



PIL A In Cattle



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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UK cattle industry



Beef cattle

- Most beef cattle are kept outdoors for nearly all of the year

Dairy cattle

- Most are kept indoors/outdoors based on lactation status.

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Uses in research

- Infectious disease of humane health concern – Salmonella, E. Coli, TB
- Feed studies to ascertain the best quality meat and milk



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Cattle and ASPA

- Cattle 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
- Audit of vendors advised before purchase



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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

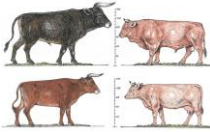
In addition to the mandatory requirements covered in Sections 1 and 2 of this Code of Practice, in the case of farm animals, compliance with legislation relating to the identification, welfare, keeping, breeding, transport and slaughter of these species is necessary.

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

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Cattle Phylogenetic Classification

Class: Mammalia
 Orders: Artiodactyla – even-toed ungulates
 Sub-order: **Ruminantia (ruminants)**
 Family: Bovidae
 Sub-family: Bovinae
 Genus: *Bos (Cattle)*



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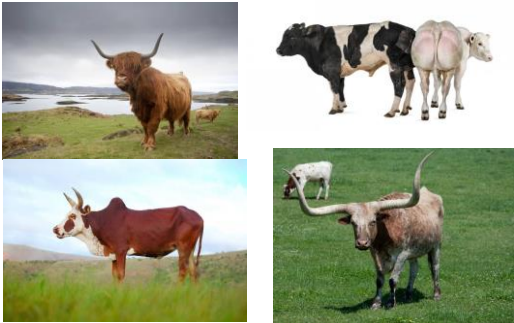
Breeds of Cattle (UK)

Dairy breeds: Holstein Friesian, Jersey, Guernsey
 Beef breeds: Hereford, Aberdeen Angus, Charolais



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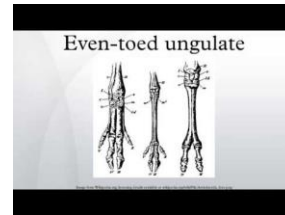
Breeds of cattle



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Ruminant

• Definition: even-toed ungulate mammal that chews the cud regurgitated from its rumen.



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Ruminants

Cattle are ruminants
 As are sheep, goats, deer, antelope, giraffe
 Closely related to camels and alpacas



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Ruminants

Strict herbivores, with a modified gastro-intestinal tract to digest the cellulose in plants

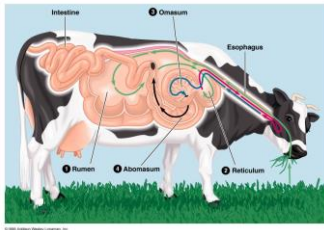
- No upper incisor (or canine) teeth– dental pad
- Produce copious quantities of saliva
- Large dorsum to tongue
- Unique four-chambered stomach:
- Regurgitate food for secondary digestion – 'chewing cud'



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Digestive system – Foregut fermenter

Four chambers: Rumen, Reticulum, Omasum, Abomasum
Cellulose digestion occurs in the four chambered stomach



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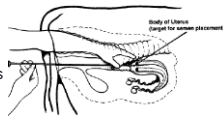
Digestive process

1. Plant material is initially taken into the **Rumen** (largest section) where it, processed mechanically and exposed to bacteria than can break down cellulose.
2. The **Reticulum** allows the animal to regurgitate & reprocess particulate matter.
3. More finely-divided food is then passed to the **Omasum**, for further mechanical processing.
4. The mass is finally passed to the true stomach, the **Abomasum**, where the digestive enzyme lysozyme breaks down the bacteria so as to release nutrients.
 - The digestive process can take up to 100 hours!

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Bovine Reproduction

- Breed all year
 - nonseasonal polyoestrous breeders
 - Oestrus every 21 days
- Sexually mature at 12-15 months
- Mated (served) at 15 months
- Natural service or artificial insemination
- Embryo transfer relatively common
- Gestation length 283 days (9 months)
- Litter size 1 (occasionally 2)
- Re-mated 3 months after parturition



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Calf weaning

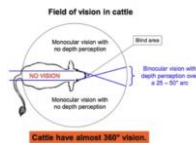
- Beef – remain with mother for up to 9 months
- Dairy – remain with dam for 1-4 days to allow ingestion of antibody-rich milk (colostrum). Weaned at 6 weeks
- It is very important that as well as milk, calves are given some fibre (hay) in their diet from an early age to promote the development of the rumen.



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Cattle Behaviour

- Grazers – eat grass and other herbaceous plants
- Very social animals - graze in herds/flocks for up to 10 hours a day
- Flock conscious –usually driven together as a group
 - Protection - “Safety in numbers”
- Wide field of visual (300°)
- Sensitive to excessive noise
- When angry, will stamp front feet or head butt (especially rams!)



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Cattle Handling

Small calves

- One competent person
- Restrain against a solid surface
- Rear of calf in a corner
- Hold the head and turn over your thigh



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Cattle Handling

Larger calves

- Two competent animal technicians.
- One person on head end and one on rear end (decide first!)
- May need to use a halter for the head



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Cattle Handling

Adult cattle should be restrained in a crush



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Routine husbandry tasks

Calves

- Ear tagging
- Disbudding – must be done with anaesthesia
- Castration
- Vaccination
- Worm monitoring and control
- External parasite control



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Routine tasks

Adult cattle

- Vaccination
- Udder care
- Worm monitoring and control
- Foot/hof monitoring and care
- Reproductive health checks



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Environment for Ruminants

CODE OF PRACTICE FOR THE HOUSING AND CARE OF ANIMALS

- Temperature and humidity
- Ventilation
- Stocking densities
- Lighting
- Noise
- Feeding
- Bedding



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Home Office Code of Practice

Section 2, Chapter 8: Farm animals (including equines)

1 Accommodation specifications

1.1 Cattle being used in procedures

Table 2.6.1 will replace table 1.6.1

Weight of animal (kg)	Minimum floor area for one or more animals (m ²)	Minimum floor area per group housed animal (m ²)	Use animals	
			Ad libitum feeding	Restricted feeding
<=50	2.50	2.30	0.30	0.30
100-150	4.50	3.40	1.10	0.80
150-200	4.25	3.40	0.40	0.50
200-400	6.00	4.80	0.50	0.40
400-600	9.00	7.50	0.65	0.70
600-800	15.00	9.70	0.65	0.60
>800	18.00	10.00	0.65	0.50

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

1.1.1 Introduction
 1.1.2 Introduction
 The Home Office Code of Practice for the Housing and Care of Animals is a code of practice for the housing and care of animals used in procedures. It is intended to provide a minimum standard of care for animals used in procedures. It is intended to be used in conjunction with the Animals (Scientific Procedures) Act 1986 (ASPA) and the Animals (Scientific Procedures) Regulations 2012 (ASPU). It is intended to be used in conjunction with the Home Office Code of Practice for the Housing and Care of Animals (COPA) and the Home Office Code of Practice for the Housing and Care of Animals (COPA) (COPA).

HO advice on housing, ventilation, temperature, etc.

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LO: 4.2

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Housing - cattle

- Survive well outdoors – susceptible to heat stress
- As per HO advice, should be provided shelter and dry laying area in inclement weather.
- Social animals so should be kept in groups within sight and sound of each other
- Don't mix horned and polled cattle to minimise bullying
 - Horned cattle need more space to be housed together



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LO: 4.2

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Housing - cattle

- Separate feeding/hard standing and soft laying area should be provided
 - Straw bedding (when clean) allows natural foraging
 - Sand and mat or mattress beddings are also commonly used
- Bare environment can lead to stereotypic behaviour e.g. matt chewing



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LO: 4.2

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Housing - calves



- Calves bedded on wood shavings, replacing bare concrete floor and rubber mats
 - Drier & cleaner.
- Ensure adequate ventilation without draughts
 - Poor ventilation predisposes to respiratory disease
- Toys are hung around the room

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LO: 3.1.5

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Cattle feeding



- Strict herbivores - ad lib fodder with a high fibre content needed.
- A lack of substrate can lead to metabolic in-balances, indigestion, behavioural disorders.
- For indoor feeding – must have sufficient room to feed simultaneously
- Conserved forage such as silage and hay should be fed in winter months
- Water ad lib – lactating cows need large quantities of water

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LO: 4.2

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Cattle Environmental enrichment

- Rotor brushes are excellent enrichment for adult cattle
- Toys and playthings can work for young ruminants, but adults soon tire



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LO: 5.2

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Health status

Conventional Farm

- Most are unknown health status
- "high" health status is voluntary through schemes

Animal Health checks (e.g. on arrival)

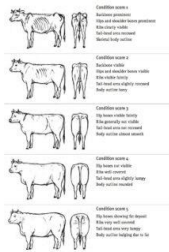
- History of illness
- Clinical examination should include:
 - body condition score
 - Appearance
 - Lameness
 - Breathing
 - Diarrhoea
- Laboratory tests - blood, faeces, skin scraping

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Assessing health

Rectal Temperature 38.5°C
 Respiratory rate 15 – 20 / minute
 Heart rate 60 –90 / minute
 Blood volume 60ml/kg

- Check eating/drinking/urinating/faeces
- Check weight or BCS
- Check skin
- Rectal examination if required



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Signs of pain

- Tail swishing
- **Teeth grinding**
- **Absence of chewing cud**
- Weight loss / reduced body condition
- Abnormal posture
- Increased respiration
- Lethargy
- Isolated from herd



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Signs indicating system affected

Respiratory - Coughing and sneezing, Ocular-nasal discharge, Raised temperature, Increased respiratory rate

Gastrointestinal – chronic weight loss, diarrhoea, dehydration, low temperature (common in calves)

Locomotor – lameness, feet abrasions, interdigital dermatitis

Nervous – tremor, head-tilt, circling, seizures



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Notifiable Diseases

• A **notifiable disease** is any disease that is required by law to be reported to government authorities.

- REPORT TO DEFRA

• Examples:

- TB – common in the UK
- Anthrax
- BSE
- Bluetongue
- Foot and Mouth disease
- Rabies
- Rift Valley Fever



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Zoonotic Diseases

Diseases that spread between animals and humans

Skin: Ringworm (common)

Abortion: Q fever

Digestive: Cryptosporidia, Campylobacter, Salmonella, E coli O157

Respiratory: Tuberculosis

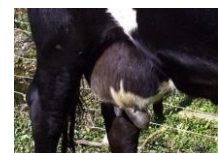
Other: Leptospirosis



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Common Bovine diseases

- Skin diseases – Ringworm, ectoparasites (lice, mites)
- Respiratory diseases – Calf pneumonia, IBR, TB
- GI diseases – viral, bacterial, parasitic, bloat
- Metabolic – hypocalcaemia, rumen acidosis
- Reproductive – metritis, abortion, mastitis
- Neurological – clostridial diseases, leptospirosis



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LO: 5.2

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Disease prevention

Vaccination

Cattle
Clostridial
Respiratory viruses – IBR, PI3, BRSV
Leptospirosis
Bovine virus diarrhoea

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LO: 4.8 & 8.1

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Minor Procedures

Administration of substances

- Oral
- Subcutaneous
- Intramuscular
- Intravenous
- Intranasal

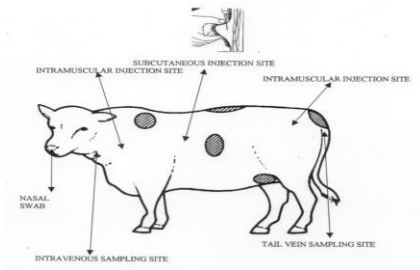


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LO: 4.8 & 8.1

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Common injection sites



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LO: 4.8 & 8.1

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Venous sites



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LO: 4.8 & 8.1

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Needle selection

- Influencing factors:
 - Age – calf v cow
 - Route of administration IM (longer) v subcutaneous (shorter)
 - Viscosity of liquid to be injected – wider gauge needed for thick substances
- **Never re-sheath/reuse needles**

Needle Sizes			
Animals	IM	SubQ	IV
Calf	18G x 1"	18G x 3/4"	18G x 1"
Cow	16G x 1-1/2" 18G x 1-1/2" 20G x 1-1/2"	16G x 1"	14G x 2" 16G x 1-1/2"

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LO: 4.8 & 8.1

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Anaesthesia in Cattle



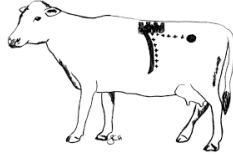
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LO: 20.3

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Local and regional anaesthesia

- Commonly used in cattle in combination with sedation
 - Disbudding
 - Castration
 - Caesarians
 - Displaced abomasums (bloat)



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LO: 20.11

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Ruminants General Anaesthetic (GA) Risks



- Inhalation (aspiration) pneumonia - Regurgitation, salivation inhaled into lungs
- Bloat - Build up of rumen gases
- Impaired respiration - Weight of abdominal viscera on diaphragm
- Impaired venous return - Weight of abdominal viscera on Posterior Vena Cava

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LO: 20.6

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Anaesthesia agents

Sedation: Xylazine (alpha2)

Induction: Injectable generally advised

- Propofol
- Alfaxalone

Maintenance: volatile advised

- Isoflourane

Note ketamine + alpha 2 does not provide good surgical anaesthesia in ruminants so is best avoided.



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LO: 20.5

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Laparoscopic
surgery
increasing



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LO: 20.5

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Pre-GA considerations

- Acclimatisation
- Health check (PiL responsibility)
- Fasting – controversial some recommend 24 hours to reduce the amount of gas produced
- Pre-medication – useful in ruminants
 - Xylazine



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LO: 20.9

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Intra-operative considerations

- Positioning: flat, padded area, nose lower than body
- Ventilation – often used due to weight of rumen contents pressing on diaphragm
- Heat source
- Rumen tubes – release gas build up.
- Fluid support
- Monitoring – pulse oximetry, capnography, Blood pressure measurement

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LO: 20.12

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Analgesia

- Opioid
 - Not commonly used in ruminants as the effects vary and have a very short duration of action
 - Butorphanol can be used to reduce sedative dose
- Non-steroidal anti-inflammatory drugs (NSAID's)
 - Flunixin (Finadyne solution)
 - Meloxicam (Metacam)
 - Ketoprofen (Ketofen)



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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 foetuses 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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Any questions?



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