weak agonist)
- Pethidine (older, above options are considered newer and safer)

Duration of action varies but is less than or up to 2 hours

66

LO: 20.8

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Analgesia- Local anaesthetics

- Inject into the skin over the site or use IV catheter placement
 - the dosage should be kept to the minimum required to produce the desired effect.
 - Always calculate the dose based on the horse's weight
- Mepivacaine
- Lignocaine - max 50 ml per horse (!) toxicity does occur so calculate dose carefully

- Duration of action is a few hours

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LO: 1.12

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Schedule 1 methods

ALL UNGULATES (Sheep, Goats, Cattle, Pigs, Horses)

- 1) **Overdose of anaesthetic using a route and agent appropriate for the size and species of animal**
- 2) Destruction of the brain by a free bullet, **carried out by a veterinary surgeon**
- 3) Captive bolt, percussion or electrical stunning followed by destruction of the brain or exsanguination before return of consciousness, **carried out by a veterinary surgeon or licenced slaughter-man**

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LO: 1.12

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Foetal or embryonic forms

The only Schedule 1 method for fetuses and embryos of ungulates is overdose of an anaesthetic, using a route and agent appropriate for the size and species of animal.

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LO: 1.12

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Confirmation of death

- 1) **Permanent cessation of the circulation** /destruction of the brain
- 2) Dislocation of the neck
- 3) **Exsanguination**
- 4) **Onset of rigor mortis**
- 5) Instantaneous destruction of the body in a macerator

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Questions?



Toridon, Scotland

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