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*Suggested Personal & Professional Development (PPD)



TB IN GOATS

Bovine TB in goats

No matter how and why they are kept, *all goats* are classified as farm animals and are potentially susceptible to bovine TB and the implications of its control. This article gives some background information on the disease, which is still comparatively uncommon in goats.

In the UK, it is estimated that there are between 98,000 and 100,000 goats kept – a small population when compared to cattle and sheep. This population, however, has a very varied makeup, including a significant commercial dairy sector predominantly housed all year round, with individual herds of up to 4,000. There is an important fibre sector (both Angora and Cashmere), and a small – yet increasing – meat sector.

Some goats are kept purely as a hobby for home milk provision and showing; and others, such as the Pygmy goat, are kept purely as pets – being particularly popular in public attractions and open farms.

No cases of bovine TB were confirmed in goats between 1950 and 2007. This led to a decision to suspend routine testing of goats for TB unless they were on a holding on which cattle were also kept. Goats are generally considered to be ‘spillover hosts’, in that they are most susceptible to infection when the local background levels in cattle and the local wildlife population, particularly in badgers, are high.

In 2007, infection re-emerged in goats for the first time in over 50 years, in a small group of hobby goats. Over the next five years, two more incidents were again confirmed in small hobby herds, including one in Wales in a pedigree

Golden Guernsey herd – which was unfortunately sold and dispersed around England and Wales while still infected.

All goats were traced, and this outbreak and the two previous incidents were all brought under control through repeat tuberculin skin testing in the affected herds and slaughter of all test-positive (‘reactor’) goats. Of significance – and in support of the ‘spillover’ concept – all goats were infected with the local geographically distinct TB spoligotype.

In late 2013, however, TB was confirmed in a large commercial dairy goat herd in the west of England, in adult goats sent for post-mortem examination (PME) at the AHVLA Langford VI Centre – these goats had been recently purchased and were culled owing to clinical signs including weight loss and respiratory signs. Lesions were widespread.

It transpired that they had originated from another herd in the NW of England, in which disease had not been identified. The spoligotype was not the local profile, but that of the more northerly herd in which – by skin testing – TB was confirmed. One further unrelated outbreak has also been confirmed more recently in another commercial herd.

So since 2007, to the best of the author’s knowledge, there

have been only six incidents, and none in the 50 years prior to this.

What are the clinical signs?

Owing to the widespread TB testing programme in the UK, clinical disease in cattle is rarely reported. In goats, however, once infection gains access to a herd, infected individuals may quickly show early clinical signs. These may include weight loss, inappetence, reduced milk yield, dyspnoea and coughing.

In areas in which there is a known background TB problem in the cattle and wildlife populations, TB should be considered as a possible differential diagnosis if this spectrum of clinical signs is identified. This becomes particularly relevant if coughing or dyspnoea continues, despite treatment for other infectious causes.

These same principles also apply, in ‘TB-free areas’ if a history confirms that goats may have been purchased recently from a known infected area.

What is the disease pathogenesis?

Post-mortem studies have shown that in the affected goats in the 2008 outbreak (many of which were subjected to detailed post-mortem examination), the typical localised ‘tubercle’ lesions did not always develop. Instead, large abscesses were produced with more liquid pus (**Figure 1**).

If these abscesses erode into the airways, then cases can quickly become ‘open’ – with dissemination via the

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“Owners of infected pet goats may ask for their animals to be treated for TB – this is not permissible”

respiratory route. Lesions have also been widely evident in other organs, including the liver (**Figure 2**) and spleen, in which more typical caseous and calcified lesions can also develop.

Testing in the larger herds, has shown very widespread infection, undoubtedly in part caused by the greater shedding of infection as a result of this pathogenesis; but also by the fact that in each herd, goats are housed in close proximity with each other 24/7 (**Figure 3**).

What are the potential sources of TB for goats?

As already stated, goats are considered as ‘spillover hosts’.

It follows, therefore, that infection may originate from three potential sources:

- from infected cattle, if goats are kept in the same airspace, or in close proximity
- from other infected goats entering the herd
- from local wildlife, particularly badgers.

Goats have evolved as browsing animals and, when kept outdoors, are more likely to stray into hedgerows, field margins and woodland than their grazing cattle counterparts. This can increase their risk of direct or indirect contact with badgers and badger latrine areas.

As the large commercial herds are mainly housed all year – with little or no contact with cattle or other goat herds – the risk here is of badger access to buildings or feed stores. Most commercial herds will feed TMR rations based on maize silage, to which hungry badgers may be attracted.

Indirect spread of infection can result from access to

contaminated equipment – the practice of sharing equipment between smaller herds being a particular risk factor.

What if I suspect disease?

TB is a notifiable disease, and any suspicion should be reported to – or discussed with – the Animal and Plant Health Agency (APHA) in England, Wales and Scotland. Private tuberculin skin testing of goat herds (or individual animals) of unknown TB status can be permitted, and must be undertaken by an approved ‘official veterinarian’ (OV) holding the ‘TT qualification’, provided that the owner is willing to pay for the test.

Owners must be made aware of the repercussions of a positive test result; such as herd restrictions, reactor slaughter and further compulsory testing. Before this testing is undertaken, clearance must be obtained from the local APHA office, and this same office should be informed of the results of any such testing. Any subsequent actions necessary will vary between the devolved administrations.

One of the main reasons that this permission must be sought is that once a TB skin test has been undertaken, it leads to a period of desensitisation – when there is a danger that false negative results may be obtained. Such a dialogue should ensure this cannot happen.

Suspicion of disease should also be reported if lesions suggestive of TB are encountered during a post-mortem examination – the same applies to lesions identified in an abattoir at meat inspection.

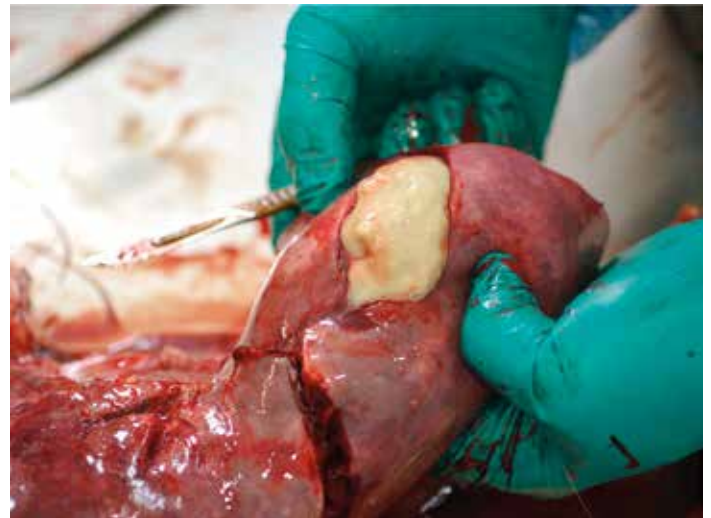


Figure 1. A bovine TB abscess in lung tissue (Crown Copyright 2017, with kind permission of APHA).



Figure 2. More typical TB lesions in liver (Crown Copyright 2017, with kind permission of APHA).



Figure 3. Commercial dairy goat herds housed all year round – TB infection can spread rapidly if it gains access.

Owners of infected pet goats may ask for their animals to be treated for TB – this is not permissible.

If dairy goats test positive to the skin test, or if TB is confirmed in a herd of dairy goats, APHA will inform the local authority. Until movement restrictions have been lifted, the owner will be responsible for ensuring that all milk produced by the herd is pasteurised before it can be sold to the public.

The occupational zoonotic risks are also assessed, in conjunction with the local Health Protection Team. If there is genuine concern of significant exposure, then TB screening may be offered.

What tests are currently available?

The current official test is the single intradermal comparative cervical test (SICCT) or skin test as used in cattle. As the neck region is very narrow in goats, the usual procedure is to inject the avian tuberculin on one side of the neck, and the bovine tuberculin on the opposite side – ensuring that the injection is intradermal and not subcutaneous, because the skin can be very thin, particularly in younger goats.

Field experience in investigating outbreaks, has confirmed that the test is very predictive of disease, with a specificity of around 98 to 100 per cent, but with a sensitivity of around 84 per cent.

If Johne's disease vaccination (with Gudair vaccine) has been undertaken within a herd, or if purchased goats have previously been vaccinated, then this vaccine may interfere with the interpretation of tests for TB. In TB-infected herds, a likely consequence of an apparent cross-reaction to avian tuberculin would be a drop in the sensitivity of the screening tests for TB

in vaccinated animals. This can result in some animals infected with *M. bovis* being wrongly classified as negatives or inconclusive reactors (IRs) rather than reactors – and the fate of inconclusive reactor goats in TB control programmes has been problematic.

As stated, routine statutory skin testing of goats is not a mandatory requirement in the UK – although they have been included in local initiatives in Wales.

Circumstances in which a test may be required include:

- for 'diagnostic' purposes – for example, when suspect lesions of TB have been reported during post-mortem examination or post-mortem meat inspection of goats, to assess levels of infection in the herd of origin
- when the causative bacterium of TB (*M. bovis*) has been identified in goats by laboratory culture of samples
- when TB has been confirmed in a cattle herd or other livestock adjoining (or co-located with) a goat herd
- to allow removal of movement restrictions following the disclosure of TB test reactors, clinical cases or confirmed slaughterhouse cases
- when goats have moved onto a farm from another herd in which TB has been confirmed (tracings).

As is the case with the camelid sector, there has been much interest in the potential use of serological tests to supplement or replace the SICCT (the latter is the current EU test of choice). The test is a multiplex serology test using antigen arrays to detect antibodies to specific *M. bovis* antigens, and has been employed with Defra approval for assessment – alongside SICCT testing – in recent herd breakdowns.



Figure 4. Goats are browsing animals and thus more likely to 'forage' where badgers are active.

The declared sensitivity in one herd tested was given at 95 to 98 per cent, with 98 to 100 per cent specificity. Further validation is required, but from experience to date, serological testing is looking very promising indeed. APHA has used this test alongside the skin test when dealing with individual incidents.

How can I keep goats TB free?

Risk-based, pre- and post-movement testing (following APHA notification) of all – or a proportion of – goats should be considered, with the risk being largely dependent on the geographical area from which goats are being purchased. Remember goats are 'spillover hosts'.

As there could still be goats which were incubating the disease at a stage when no available test could detect it then, in an ideal world, any incoming goats should be isolated for around eight weeks and then retested before they join the herd.

Wildlife sources

Grazing goats in an area where TB in badgers is at a high level will always be a risk, particularly as goats are browsing animals and thus more likely to 'forage' in hedgerows and woodland where badgers are most likely to be active (**Figure 4**).

For housed goats, the risk is of infected badgers coming into housing and infecting goats either directly or indirectly via contamination of their food supplies. Maize silage in clamps or when spread out to feed is highly attractive to badgers, and can be readily contaminated by TB excretions. This is particularly important during the hours of darkness, when buildings are quiet and less active.

When taking steps to reduce access by badgers to goat housing, each holding will differ, but the following points (adapted from the Defra publication, *Do you know what is happening in your feed store?*) should be considered.

Keep badgers away from stored goat feed and straw bedding

It is important to make walls and doors of feed and bedding stores secure, especially if they are used for storage of 'straights' or include concentrate feed. Doors to these feed store doors must be kept shut, especially in the evening and at night because this is the peak time for badger visits; and there should be no gaps in doors and walls that allow access to badgers.

If a feed store is accessible to badgers and too costly to modify, it is worth considering storing feed in a

different building or in secure containers. When building a new feed store, consider ways of preventing wildlife access – foundations 45cm deep will prevent badgers burrowing beneath them.

Make farmyards less attractive to badgers

This too is mostly related to access to food. Do not leave feed easily accessible in the farmyard as this is an attraction to badgers, and avoid feeding goats on the ground, despite its being accepted that this is common practice on many goat units. Consider ways of preventing badgers from gaining access to feed.

While it may be difficult to keep badgers out of goat housing completely, it makes sense to make such housing more difficult for badgers to access. Ensure silage clamps are well covered and consider protecting the open face by electric netting at times when access is not needed.

Be aware of high risk areas at pasture

Feeding at pasture may be a higher risk than feeding in the farmyard, especially in high-risk areas such as badger latrines and active setts at pasture. Allowing goats access to woodland should be avoided.

Note that feed and water troughs can become contaminated by wildlife, so keep an eye out for such signs of contamination and clean these out regularly. If using molassed, salt or mineral blocks, consider taking measures to make them more difficult for badgers to access – by suspending them maybe. And remember that badger carcasses are a potential source of disease, so dispose of them sensibly.

What happens if TB is confirmed in a goat herd?

There is currently no legislation that covers the actions taken by APHA/

Defra and no compensation is payable in England – although there are compensation scales in Wales.

We are currently awaiting the final outcome of a ‘TB in Non-Bovine Species Consultation’ to which the Goat Veterinary Society and others within the goat sector responded. We have been assured that this legislation will soon be in place – but in the meantime,

any new incident is likely to be dealt with on a locally agreed risk-based strategy involving testing and culling – with negotiation regarding any compensation. ■

Further information

Goat Veterinary Society: www.goatvetsoc.co.uk/goat-health/tuberculosis/

APHA instructions on TB testing in goats: http://ahvla.defra.gov.uk/External_OV_Instructions/TB_Goat_Instructions/Updates/index.htm

Defra fact sheets for owners: www.gov.uk/government/publications/tuberculosis-in-goats

PPD Questions

1. Goats are kept in the UK for many reasons. From the list below select which type of goat enterprise is potentially susceptible to bovine TB
 - A. commercial dairy goats
 - B. pedigree show and hobby herds
 - C. Cashmere and Angora goats
 - D. goats kept as pets or at public attractions
 - E. goats reared for meat.

2. List the five most commonly reported clinical signs.

3. What should you do if you suspect TB in a live goat?
 - A. arrange immediate euthanasia and post-mortem examination
 - B. treat the goat symptomatically, and tell the owner to report back
 - C. assess the local risk factors and, if the goat is kept in a high-risk TB area, contact APHA to discuss next steps
 - D. carry out a TB skin test – you have your McClintock syringes in the car!
 - E. place the goat in strict isolation as there could be a zoonotic risk and advise the owner to seek medical advice.

4. Routine TB skin testing of goats is not currently undertaken in the UK, but give at least three reasons why you may be asked to undertake such a test on a client’s herd by APHA.

Answers

1. all equally susceptible
 2. weight loss, inappetence, reduced milk yield, dyspnoea and coughing
 3. C, although D and E may be steps to be taken, skin testing can only be undertaken in consultation with APHA.
 4. when suspect lesions of TB have been reported during post-mortem examination or post-mortem meat inspection of goats, to assess levels of infection in the herd;
 – when the causative bacterium of TB (*M. bovis*) has been identified in goats by laboratory culture of samples;
 – when TB has been confirmed in a cattle herd or other livestock adjoining (or co-located with) a goat herd;
 – to allow removal of movement restrictions following the disclosure of TB test reactors, clinical cases or confirmed slaughterhouse cases;
 – when goats have moved onto a farm from another herd in which TB has been confirmed (tracings).