TBSG NOTE: Defra's policy is constantly changing. You must obtain and read the CURRENT version from your Animal Health Officer, or obtain a copy from Dianne Summers.
This version was provided to us for use on the site by AH and was current on October 26th 2010 and may have changed.

TB in South American Camelids (llamas, alpacas, vicuñas, guanacos)

Background

TB is not a major health problem of South American camelids, worldwide but these species do occasionally become infected and develop clinical TB. Reports of infection in their natural habitat in South America are scarce, but cases of TB caused by *Mycobacterium bovis* have been diagnosed in llamas and alpacas in New Zealand, the USA, Holland, Ireland and Great Britain, some of them with high morbidity and severe pathology. *M. avium* and *M. microti* infections have also been documented in the veterinary literature. Even when the infection results in clinical disease, TB is very difficult to diagnose in these species on clinical examination alone. TB should be considered in the differential diagnosis of all cases of chronic loss of condition and debilitating disease in these species, with or without obvious respiratory signs, particularly where camelids are reared (or originate) in areas of high bovine TB incidence.

Procedures

There is no statutory surveillance and control programme for TB in South American camelids in GB at present. However, there is a legal obligation on herd owners and veterinary practitioners to report to the local Animal Health office any cases of disease with gross pathological (or histological) findings suggestive of TB. Camelid owners should be encouraged to have any sudden deaths (as well as other conditions potentially related to TB) investigated by their PVS, involving the local VLA Regional Laboratory if necessary. If TB cannot be ruled out at post-mortem examination, Animal Health or the VLA Regional Laboratory will arrange for the appropriate tissue samples to be submitted to VLA Weybridge for mycobacterial culture, free of charge to the PVS/owner.

In the absence of statutory powers to register, identify and record movements of camelids in GB, Animal Health will continue to treat any sporadic TB incidents in these species on an individual basis as an when they arise. Animal Health must rely on herd owners' co-operation to resolve these incidents, using the general legal provisions for movement controls and isolation and the limited ante-mortem TB diagnostic tools at our disposal. Although under the Animal Health Act Veterinary Inspectors have the power to test any animals (not just cattle) for TB, in the absence of a specific compensation order for camelids the current TB legislation in England affords no legal powers to enforce the slaughter of reactors or contacts. Therefore, any TB testing of camelids has to be done on a voluntary basis. However, where camelid keepers wish to test their animals at the Department's expense this needs to be linked to a voluntary prior agreement to release any test reactors for Post Mortem examination (PME)

Camelids can be tuberculin skin tested at the Department's expense if:

- infection with M. bovis has been confirmed by bacteriological culture of tissues of a previous clinical case or necropsy submission from the affected herd;
- they are identified as forward or back tracings from a camelid herd with confirmed *M. bovis* infection;
- they are co-located with (or contiguous to) a cattle herd affected by a confirmed TB breakdown.

- there is a reasonable suspicion of *M. bovis* infection in an unrestricted herd following disclosure of characteristic TB lesions at post mortem examination (PME). In this case a VO may serve movement restrictions on the rest (or part) of the herd and, with the owner's agreement, arrange for an immediate tuberculin skin check test pending receipt of culture results. This should be considered particularly in herds to or from which animal movements could be taking place which might result in further spread of disease. Any check test carried out less than 90 days after the death of a tuberculous camelid will not count towards the two negative herd tests normally required after tissue culture proves positive for *M. bovis*.

If the suspicion of clinical TB in a camelid is based on clinical grounds alone, in an otherwise unrestricted herd without PM evidence of infection or some epidemiological link to a confirmed TB incident (be it through a forward or back-tracing, adjoining premises, or co-location with an infected cattle herd), then it will be up to the OV/owner to decide whether they wish to arrange for a private skin test, keep the diseased animal(s) under observation (and any symptomatic treatment) or euthanase them straight away for PM examination. In such cases, Animal Health should not offer to carry out TB testing at the government's expense and movement restrictions should not be served unless a PM examination subsequently reveals characteristic TB lesions in the clinically suspect animal

Where *M. bovis* infection has been confirmed in a camelid herd, Article 18 (17 or 16, as applicable) restrictions (TR148) will be served and remain in place until the DVM/RVL is satisfied that the herd is free from infection. In practice, this means that the movement restrictions can only be rescinded once all suspect camelids (including any skin and blood test reactors) have been slaughtered and all remaining animals have undergone two consecutive comparative tuberculin skin tests with negative results at intervals of 90 days or more. Alternatively, the whole herd in which *M. bovis* has been isolated may be privately slaughtered or, if the owner does not give permission to test, it will remain under permanent movement restrictions.

The movement licence (TR219) may be used to authorise any direct movements of live camelids to a place of slaughter.

The withdrawal of restrictions notice (TR220) should be used to lift restrictions when appropriate.

Camelids co-located on infected cattle premises

Where a camelid herd is co-located with an infected cattle herd on the same TB2 restricted premises and infection has not been demonstrated on the camelids themselves, a notice of restrictions (TR148) should be served. This can be lifted once TB2 has been withdrawn from the infected cattle herd and the entire camelid herd has undergone one tuberculin skin test with negative results.

NOTE: 'Co-located' in this context involves occupation of the same holding as the infected cattle herd with potential for direct or indirect transmission between cattle and camelids (in buildings with a shared airspace and/or on shared grazing areas), or exposure to a common source of *M. bovis* infection.

Whenever the need has arisen in the first place to test camelids located on the same premises as infected cattle, the cattle TB2 restrictions cannot be lifted unless the camelids have received one tuberculin skin test with negative results, or control measures had been adopted by the owner to effectively segregate the cattle from the untested animals on the same farm before commencement of the cattle short-interval testing regime.

If the owner refuses to test camelids on a TB2 cattle farm, the decision as to whether the restrictions should remain in force or be withdrawn when the TB10 is served on

the cattle herd should be taken by the DVM/RVL and should be based on the risk-assessment of the management of the two species on the affected farm, the likely source of infection for the cattle herd and the potential routes of transmission.

The CCDC/CPHM should not be notified in the case of co-located camelids, unless/until *M. bovis* infection has been confirmed in the camelid herd itself. The CCDC should already be aware that *M. bovis* infection had been found in the cattle herd.

Tracings and herds on contiguous premises

Any animals that may have moved out of an infected (culture-positive) camelid herd should be forward traced and tuberculin skin tested once at the Department's expense. It is difficult to define a time window for forward tracings in the absence of any testing history for most camelid herds. Where the infection appears to be due to the purchase of infected stock, tracing investigations should span the period since the arrival of the infected camelid(s). By contrast, where the presumed origin of the TB incident is lateral spread into camelids from local cattle or wildlife source, then the window for forward tracings will be determined by the most likely date of exposure for the diseased camelid(s), based on pathological and epidemiological findings.

Testing of any forward-traced animal should take place at least 90 days after the animal left the infected flock. Individual camelids/herds identified as forward/back tracings from an *M. bovis*-infected herd do not, in principle, need to be placed under restrictions. However, if the owners refuse to allow testing of traced animals, or if there is suspicion that the traced animal could be moved prior to testing, Animal Health should place the traced camelid(s) under Article 18 or 17 or 16 restrictions (TR148). The Notice TR148 should confine the traced animals to the premises and isolate them from other susceptible animals until slaughtered, tested with negative results or dead.

In the absence of compulsory individual animal ID for camelids and where the current owner cannot conclusively identify which animals came from the infected herd, there may be no option but to check test the entire destination herd. Back tracing investigations and skin check testing of the suspected herd(s) of origin of a tuberculous camelid should also be undertaken as part of the normal management of any TB breakdown involving camelids.

Consideration should also be given to testing camelid herds that are identified as being contiguous with cattle herds affected by confirmed TB breakdown, where the epidemiological investigation (DRF) reveals that camelids might be a source of (or at risk of) infection. Again, only one skin test with negative results will be necessary. This will be at the Department's expense and with the owner's agreement and understanding of the implications. The herd should not, in principle, be subjected to TB restrictions (TR148) pending TB testing, unless a veterinary risk assessment concludes otherwise.

Private TB testing

Private tuberculin skin testing of camelid herds (or individual animals) of unknown TB status at the owner's request can be permitted, provided that the owner is willing to pay an OV to perform the test. Animal Health must inform the herd owner, in advance of testing, of the possible repercussions of a positive test result (e.g. herd restrictions). Animal Health will supply the necessary tuberculin free of charge. The testing OV will need to write the results up on the usual TB52(LT)/TB52(VI), TB52A(LT)/TB52A(VI) forms and promptly send those to the local Animal Health office.

If an OV reports a reactor at a private skin test of camelids, Animal Health will consider the circumstances of the case, any suspect clinical signs and TB risk factors affecting the herd in question. As a minimum, Animal Health will want to seek

reassurances that the private skin test was carried out according to the existing SOP, place the herd under movement restrictions and arrange a skin check test of other camelids on the premises (with the owner's agreement). However, the position regarding ex gratia payments for any reactors disclosed at private tests is more complicated and Animal Health should not be making any commitment to the herd owner. The Animal Health office should first consult with the Vet & Tech Services Team if this situation arises. If the reactor dies or is privately culled by the owner in the meantime, Animal Health will not make a retrospective payment for that animal, but the legal obligation for veterinary surgeons and anyone who has a carcase in their possession or under their charge to notify Animal Health of any suspicion of TB at PM examination will continue to apply.

Testing technique and ancillary blood testing

Procedures for arranging testing

Where TB testing is being carried out at the Department's expense, an ex-gratia flat payment may be available for each reactor, subject to a risk assessment by Animal Health which concludes that infection in the camelid herd poses a risk for animal and/or human health in the locality and payment would encourage the removal of potentially infected animals. The office should contact the Veterinary and Technical Services Team (VTST) before committing to any payments with the owner. VTST will forward the request to the relevant administration for approval. Approval must be received from the relevant policy team before any agreement for payments are made with the owner. Before undertaking any TB test (skin or blood-based) Animal Health must also obtain the owners' written confirmation of their agreement to surrender and accept the ex gratia payment for any reactors:

- the case VO should discuss testing with the owner of the herd, encouraging use of the test as surveillance of the disease status of the herd. The implications of carrying out the test must be explained and agreement sought that the owner will consent to voluntary surrender of all reactors for slaughter;
- the Animal Health office should notify VTST of intent to use the consent to test letter *prior* to obtaining the owner's signature. The email must include details of the number of animals to be tested, in addition to the owner's details;
- the Veterinary Services Manager will forward the request to TB Programme, WAG or SG and they will seek approval and will email the relevant Animal Health office advising them that they can now go ahead and obtain the owners signature on the letter;
- the letter TB154E (in England), or TB154W/TB154CW (in Wales) should be sent to the owner confirming the arrangements and implications and requesting signed agreement;
- once the Animal Health office has obtained a signed copy of the letter from the owner they can then go ahead with the testing of the herd and slaughter of any reactors.
- the Animal Health office should notify VTST team of the date of testing and, where appropriate, the number of camelids slaughtered.

Testing

Tuberculin testing of camelids will be by the single intradermal comparative tuberculin test (SICTT) applied in the posterior axillary region (behind the elbow). Although not fully validated in camelids, the SICTT is adequate for assessing the status of individual camelids in a herd with confirmed TB. If performed meticulously this test can provide reasonable sensitivity and high specificity. The SICTT is also the official pre-export TB testing procedure for camelids traded within the EU and has been officially adopted by the Swedish Board of Agriculture and the Swiss Federal Veterinary Office as the recommended test for TB in camelids. Intradermal tuberculin tests in the posterior

axillary site are also the prescribed tests for TB in camelids in the USA (Animal and Plant Health Inspection Service, US Department of Agriculture), Argentina (SENASA – National Food Hygiene and Quality Service), New Zealand (Alpaca Association of New Zealand) and Canada (Canadian Food Inspection Agency).

The SICTT in camelids should ideally be applied by a VO. Failing that, the test, in decreasing order of preference, can be applied by:

- an OV in the deer testing panel;
- an OV with experience of testing camelids for export;
- a camelid experienced OV.

For these options, and where possible, a VO will attend and supervise at least the start of the test to ensure testing protocols are clear and for Animal Health to gain knowledge of camelids.

The protocol and interpretation that must be adopted is set out in detail on The Tuberculin Testing of Camelids section on the Sample, Test & Techniques page.

HEALTH AND SAFETY WARNING

Unlike cattle, camelids can spit a mixture of gastric contents and saliva. This is a potential zoonotic risk. Please take appropriate health and safety precautions when TB testing these animals

Tested camelids will be considered potentially infected (reactors) if a positive reaction (i.e. >2mm increase or detectable oedema) is observed at the bovine tuberculin injection site 72 (±4) hours after injection and the increase in skin thickness at the bovine injection site exceeds that measured at the avian injection site. Any other animals will be considered negative. Test results should be recorded on the standard cattle test charts TB52(VI), TB52A(VI) and submitted promptly to the Animal Health office. If the skin test identifies a reactor, the whole herd will be placed under Article 18, 17 or 16 restrictions as relevant if not already in force. TB restrictions will remain in force until all test reactors have been slaughtered and undergone post-mortem examination and the remainder of the herd has undergone at least one skin test 90 days from the removal/isolation of the reactors, with negative results. If disease is confirmed in any reactors, or DCs (VL and/or culture positive), the herd will need to pass a minimum of two further skin tests before movement restrictions can be lifted.

Ancillary Tests

To date, no alternative in vitro diagnostic methods for bovine TB have been properly validated in sufficient numbers of camelids. The serology Chembio STAT-PAK rapid test is available at VLA on an experimental basis. This blood test is based on the detection of antibodies to a set of recombinant *M. bovis* antigens and is known to detect tuberculous animals of a range of species. Experience from badgers and cattle indicates that the Rapid Test has good specificity but a moderate sensitivity. It can be used as a **voluntary** ancillary parallel test of skin test-negative animals in camelid herds **with confirmed *M. bovis* infection** to enhance the overall sensitivity of TB testing, ideally after the initial skin herd test. Approval for this test must be obtained in advance from the VSM in the VTST and, if granted, blood samples are to be taken **10-30 days following a tuberculin skin test**. Further information can be found on

the Diagnostic Testing page. VLA does not offer the rapid test on a private basis to owners of camelids.

VLA, in partnership with the camelid industry, Animal Health, Defra and the Devolved Administrations, are working on the validation of this and other ancillary blood tests for camelids, including a camelid specific γ-IFN test, which may also be available for application in infected herds subject to prior specific agreement with VLA. The existing γ-IFN test (Bovigam®) for TB in cattle does not work in camelids.