RED KITE
VETERINARY CONSULTANTS

PIL A for Sheep and Goats


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Sheep Classification

Class:	Mammalia
Orders:	Artiodactyla – even-toed ungulates
Sub-order:	Ruminantia (ruminants)
Family:	Bovidae (cloven hoofed ruminant)
Sub-family:	Caprinae
Genus:	Ovis

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Goat Classification

Class:	Mammalia
Orders:	Artiodactyla – even-toed ungulates
Sub-order:	Ruminantia (ruminants)
Family:	Bovidae (cloven hoofed ruminant)
Sub-family:	Caprinae
Genus:	Capra

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Sheep and Goats in ASPA

- Sheep and goats 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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Uses in research

- Sheep
  - Alternatives to rabbits to produce polyclonal antibodies
  - Synthesising bioactive compounds in mild for studies in parturition, neonates and reproduction
  - Studies in prion disease
- Goats
  - surgical training and teaching.
  - used in medical, orthopedic, psychological, chemotherapeutic, and physiologic research.
  - Studies in prion disease

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Breeds of Sheep

Hill breeds	Scottish Blackface Welsh mountain
Upland breeds	Cheviots Swaledale
Lowland breeds	Down breeds Polled Dorset



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Breeds of Goat

- Milk
  - Alpine
  - LaMancha
  - Nubian
- Meat
  - Spanish
  - Boar
- Skin/Wool
  - Angora
  - Black Bengal

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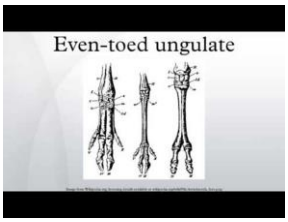
Ruminant

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



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Ruminants

Sheep and goats are ruminants

As are cattle, deer, antelope and giraffe

They are closely related to camels and the South American camelids

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Ruminants

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

- No upper incisor 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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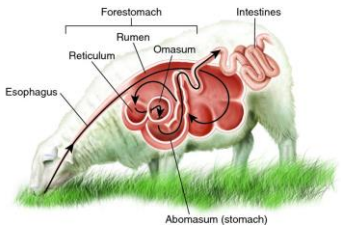
Digestive system

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** 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 **Abomassum**, 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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Sheep Reproduction

Seasonal breeders – early autumn – late winter although breed variations
Oestrus every 17 days
Females sexually mature 5-8 months old
First mated at 6 months or 18 months of age
Natural service – AI and ET rarely used
Gestation length 145 days (5 months)
Litter size 1-2

Breed only once a year
(note Polled Dorsets)

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Goat reproduction

- Seasonal breeders – September to March (decreased day length)
- Oestrus every 21 days
- Males and famales become sexually mature at 6 months however most not bread until 18 month of age
- Natural service – AI and ET can also be used
- Gestation length 150 days +/- 5 days
- Litter size 1-4 – born in spring

Note: Pseudopregnancy 'cloudburst' – uterine and udder englargement caused by build up in fluid in uterus.
Often resolved by sudden discharge of uterine fluid

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Weaning

- Sheep - usually 14-18 weeks, but with some systems can be as early as 6 weeks (Dorsets)
  - Milking herds – lambed weaned at 2-4 days and reared on replacer and weaned at 4-5 weeks
- Goats – kids from milking goats are often weaned at 2-4 days of age and artificially reared – weaned at 2 months

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Structure of the sheep industry

Most sheep are kept outdoors for nearly all of the year – some lambed indoors

They are predominantly found in Scotland, Wales and the West of England

Little genetic improvement in sheep breeds compared to poultry, pigs and cattle

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Sheep Behavior

VERY flock conscious –usually driven together as a group

"Safety in numbers"

Wide visual field -~ 270°

Highly sensitive to excessive noise

When angry, will stamp front feet or head butt (especially rams!)

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Sheep Behavior

Different responses to handling based on breed

- White-faced wool breeds have greater flocking instinct
- Barn raised – shorter flight zone
- Pasture raised –bigger flight zone

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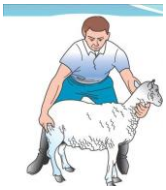
Sheep Restraint



- Drive flock into small pen or enclosures
- Approach individual slowly
- Capture animal by putting one arm around its neck and front quarters then quickly wrapping other hand around rear quarters and grabbing its tail stump (dock) or under hindlimb
- Guide animal into desired area for treatment
- NEVER grab a sheep or a mohair goat by the wool!

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Sheep Restraint

Sheep may be restrained in a standing position

Or tipped over to a sitting position

One hand in fold of flank – turn the head away from you and pull the sheep towards you.

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Sheep Restraint

Use to examine:

Head – eyes and teeth
Feet
Genitalia
Ventral abdomen

Perform routine tasks:
Hoof trimming
Shearing

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Goat Handling

Goats will not stay together when herded, but scatter.

Best to identify the lead goat (usually a doe) and guide her into pen - the others will follow

Goats don't tolerate rough treatment – will try to butt

Use the minimum amount of restraint necessary

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Goat Handling

Warning Signs!

- Hair raised along spine
- Stamping foot
- Sneezing/Snorting
- Rearing up on hind legs

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Goat restraint

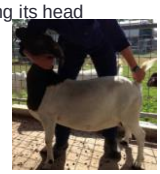
Do not capture by horns: hold around the neck

Restrain against a wall/fence with your legs and hips

Useful to back the goat's hindquarters into a corner

Can straddle at the shoulders while holding its head

Never turn a goat (cf sheep)



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Routine tasks

Lambs

Tail docking – first week of life

Castration

Worm control

External parasite control – blowfly strike

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Routine tasks

Adult sheep

External parasite control – mange and lice

Shearing

Worm control

Foot care

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Routine tasks

Kids

Disbudding – vet procedure and must be done under general anaesthesia

Castration – commonly carried out at the same time as disbudding

Worm control

External parasite control

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Routine tasks

Adults

External parasite control

Worm control

Footcare

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Housing and Care for Sheep and Goats

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

Goats and sheep bodyweight	Minimum floor area in m^2 when housed in groups	Minimum floor area in m^2 when housed singly	Minimum length of feed rack or trough per head in metres
< 35 kgs	1.3	2.0	0.35
> 35 kgs	1.9	2.8	0.35

Temperature: 10-24^{0}C

Relative humidity: 45 – 65%

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Housing - sheep

- Survive well outdoors – susceptible to heat stress
- Social animals so should be kept in groups within sight and sound of each other
- Don't mix horned and polled sheep to minimise bullying
  - Horned sheep need more space to be housed together

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Housing - goats

- Less hardy than sheep - dislike rain so should be provided with sheltered area
- Social animals so need to group housed within sight and sound of each other
- Don't mix horned and polled goats to minimise bullying
  - Horned goats need more space to be housed together

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Sheep feeding

- Strict herbivores – add lib fodder needed
- When lambing – ewes need extra energy from cereal based concentrates – care with copper concentration
- Winter feed – silage, hay, turnips, kale
- For indoor feeding – must have sufficient room to feed simultaneously
- Reduced mesh size promotes more grazing
- Water ad lib – prefer flowing water cf static tanks

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Goat feeding

- Strict herbivores – ad lib fodder needed
- Primarily browsers rather than grazers like sheep and goats
- Very inquisitive and will eat anything at a height!
- Feeders preferably kept at a height to promote browsing
- When kidding – does need extra energy from cereal based concentrates – care with copper concentration
- Fresh clean ad lib water

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Environmental Enrichment - sheep

- Difficult – flock animals so always keep in groups
- Ad lib fodder allows natural grazing behaviour
- Deep straw bedding allows foraging behaviour
- Enrichment balls tend to be of limited value in sheep
- The provision of rock salt licks is both an enrichment and helps to prevent urolithiasis in males

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Environmental Enrichment - Goats

- More inquisitive and independent than sheep
- Social animals so should be group housed
- Provision of ad lib roughage at head height allows natural browsing behaviour
- Provision of a raised area – goats are natural climbers
- Toys suspended from height – goats are inquisitive
- Respond well to human contact

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Health status

Conventional – unknown health status
- "high" health status

Health checks

1) History

2) Clinical examination – body condition score
appearance
lameness
breathing
diarrhoea

3) Laboratory tests - blood, faeces, skin scraping

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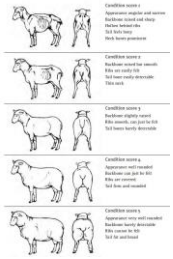
Assessing Health: Sheep

Rectal Temperature	39.0 C
Respiratory rate	12-20 / minute
Heart rate	60-120 / minute
Blood volume	60ml/kg

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



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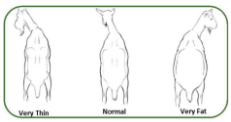
Assessing health: Goats

Rectal Temperature	38.5 C
Respiratory rate	15-25 / minute
Heart rate	70-135 / minute
Blood volume	60ml/kg

- Check limbs/feet
- Check eating/drinking/urinating/defaecating
- Check weight or BCS
- Check skin
- Rectal examination if required



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Signs of pain – sheep and goats

- Prey species so will not often show signs of pain until disease is advanced
  - Reduced feed intake and rumination – **no chewing cud**.
  - Licking, rubbing or scratching painful areas.
  - Reluctance to move.
  - **Grinding their teeth** and curling their lips.
  - Altered social interactions.
  - Changes in posture to avoid moving or causing contact to a painful body area.
  - Sheep facial grimace

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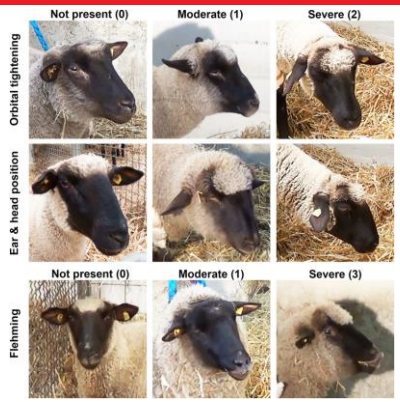

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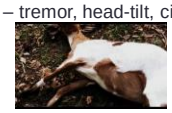
Signs indicating system affected

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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Mucous membranes

Colour

Pink	normal
Red	inflamed
White	anaemic
Yellow	jaundiced
Purple	septicaemic
Blue	cyanotic

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Notifiable diseases - sheep

- A **notifiable disease** is any disease that is required by law to be reported to government authorities.
  - REPORT TO DEFRA
- Examples:
  - Anthrax
  - Brucellosis
  - Bluetongue
  - Foot and Mouse disease
  - Scrapie

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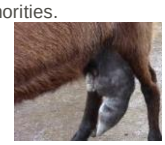
Notifiable diseases - goats

- A **notifiable disease** is any disease that is required by law to be reported to government authorities.
  - REPORT TO DEFRA
- Examples:
  - Anthrax
  - Bluetongue
  - Foot and Mouse disease
  - Goat pox
  - Contagious agalactia
  - Pest des petits ruminants



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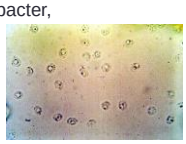
Zoonotic Diseases

Skin:	Orf,
Abortion: (common)	Chlamydophilia, Toxoplasmosis
Digestive:	Cryptosporidia, Campylobacter, Salmonella, E coli O157
Respiratory:	Tuberculosis (goats only)
Other:	Leptospirosis



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Common Ovine diseases

- Skin diseases – Orf, ectoparasites (lice, mites)
- Respiratory diseases – pasteurellosis,
- GI diseases – viral, bacterial, parasitic
- Reproductive – metritis, abortion, mastitis, twin lamb disease
- Neurological – tetanus, botulism,
- Locomotor – foot rot (common), contagious ovine dermaititis

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Common Caprine diseases

- Skin diseases – Orf, ectoparasites (lice, mites)
- Respiratory diseases – pasteurellosis,
- GI diseases – viral, bacterial, parasitic, MAP
- Reproductive – metritis, abortion (EAE, Toxo), mastitis, twin lamb disease
- Neurological – tetaus, botulism,

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Disease prevention

Sheep Vaccines

Clostridial diseases – 10 diseases (tetanus etc.)

Pasteurellosis

Abortion agents (EAE and Toxoplasmosis)

Foot rot

Contagious pustular dermatitis (Orf)

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Goat vaccinations

- Only 2 licences – Clostridium perfingenes & Tetanus

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Minor Procedures

Administration of substances

- Oral
- Subcutaneous
- Intramuscular
- Intravenous
- Intranasal
- Intraperitoneal

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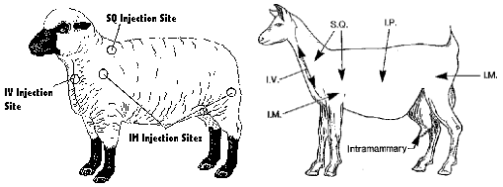
Injection sites



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Minor Procedures

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Needle selection:

- Influencing factors:
  - Age – young v adult
  - Route of administration IM (longer) v subcutaneous (shorter)
  - Viscosity of liquid to be injected

Age	Gauge	Needle Length	
		Intramuscular injection	Subcutaneous injection
< 4 weeks old	20 to 22	½ inch	½ inch
4 to 16 weeks	20 to 22	5/8 to ¾ inch	½ inch
4 to 6 months	20 to 22	1 inch	½ inch
> 6 months	18 to 20 to 22	1 inch	½ inch

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Anaesthesia

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Local/regional anaesthesia

- Used in combination with sedation in sheep
- Goats (especially kids) very sensitive to local anaesthetic agents and overdose easy – not often used

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General Anaesthetic risks in Ruminants

Inhalation pneumonia: Regurgitation
Salivation

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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Pre-GA considerations

- Acclimatisation – check local rules
- Health check
- Fasting – controversial some recommend 24 hours
- Pre-medication – useful in ruminants
  - Diazepam, Midazolam, Acepromazine
  - Xylazine not recommended cf cattle due to narrow safety index

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Anaesthesia

Sedation - Diazepam

Induction – Alfaxalone/propofol

Maintenance – Isoflurane

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

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Intra-operative considerations

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

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Analgesia

- Opioid
  - Not commonly used in ruminants as the effects vary and have a very short duration of action
- Non-steroidal anti-inflammatory drugs (NSAID's)
  - 1) Flunixin (finadyne solution)
  - 2) Meloxicam (metacam)
  - 3) Ketoprofen (ketofen)

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Schedule 1 methods of killing

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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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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Confirmation of death

1) Permanent cessation of the circulation

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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