Keeping the commercial goat herd healthy

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Starting out

- Buy healthy goats!!!
  - from established goat keepers where the animals
    - have a known health history
    - established genetics
- Ask about any health problems in the herd
- Look before you buy!



Before purchase

- Check the preventative measures on vendor's farm
  - Vaccination
  - Worming (including liver fluke)
- Consider blood tests for specific diseases
  - CAE (compulsory for importation into Ireland)
  - Enzootic (Chlamydial) abortion
- Reject goats vaccinated against orf, Johnes disease & enzootic abortion as vaccination does not guarantee freedom from disease

- Remember most diseases are brought in with new animals and **you have paid for them**!!!!



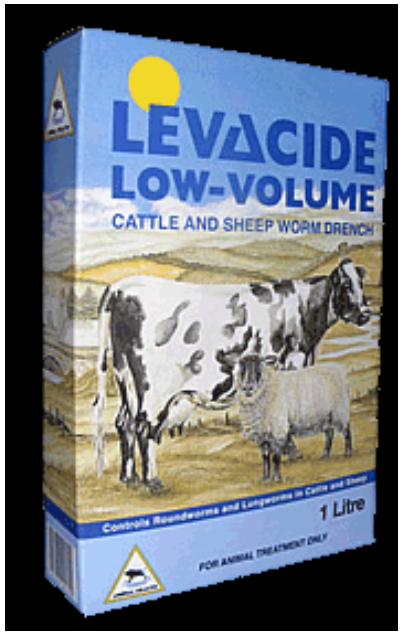
On arrival

- Quarantine the new goats
  - Preferably 6 weeks (minimum 2-3 weeks)
  - 2m away from any building housing goats or sheep
  - Double fence paddocks with 3m separation





- Observe quarantined animals regularly
- If the goats have been grazed, give simultaneous doses of levamisole (`yellow wormer') & an avermectin product (or monepantel) to avoid introducing resistant worms
  - Check worm egg counts on faecal samples





Dose rates for anthelmintics

- Benzamidazoles: 2 times sheep rate
- Levamisole: 1.5 times sheep dose rate
- Avermectins: 2 times sheep dose rate
- Monepantel, Zolvix(Novartis), amino-acetonitrile derivative: 1.5 times sheep dose rate
- Derquantel + Abamectin, Startect (Zoetis) – don’t use in goats

- **Anthelmintics should always been given at the correct dose, generally by mouth**.

Underdosing increases the rate of selection for anthelmintic resistance by exposing nematodes to sublethal concentrations of anthelmintic.

- **Groups of goats should be dosed at the rate for the largest in the group.**

Wherever possible goats should be weighed, eg while at shows in cattle markets or weigh bands can be used. With the exception of levamisole, anthelmintics have a wide safety margin so overdosing is not a problem.

Diseases to watch for

Johnes disease

Caseous lymphadenititis (CLA)

Caprine arthritis encephalitis (CAE)

Chlamydia

Toxoplasmosis

Respiratory disease

Orf

(Gastrointestinal parasites)



- Maintaining herds free from CAE, Johnes and CLA provides an excellent basis for future sales of goats within Ireland and for export within the EU
- All 3 diseases are debilitating, chronic and result in marked loss of income through decreased production and culling of goats



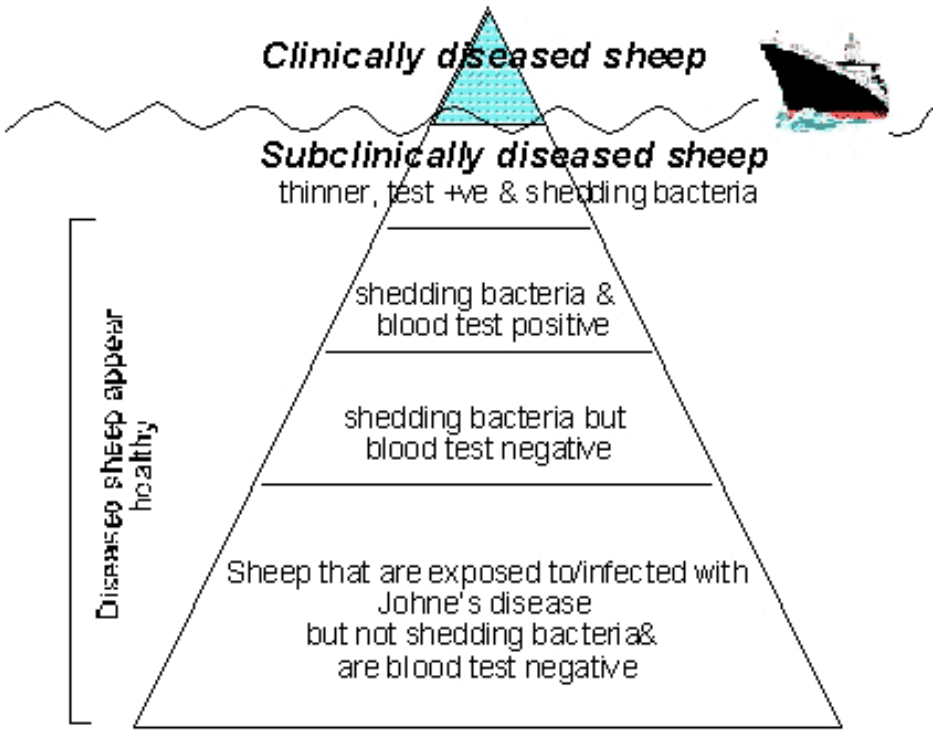
Johnes Disease



Johnes Disease

- Disease of intensification
  - largely a disease of commercial herds
- Spread by movement of goats between herds as new herds are established and other herds pack up
- In severely affected herds, cull rates of 20% or more are common
- Decreased milk yield & loss of economic potential

THE JOHNE'S DISEASE ICEBERG



Johnes Disease
Clinical signs

- Progressive weight loss
- Increasing lethargy
- Decreased appetite
- Rough hair coat
- Diarrhoea not a feature
- Young adult goats



Typical Johnes faeces



Johnes Disease

- Impossible to diagnose Johnes Disease clinically in a single infected animal
- Not possible to screen animals effectively before purchase
- All laboratory tests have limitations
  - blood tests
    - AGID or ELISA
  - faecal culture
  - PCR



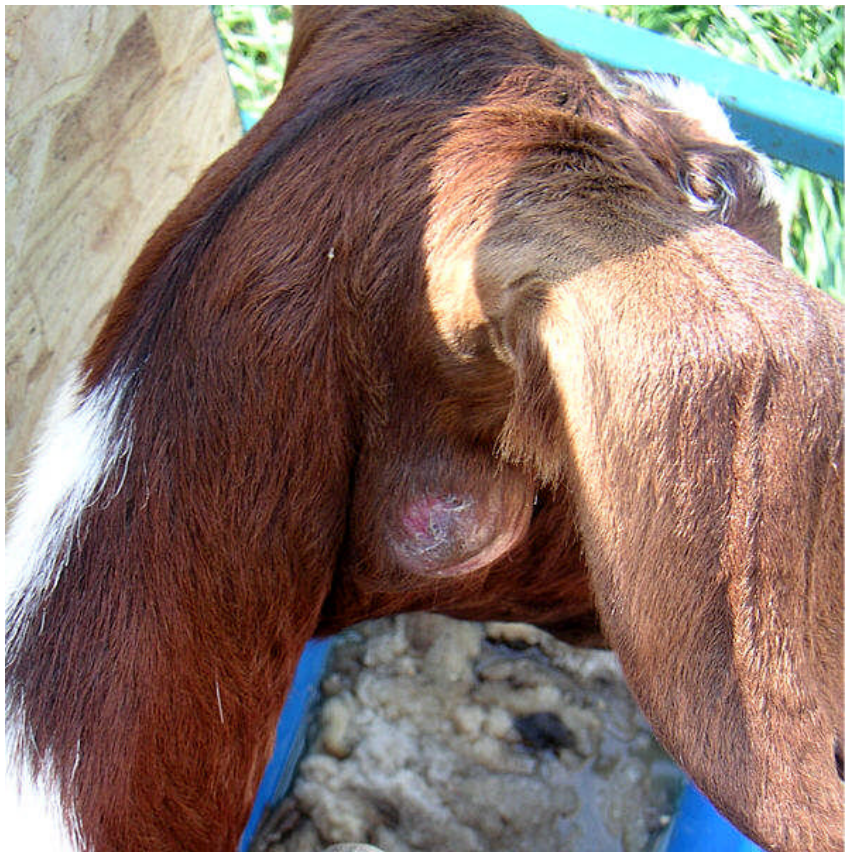
Control of Johnes Disease

- Control is not easy
- Identification & removal of infected animals from the herd
- Improved management & hygiene
- Snatching kids and rearing separately

- Vaccination against **Johne's disease** is commonly used in commercial situations
- A killed vaccine, Gudair (Virbac) in the UK. The vaccine is manufactured in Spain and can be imported and administered under the prescribing cascade provisions.
- Vaccinate kids between 2 - 3 weeks and 6 months of age, and then rear kids separately.
- Adult goats should also be vaccinated in infected herds.
- Dose: 1ml, s.c. or i.m., the brisket is generally the recommended site for s.c. injection



Caseous lymphadenitis



Caseous lymphadenitis

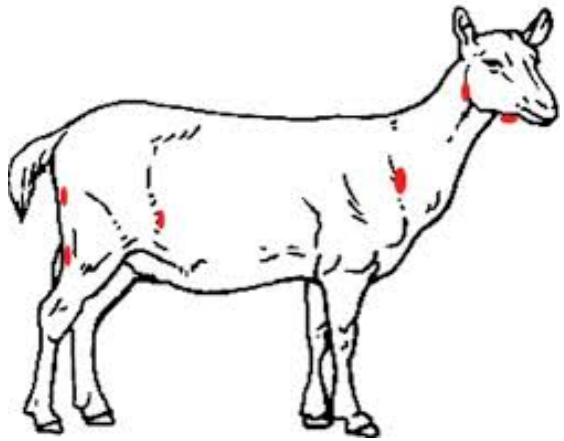
- In the UK, largely a disease of commercial goats but only a matter of time before it enters the show stock
- Best means of control is keeping infection out
- Keep purchased goats in quarantine for **at least 2 months**
- Sheep are a major source of infection
- Feed troughs etc could carry the organism

- Abscesses produced in lymph glands by bacteria *Corynebacterium pseudotuberculosis*
- Rarely fatal
- Variety of clinical signs depending on location, size and number of abscesses involved



Caseous lymphadentitis
Clinical signs

- Superficial lymph glands most commonly affected
- Internal lymph glands, eg thoracic & abdominal, occasionally affected
- Abscess may develop in internal organs such as liver, lungs & kidney



Caseous lymphadenitis - clinical signs

- The abscesses eventually burst , so pus discharges and infects other goats and the environment
- If internal organs are infected, a variety of clinical signs can develop, depending on the location, size and number of abscesses involved
- If the supramammary gland is infected, pus could enter milk





Caprine arthritis encephalitis (CAE)



Caprine Arthritis Encephalitis

- Ireland is free of the disease
- Make sure it stays free!!!

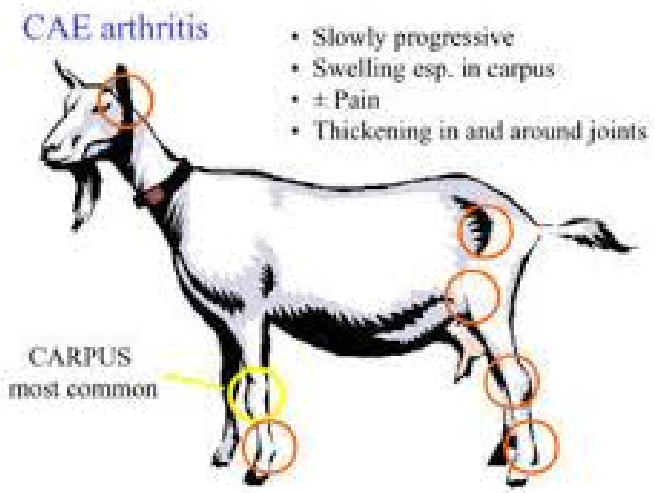


CAE

- Goats infected with CAE remain carriers for life
- Many goats remain symptomless carriers of the virus
- The virus can thus be introduced with apparently healthy goats and then spread throughout the herd, particularly to the kids by feeding pooled milk

CAE
Clinical signs

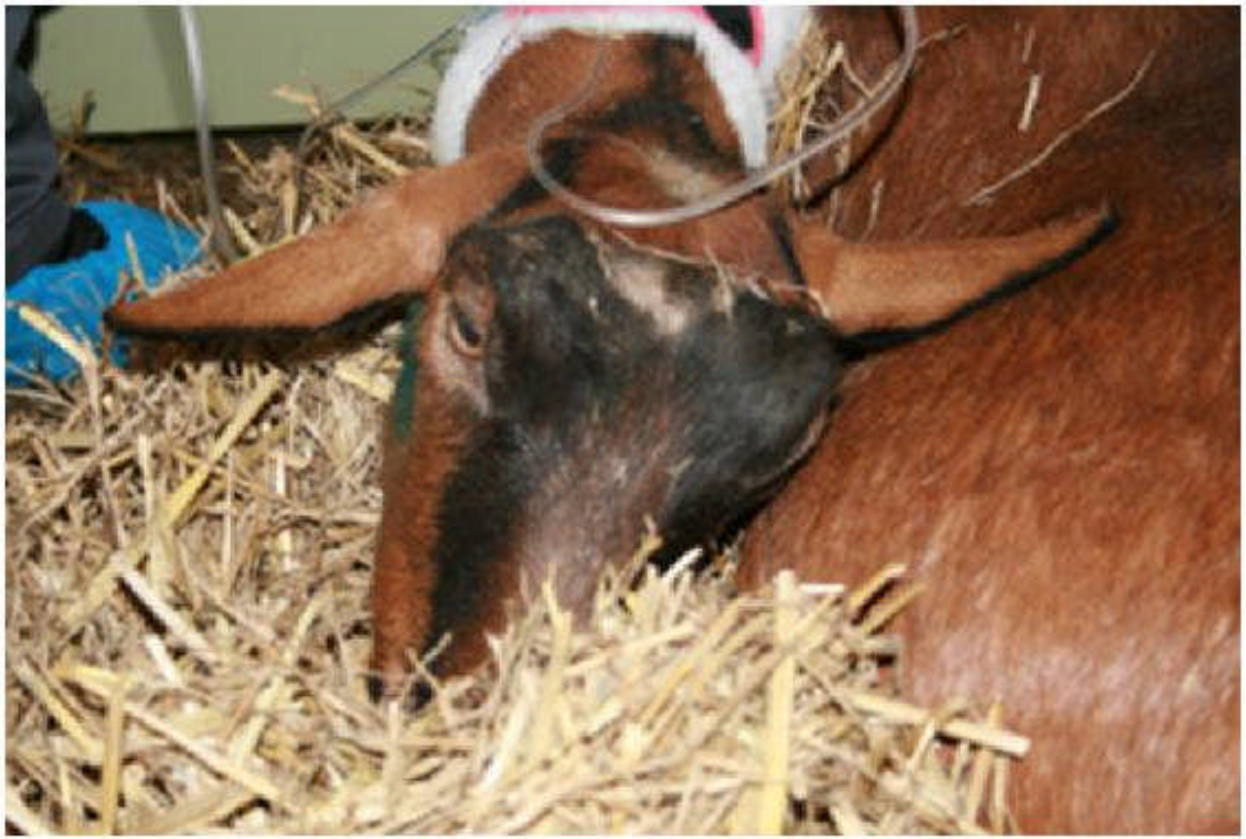
- The disease occurs in 5 clinical forms
  - Arthritis
    - Yearlings or young adult goats
    - Chronic, develops slowly
    - Commonly carpal (knee) joints, but also hock, stifle, fetlock, neck & hip joints
    - Variable lameness from slight stiffness to extreme pain
    - Loss of condition related to pain & inability to feed



CAE
Clinical signs

- Progressive weight loss
- Hard udder
  - Firm, swollen udder in newly kidded goats, particularly first kidders
  - Indurative changes in udder tissue
  - Markedly reduced milk yield, although milk appears normal
- Encephalitis
  - Nervous signs in kids
  - Never reported in the UK
- Pneumonia
  - Progressive interstitial pneumonia
  - Chronic cough

Listeriosis



Signs of listeriosis:

- Depression, anorexia, fever.
- Facial paralysis, drooping of ears and eyelids (often asymmetrical), protruding tongue, drooling of saliva.
- Dificulty swallowing - cud remains in mouth.
- Head tilt, nystagmus, circling, head pressing.

A recumbent animal with its head turned to one side almost certainly has listeria if, when it is turned over onto its other side, it immediately flips back to the original position.

- Progressively uncoordinated movement - knuckling, rigidity, paresis.
- Recumbency, opisthotonos, convulsions.
- Death (mortality rate 3 to 30%).

- Very acute encephalitis does not always present as the 'circling disease' more typical of sheep. Goats may be presented as dull and uncoordinated, with death occurring in as little as 6 hours. The disease may be mistaken for **hypocalcaemia** or even **pneumonia**.
- **Abortion** and encephalitis occur in the same goat more commonly than is the case for sheep.
- **Keratoconjunctivitis**

Avoid soil-contaminated feed, particularly **silage**, but animals grazing low-lying swampy/boggy areas, or being fed on the ground are also at risk.

Ensure good quality silage is made.

Reject silage from damaged or punctured bales.

Do not feed:

- mouldy silage
- silage with a pH content > 5
- silage with an ash content >70mg/kg DM.

Use of additives when making grass silage will produce more acid conditions that discourage listerial growth.

Remove any silage not eaten within 24 hours.

Feed dry hay - avoid big bales of hay in wet conditions.

Early treatment is essential

- High doses of **antibiotics**
- **Fluid therapy** to correct dehydration either intravenously or by stomach tube
- **NSAIDs**
- **B vitamins**, particularly **B^1**, because rumen activity is depressed and there is little production of vitamin B^1 by ruminal microorganisms.
- Nutritional supplements and slurries of lucerne pellets can be fed by stomach tube.
- Recumbent animals should be kept on **thick bedding** and **turned regularly.**

- A goat may survive the neurological challenge only to die of dehydration



Cerebrocortical necrosis (CCN, polioencephalomalacia)

Thiamine (vitamin B^1) deficiency

- Thiamine (vitamin B^1) is usually produced in adequate amounts by ruminal microflora.
- Lower levels of thiamine result in a lower supply of carbohydrates to the neurons in the brain.

Deficiency can arise due to:

- **Mouldy or fungal contaminated feed** or **acidosis** which result in changes in rumen microflora, with increased production of thiaminase enzymes that breakdown thiamine.
- **Prolonged diarrhoea**, e.g. coccidiosis.
- **Drug therapy**, e.g. thiabendazole, levamisole and amprolium.

Treatment for diarrhoea can result in CCN

- Some plants such as bracken (but unpalatable so unlikely)

High sulphur intake can also cause CCN

- The excess sulphur can come from a variety of sources, including water, high grain diets and forage
- Microbes in the rumen convert the ingested sulphur in the rumen to hydrogen sulphide which blocks cellular energy metabolism.
- This particularly affects the CNS because it needs a high, continuous energy production.
- Animals with sulphur-associated CCN have normal thiamine levels.

Clinical signs

- Generally young animals affected, but also older animals.
- Stargazing, ataxia, nystagmus, blindness (normal pupillary light reflexes), head pressing, collapse + convulsions and opisthotonus.
- Can be confused with pregnancy toxaemia.
- Severe but transient diarrhoea.
- Afebrile (except during convulsions).
- Death 1 to 2 days after onset of clinical signs.

Treatment

- **Thiamine**, 10mg/kg i.v., every 6 hours for 24 hours.
- **Multivitamin preparations** can be used if thiamine is not available, but must be given according to the thiamine content (usually 10 or 35mg/ml).
- The response to thiamine is diagnostic if thiamine deficiency is involved, but will only be successful if treatment is commenced early; in more advanced cases there may be residual brain damage and blindness.
- Animals with CCN apparently caused by excess sulphur sometimes show some level of improvement when thiamine is administered, although the response is typically less than with a primary thiamine issue.

Orf



Orf
(Contagious pustular dermatitis)

- Very infectious condition of goats and sheep
- Pustules then crusty scabby lesions on lips, gums, nostrils and lining of mouth + occasionally udder, feet or tail
- Easily transmitted to humans
- No treatment – secondary infection controlled with antibiotic injections & sprays
- Vaccine available
  - Live, sheds virus for 3-4 weeks
  - Use only on farms with an existing problem


Photograph Copyright 2004 GoatWorld

Abortion Action Plan

- Isolate aborting doe or does
- Collect all products of abortion for laboratory examination & place in leak-proof container
  - Kids, **placenta**
- Dispose of any additional aborted material so that it cannot be dragged off by dogs, foxes etc
- Bury or burn any contaminated bedding

Abortion Action Plan

- Seek veterinary advice
  - Samples (including blood sample) to lab
- Keep pregnant women, very young, elderly or anyone immunosuppressed away from kidding area
- Adopt sensible hygiene
  - Handwashing; no eating, drinking or smoking
- Cull any surviving kids from an aborted litter

Chlamydial (Enzootic) Abortion
Introduction of Infection

- Purchase of infected goat or sheep
- Contamination of clothing or footwear with products of abortion or normally kidding goats



- Infection is spread within the herd by contact with products of abortion



Chlamydial Abortion

- Abortion at almost any stage of pregnancy
- Short incubation period (as little as 2-3 weeks)
- Infection and abortion can occur within one kidding season (cf sheep where infection is normally followed by abortion the following year)

Chamydial Abortion

- Aborted kids may look normal
- Some kids may be born live but weak and act as carriers, shedding organisms when they kid themselves
- Placenta thickened and congested, often with visible pus over its surface

Clamydial Abortion

- Dispose of aborted material & disinfect area
- Cull any live kids born to infected does
- Segregate aborting animals for 2 weeks until excretion of chlamydia has ceased
- Treat all pregnant does with tetracyclines for 10 days and move to clean area halfway through treatment
- Consider vaccination programme [but only when infection already present in herd]

Chlamydial Abortion
Risk to humans

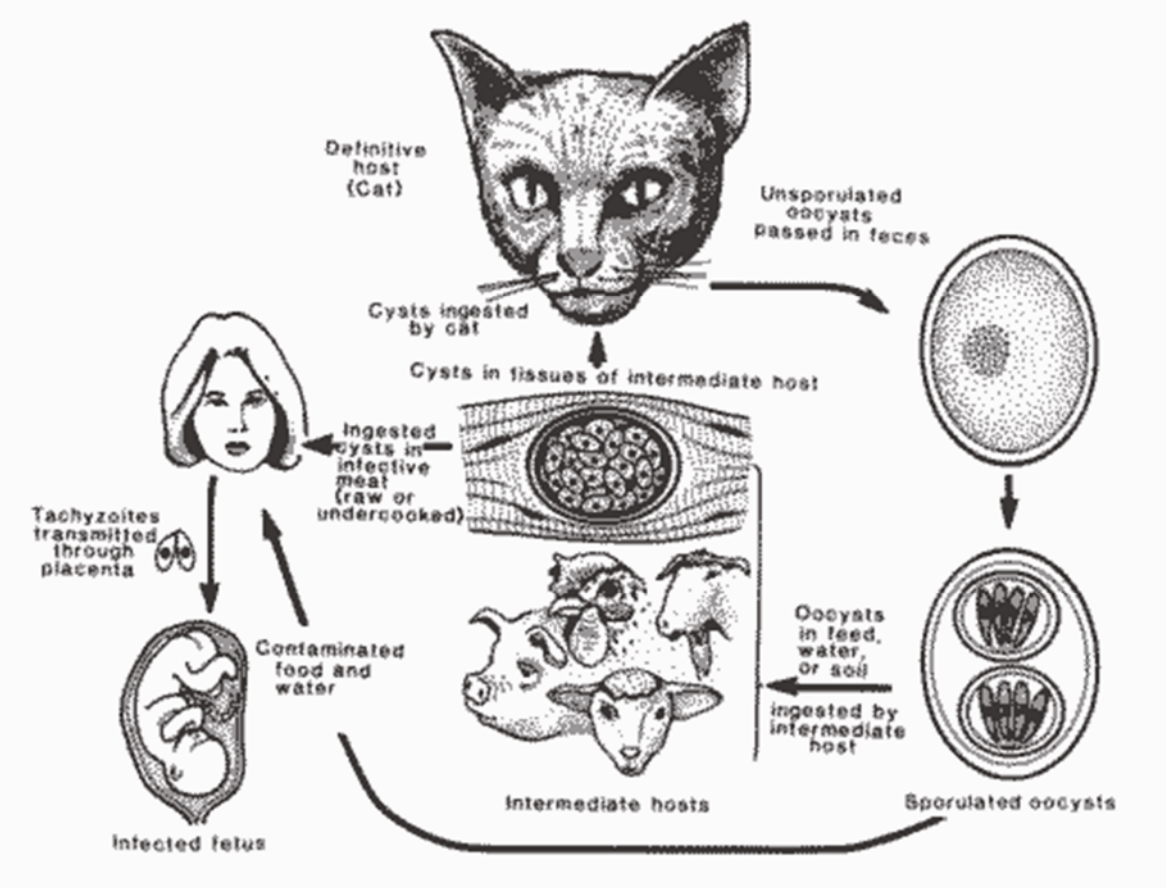
- Aborted kids, placentae, foetal fluid and vaginal discharges highly infectious
- Milk may also be infected, particularly if the udder & teats are contaminated
- Pregnant women particularly at risk from aborted material & unpasteurised milk

Toxoplasmosis

Protozoal parasite with complex life cycle involving two different hosts

Main host = cat

Secondary host = sheep and goat (& human)



Toxoplasma Abortion
Introduction of infection

- Unlike sheep,goats do not appear to develop strong immunity after infection, so an existing dormant infection can be reactivated if the animals are stressed, eg by moving to new holding
- Cats are the main source of infection
  - Neuter all farm cats as young cats are greatest source of infection
  - Maintain a number of healthy neutered cats to prevent feral cats moving onto the farm

Toxoplasmosis

- Clinical signs only seen if infection acquired during pregnancy
- During pregnancy, toxoplasma parasites target placenta & developing kids, with results depending on stage of pregnancy at time of infection
  - Early embryonic death with return to service
  - Foetal death with abortion of mummified or decomposing kids 2-3 weeks before expected kidding date
  - Birth of stillborn or weak kids

Toxoplasmosis

- No treatment available
- Sheep vaccine available (not licensed for goats)



Toxoplasmal abortion
Risk to humans

- Primary host (cat) acts as main risk to humans, eg cleaning litter trays etc
- Toxoplasmal developmental stage (tachyzoite) may be passed in milk of infected does & may pose slight risk to pregnant women, although it is destroyed by stomach acid on ingestion

Respiratory Disease

Respiratory disease tends to occur in housed goats as a result of:

- **Overcrowding**
- **Poorly ventilated buildings**
- **Mould spores and dust**



Preventing respiratory disease

- Easy to bring disease in with new animals or from mixing at shows; difficult to eradicate
- Buy healthy animals!!
- Avoid overcrowding
- Avoid housing goats in poorly ventilated buildings
- Avoid mouldy/dusty feed and bedding
- Quarantine incoming animals before mixing

- Take particular care when adapting existing building - goats **like ventilation**, **hate draughts**
- Air should flow in freely from the sides of the building **above** the goats, thus avoiding draughts and then be allowed to escape at a high point in the building to keep the air fresh (warm exhaled air rises).
- Goats must have **sufficient lying area** and **trough space**

- Mould spores and dust, as well as being harmful in their own right, can irritate the upper airways allowing infectious organisms such as pasteurella to multiply - **avoid mouldy and dusty food and bedding**

Causes of respiratory disease

- Many infectious causes of respiratory disease may well be multifactorial
- Often more than one underlying cause
  - more than one infectious agent
  - environmental factors involved



Causes of respiratory disease

- Pasteurellosis
- Mycoplasmosis
- Viruses
- **The Environment**
- **Don’t forget TB**



Pasteurellosis

- *Mannheimia haemolytica* & *Pasteurella multocida* main bacteria involved
- Number of different strains of *Mannheimia*
  - Most disease caused by A1, A2 & A6 with T strains rarely involved in goat disease
- Most vaccines give protection against wide range of different serotypes, but there is no vaccine that is specifically designed for goats

Pasteurellosis

- *Mannheima* organisms can be found in throat and tonsils of high proportion of apparently healthy goats
- Disease often follows stressful incident such as weaning, overcrowding, transport etc
- More likely in animals with concurrent respiratory disease such as Mycoplasma
- Young goats more commonly

Mycoplasmosis

- *Mycoplasma ovipneumoniae* & *Mycoplasma arginini* main organisms involved
- Generally mild disease but could be precursor to more severe respiratory disease in combination with Pasteurella
- Usually confined to young kids
  - rearing setback
- Usually self limiting

Diarrhoea in kids

- Dietary scour
- Infectious scour



Avoiding diarrhoea

- Attention to detail!!
- Hygiene
- Dedicated kid rearer (female!)
- Keep kids in batches of the same age and avoid mixing groups
- Keep on deep straw and clean pens out completely every 3 weeks
- Use clean pens for new kids

Dietary scour

- Insufficient colostrum
- Artificially reared kids on a milk substitute
  - Sudden change from goat milk to substitute
  - Change in type of milk replacer
  - Poor quality milk replacer
  - Overfeeding
  - Incorrect temperature
  - Incorrect concentration
  - Dirty utensils

Infectious scour

- **Birth to 3 weeks**
  - E.coli
  - Cryptosporidia
  - Salmonella
- **4 to 12 weeks**
  - Coccidiosis
  - Gastrointestinal parasitism



Coccidiosis

- **Coccidiosis is the most important cause of diarrhoea in housed kids > 4 weeks**
- **Hygiene, Hygiene, Hygiene**
  - improved hygiene is the cornerstone of coccidiosis control



Coccidiosis

- All goats are infected with coccidia
- All kids are infected during their first few weeks of life
- Management standards determine whether clinical signs of coccidiosis occur
- Infection can occur indoors or at pasture if the grass is sufficiently short
- Oocysts are resistant to low temperature and will overwinter outside or indoors

Control of cocidiosis

- Avoid overcrowding
- Provide clean, dry, well strawed pens for each batch of kids
- Don’t mix kids of different age groups
- Raise food and water containers above the floor to avoid faecal contamination
- Clean deep litter pens every 3 weeks

Control and treatment of coccidiosis

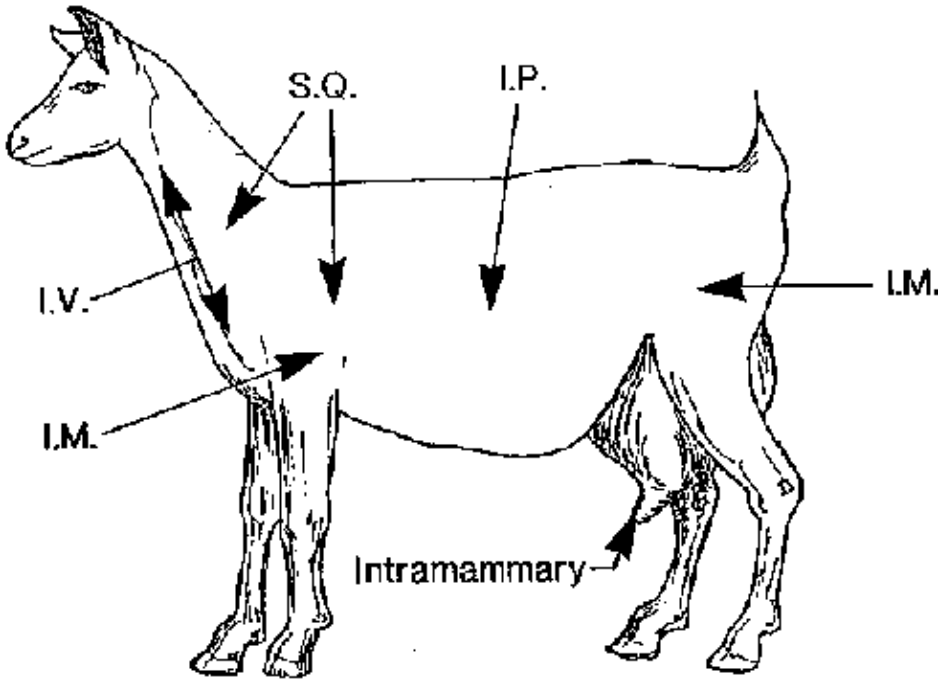
- Diclazuril (**Vecoxan**, Elanco)
  - coccidiocidal effect on the asexual or sexual stages of the development cycle of the parasite
  - 1ml / 2.5kg Vecoxan at about 4-6 weeks at the time that coccidiosis can normally be expected
  - 2nd treatment about 3 weeks later if necessary
- Potentiated sulphonamides
  - Sulphadiazine + Trimethoprim (Tribrissen, Norodine etc)
- Decoquinate (**Deccox**, Zoetis)
  - 100g / tonne feed for 28 days as prophylaxis or treatment

Vaccination

- All goats should be vaccinated against **enterotoxaemia** (*Clostridium perfringens* Type D) and **tetanus**, using 4-in-1 vaccine, such as Lambivac
  - 2 initial doses 6 weeks apart
  - Booster every 6 months
  - Booster 4-6 weeks before kidding



- Most vaccines are given subcutaneously either in the thorax behind the elbow or the neck



Respiratory vaccines

- Avoid combined respiratory and clostridial vaccines, such as Heptavac P, as the response to vaccination may not be adequate
- Consider vaccination against **Pasteurellosis** if a problem exists on the farm
  - 2 doses 4-6 weeks apart
  - Annual booster if necessary

- There is no goat licenced **Pasteurella** vaccine - ideally vaccines should contain *M. haemolytica* serotypes A1, A2 and A6 and all serotypes of *P.multocida* but no vaccine in the UK meets these requirements.

Other vaccines

Only vaccinate against:

Johnes disease

Enzootic abortion

Toxoplasmosis

Orf

if there is already a problem on the farm



- Vaccination against **Johne's disease** is commonly used in commercial situations
- A killed vaccine, Gudair (Virbac) in the UK. The vaccine is manufactured in Spain and can be imported and administered under the prescribing cascade provisions.
- Vaccinate kids between 2 - 3 weeks and 6 months of age, and then rear kids separately.
- Adult goats should also be vaccinated in infected herds.
- Dose: 1ml, s.c. or i.m., the brisket is generally the recommended site for s.c. injection

Bluetongue

- **Bluetongue in goats is generally subclinical**, but it is possible that they act as symptomless carriers of the virus. Clinical signs were seen in a small number of goats during the last outbreak in Northern Europe
- Goats are like cattle & need 2 vaccinations 3 weeks apart, starting at 1 month of age
- ? yearly or 6 monthly vaccinations (at present generally vaccinate yearly before start of danger period)
- **Problems with export to Ireland if goats have been vaccinated, because vaccines are not licensed for goats**

- **Schmallenburg virus** has been associated with late abortion or birth defects in newborn goats as well as cattle and sheep.
- Schmallenberg virus vaccines are also only approved for use in cattle and sheep and so are used off-licence.
- Use sheep protocol?





Questions?

Comments.

Disagreements.

Thank you!

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