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REPORT OF THE
"BOVINE TUBERCULOSIS"

SUB-GROUP

Meeting held in Dublin
Ireland
22-23 November 2011

**REPORT OF THE MEETING OF THE BOVINE TUBERCULOSIS SUB-GROUP FOR MONITORING
ANIMAL DISEASE ERADICATION HELD IN DUBLIN, IRELAND, 22-23 NOVEMBER 2011**

Participants: see Annex I

Agenda: see Annex II.

Presentations

A number of presentations were given on various aspects of the TB programme in Ireland. Below is a summary of some of the main points in these talks.

The meeting was opened by **DCVO Martin Blake**, who also gave some data on the animal population and outlined the structure of the veterinary authorities involved in the Irish bovine TB eradication programme. There are currently about 118 000 cattle farms with 5.9 million cattle. The yearly slaughter of cattle amounts to 1.6 million animals. There are 3.2 million sheep, with 2.3 million slaughtered yearly, and 1.6 million pigs, with 2.65 million slaughtered yearly. There is a large export of dairy products and beef. The number of farms is decreasing, with some 500 farms closing every year, while the average farm size is increasing. The Department of Agriculture, Food and Marine (DAFM) organisation was presented (see figure 1).

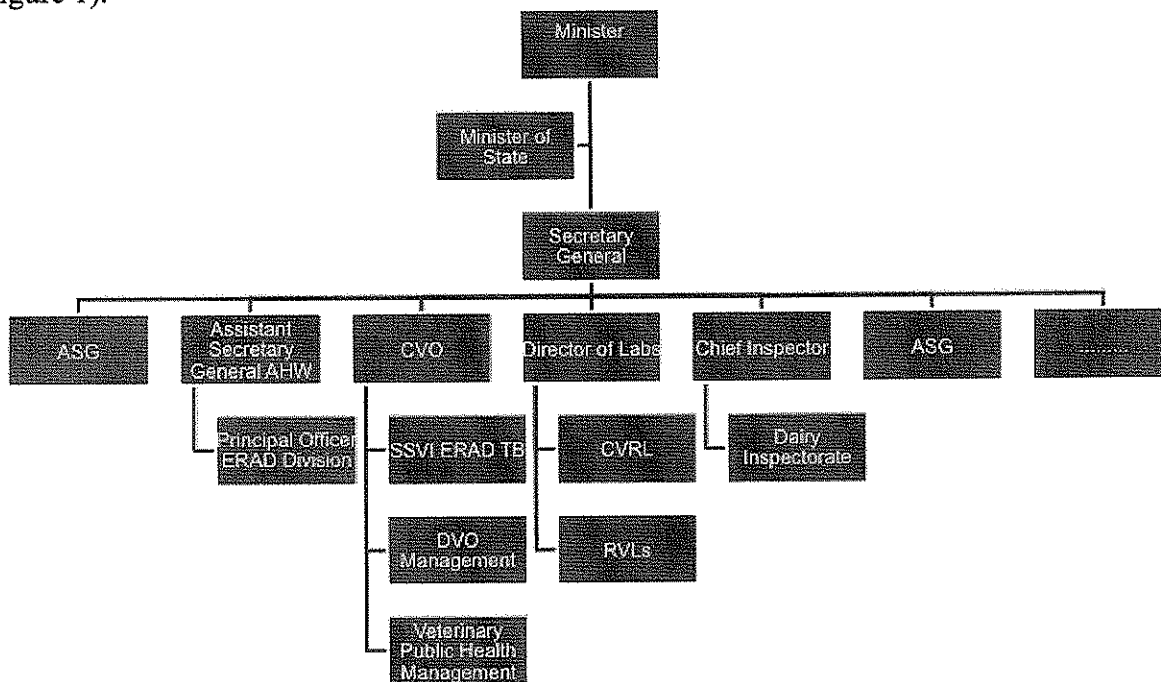


FIG 1. DAFM organisation

The department includes the CVO, the Central veterinary Laboratory, the ERAD (eradication of animal diseases) with the divisions for TB and administrative matters, respectively. The central level is represented locally by 16 District Veterinary Offices (DVO's) and 5 regional laboratories. There is collaboration with the University College of Dublin (UCD) and its Centre of Veterinary Epidemiology and Risk Analysis (CVERA), the Food Safety Authority, the Health Protection and Surveillance Centre (HPSC) and the local zoonosis committees on various aspects of the programme.

An overview of the Irish bovine TB eradication programme was given by Anthony Duignan. The TB programme was first initiated in the 1950's and made compulsory in 1957. In 1954 there were some 250 000 herds with 4.5 million cattle. Between 1960-1965 a rapid reduction in the number of reactor herds was seen and in October 1965 a national "attested" status was declared. During the following decades, however, no further progress was seen and in 1986 the Economic and Social Research Institute published a report where a number of weak points in the programme were identified. In 1989 the Eradication of animal diseases board was established, a number of measures were implemented, research was initiated and an independent evaluation was established. In the subsequent years the number of tests increased, as did the number of reactors and the costs. There were also many positive outcomes, but in 1993 the board was closed. In 1990, consultants Morris and Pfeiffer identified the badger problem that had probably existed for at least 30 years. In some areas the prevalence of TB in badgers was nearly 50%. The consultants concluded that there was a need to improve the efficiency of the programme as well as initiate research and address the wildlife issue. The East Offaly project and the 4-area study verified the badger problem and in 2002 an enhanced programme including wildlife control was launched. Under this programme the badger control was performed under license and focused on areas where it was concluded that badgers were the primary cause of the problems in cattle. From 2000 to 2009 and onwards there has been a reduction in reactor numbers.

Several performance measures are used in the Irish TB programme. Among these are: Number of reactors with and without visible lesions, reactors per 1000 animals tested, herd incidence, animal incidence, proportion of disease free herds, reactors per 1000 animals in the population, duration of restriction periods, average reactors per restriction, singleton breakdowns, interval between breakdowns.

The animal incidence is 0.36%. In 2000, 45 000 reactors were removed while in 2010 this number had decreased to 20 000. The herd prevalence was 5.83% in 2005 and herd incidence 8.20%, while in 2010 herd prevalence was 4.84% and herd incidence was 4.65%. For 2011, some 18 000 reactors and a herd incidence around 4% is estimated. These figures are the lowest ever since the 1960's. Figures include all reactors, whether confirmed or not. Depopulation is done only in heavily infected herds where no other measures work. About 20-25 herds/year are depopulated.

The severe interpretation of the tuberculin test (i.e. all animals that are not negative interpreted as reactors) is applied in high risk herds. These include herds with a previous history of breakdowns, contiguous herds and contact herds. Severe interpretation is also applied in herds where there are >2 reactors (meaning that any inconclusives are re-interpreted as reactors). In such herds Veterinary Inspectors (VI's) may use the single test if appropriate. Singleton reactor herds may be released from restrictions if no visible lesions are found in the reactor animal post mortem, all lymph nodes are culture negative, no reactors are found on the subsequent herd test and there are no epidemiological risk factors. From singleton reactors, lymph nodes are collected for culture even in the absence of visible lesions. About 20% of the herds with a single reactor fulfil these conditions and are subsequently tested only once after removal of the reactor.

Of the TB breakdown herds 30% are identified by lesions found at slaughter, 30% are detected in the (at least) yearly round testing and 15% are detected in contiguous tests. There appears to be no difference in risk between dairy herds and suckler herds. Dairy herds are usually larger while the cows in suckler herds tend to become older. Both herd size and age are risk factors for TB.

2012 will be the second year in the 5-year programme 2011-2015. The objective of the programme is the eventual eradication of bovine TB and this will be achieved by combining several eradication and control measures.

At least one test is performed in every herd every year. Restricted herds are only released after 2 clear herd tests (at 60 d and 4 months) and then they are retested every 6 months for another 2 years. There is mandatory pre-movement testing of exported animals. National movements are allowed only from herds that have been tested within the past 12 months and are not restricted. There is a TB handbook to support the work of the VI's. This is revised regularly, the last version is from 2010.

The yearly herd testing (round test) is done on a cost-sharing basis. The authorities send out notifications that the test is due and the farmers arrange for the test to be carried out. There are no exemptions.

Epidemiological investigations are conducted in all reactor herds, veterinary inspections are performed at slaughterhouses, farm hygiene measures are implemented in reactor herds, testing is audited. The γ -interferon test (GIF) is used in some cases as an additional test. More frequent testing is done in high risk areas and high risk herds. From 2012 inconclusive reactors will not be allowed to leave their herd unless for slaughter (i.e. IR's are excluded from live animal trade).

Next the legislative framework and a financial review was presented by **Richard Healy**, who is the Principal Officer of the ERAD administrative division. The disease control and eradication programmes are developed, managed and evaluated jointly by the administrative and veterinary divisions. The administrative division is responsible for the budget, compensation policy, preparation of claims for EU funding and legislative issues.

The national legislation that is relevant for TB control and eradication is the Diseases of Animals Act, the TB Order, the Bovine Levies Act and detailed circulars to enforce national law. Compensation schemes include: On-farm market evaluation (independent valuers), Depopulation grant (to compensate for income losses), Income supplement (if >10% of the herd is removed) and Hardship grant (to cover additional winter feed costs due to restrictions). Reactors are sent to the Meat Factory that gives the best price but only 4-5 companies accept reactors.

The gross cost of the TB programme was 38.4 million€ in 2010, plus staff costs estimated to 25 million€. Compensation costs included in the gross amount to nearly 16 million€. Farmers pay most of the testing costs, arrange for testing and negotiate the testing fees. Tuberculin is procured by tender and distributed to veterinary practitioners free of charge. The wildlife programme cost about 3 million€ in 2010 and the reactor collection service around 1 million€. Farmers pay disease levies which is part of the cost-sharing. This should cover at least 50% of the compensation costs. In order to maintain farmers' cooperation and trust it is important that the programme, as well as any new measures that are introduced, are scientifically sound and justified.

Delays in reactor valuation and removal or in arranging round tests will lead to penalties for the farmer.

Peter Maher then presented the animal identification and movement system (AIM), which is one of several computer systems to aid disease control. In AIM all events in an animals life

are recorder, from birth to death. The animal health computer system (AHCS) holds health data, herd disease status etc. while the corporate customer system (CCS) holds all farmers' data. All such data can only be retrieved from the CCS, to ensure correctly updated information in all systems. All holdings must be registered by the DVO's and new herds are restricted until they've had their first herd test. Calves are tagged and registered at birth, the registration may be sent in by mail or electronically. All farms must have an on-farm herd registered in the form of a book or report all events directly into the national database, or use electronic farm packages. All entries must be made within 7 days of the event. Meat plants, abattoirs, exporters, livestock markets etc. register all movements on-line. Farm to farm movements are reported by written application sent to AIM that will produce a pre-clearance certificate from which the bottom part can be removed and sent in after the movement has been completed. Deaths can only be notified through the knackery, to ensure proper disposal of the carcass.

HerdFinder is a GIS system that generates maps on requests based on farm ID.

Only one herd and one keeper can be registered per holding but there may be more than one owner. All such data is stored in CCS where information about the herd's veterinary practitioner and VI is also stored.

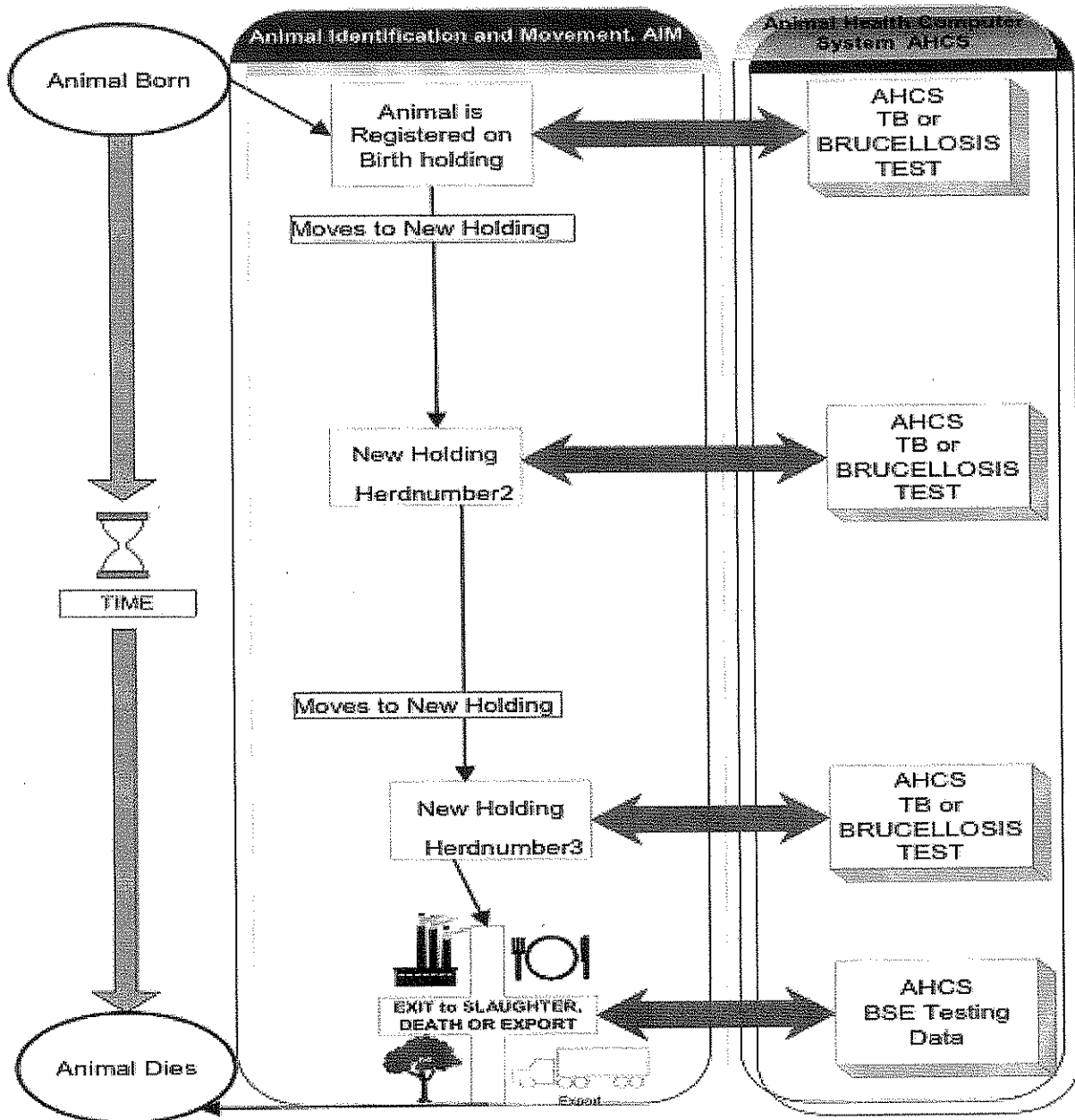


Figure 2 Schematic picture of how a bovine animal's life is registered in the IT systems

Tom McTague gave a summary of all the IT systems that support the TB programme. In addition to AIM, AHCS, CCS and HerdFinder there is a LIMS (laboratory information system) and the agriculture field inspection and testing system (AFIT) that are linked to the AHCS. The latter is a tool for the VI's and technical officers of the DVO's. With the aid of these systems controls can be traced, results from laboratory or PM investigations can be retrieved and different management reports generated. There is a link via which the veterinary practitioners can upload test results and other data. There is also a system that is used by the wildlife unit, that communicates with AHCS. EZONE is a source of information for department staff, where all systems can be accessed by links.

Next James O Keefe presented some studies on animal level risks. One study compared IR's to non-reactors in the same herd and it was found that IR's were at higher risk for presenting with visible lesions at slaughter or failing subsequent tests. Thus a different treatment of IR's is justified and from 2012 they will have to remain in the herd where they were first detected. Another study on herds that had been restricted versus those that hadn't, 2005-2007, found that there was an increased risk of animals in previously restricted herds becoming reactors. A cohort study assessing the risk of future breakdowns in different herds found that the risk was reduced as the number of years since the last breakdown increased. The size of the breakdown also decreased with time. Historically there has been a focus on herd level risks but based on new studies animal level risks may be assessed.

Ian O'Boyle explained the management of the programme at DVO level. The annual tests and the tests on new herds are monitoring tests while all others, such as reactor retests (breakdown testing), retesting of inconclusives, contiguous tests and tests following a visible lesion at slaughter are prompted by an indication of a risk of infection in the herd. Herds with visible lesions at slaughter, or tuberculin reactors, are restricted when the event occurs (and so will the contiguous herds be, to avoid animals being sold from the herd before the test is carried out). Herd status is registered in the AHCS and is assigned based on activity (active, dormant or suspended), OTF status (free, withdrawn or suspended), TB risk indicator (default, high or low risk) and TB status (0 clear, 1 reactor last test, 2 one clear test, 3 IR retest scheduled). The programme management is supported by the computer systems where overdue tests are flagged in AHCS, follow up on disease inspections are managed in AFIT and supervisions, mart controls and movement controls are also managed in the systems. The TB test dates come up in AHCS and are listed to the veterinary practitioner who takes out a list of animals to be tested when the testing is arranged with the farmer, and registers the test when its completed. The test result is interpreted in the system by the VI and any actions are decided upon. There is some farmer non-compliance for various reasons such as financial or personal problems but the overall programme ensures that most farmers comply.

John Higgins explained how a reactor herd is managed and the use of ancillary blood tests. When a reactor is detected, the necessary documents for follow-up, restrictions and notifications are produced in AHCS. The VI then performs some "desktop epidemiology" with tracing of contact and contiguous herds, scheduling of tests etc. Field visits are made to restricted herds, mainly to determine the source of the infection and prevent further spread (from and within the herd). A thorough epidemiological inquiry is done and recorded on a form (ER76). Contiguous herds are identified in the field and with HerdFinder and wildlife risk is assessed in the field and with the aid of Wildlife Map where identified badger setts are shown. Further actions to prevent spread are decided based on the investigations. Ancillary tests (mainly GIF) are used in big breakdowns involving breeding animals (fattening animals will soon be slaughtered anyway so it's not deemed worthwhile in those animals), and in cases where some fraud or nonspecific reactors are suspected. ELISA may be used when anergy is suspected (i.e. suspicion that an animal that doesn't react in other tests may be the source of the outbreak).

All actions and decisions are followed up to ensure that the farmer complies (e.g. inspection of cleaning and checks on receipts for disinfectants). In the final report in AHCS the VI has to make a decision on probable, possible and unlikely sources of the infection. One set of conclusions is generated by the system based on data entry and another is entered by the VI. If the breakdown involves more than 2 reactors the field visit is made by a VI, otherwise by technical staff. "Non-infective breakdowns" are those where there is no indication of spread within (of from) the herd.

Lorna Meaney then presented an unusual case with serious zoonotic implications. This involved a dairy farm that had 8 reactors on the yearly test in March 2009, with 6 animals showing visible lesions at slaughter. In the following investigations it was found that 102 animals had been sold since the last clear test, but these were determined to be low risk based on the test results and investigations. One reactor animal had been bought in but had 2 clear tests since and the herd of origin had 3 clear tests since. It was a low-risk area. Further investigations revealed one inactive badger sett and no indications of the infection being bought in recently. There was a BVD problem in the herd. The family was tested as they were drinking raw milk from the herd and one child was positive. 44 reactor animals (found on subsequent tests) were slaughtered and cultured to find an isolate for antimicrobial susceptibility testing. 32 of the animals had lesions and *M. bovis* was detected. There were no mammary lesions and no end stage case. 64 animals were GIF positive and 14 had visible lesions when slaughtered. In July 2009 the herd was depopulated. One cow and 7 calves that were negative in all tests showed visible lesions at slaughter. From in-depth investigations it was concluded that one cow that died in February was probably an open case that triggered an explosive outbreak in the herd. The animal may have been anergic in previous tests and disease was triggered by immunosuppression, possibly due to BVD. There were 2, possibly 3, human cases and it was discussed that PCR and ELISA testing of milk might have been of use to assess this risk. Spoligotyping of the isolated strain showed the most common pattern so there was no indication of the source. The badger density was low in the area and there was no area problem so badgers were a less likely source. Farmers in the area took the event very seriously and became acutely aware of the zoonotic risks, as did veterinarians. This is important for the attitudes towards TB control.

James O Keeffe presented the wildlife programme. There are clear associations between TB in cattle and in badgers and also to the density of either species. The case presented earlier was unusual, most breakdowns occur in geographical clusters and involve only one or a few animals. In 2000 there were 10662 episodes of TB and in 2010 there were 5619 episodes. The proportion of breakdown herds with only one case detected at slaughter and no further reactors is also increasing. In areas with larger breakdowns badger surveys indicate that the prevalence in badgers is high (35-45%).

There are around 100 000 badgers in the Republic of Ireland with the highest density in the areas with the best pastures. Now about 30% of the agricultural land is under the badger capture programme. The capture activities have led to a decrease in badger density as well as in the prevalence of Tb in both cattle and badgers.

A vaccine trial is currently under way in Longford where badger capture and vaccination with BCG is done in one third of the area and badger capture and culling in two thirds of the area. The outcome that will be assessed is the prevalence of TB in cattle under the different strategies. If the badger vaccination results are no worse than the results obtained by culling badgers then the vaccine strategy will be possible to implement in the future. The cost of vaccination is less than that of culling (BCG is cheaper than carcass disposal) and there is a political commitment to vaccination. The unsolved issue is what strategy to use and how to combine it with culling and/or other measures to achieve the best result. A standardised handling of all reactor herds in the two areas is essential for the validity of the study results and extra care is taken to ascertain this.

The Centre for Veterinary Epidemiology and Risk Analysis was presented by **Tracy Clegg**. The role of the Centre is to conduct scientific studies to support policy making. The centre was created in 2003, from the former TB investigation unit. They do other work besides TB

and produce biannual reports as well as scientific publications. A TB research strategy was devised based on the outcomes of a workshop in 2004. This involves TB in cattle (improving surveillance, high risk herd management etc.) and TB in badgers (culling trials, vaccine studies). Statistics on TB in cattle and badgers for the entire island of Ireland have been compiled and will be used for further analyses.

The work in the mycobacterial lab of the Central Veterinary Research Laboratory was described by Kevin Kenny. The lab receives samples from domestic animals and wildlife and performs histological and bacteriological (culture, PCR) investigations. Bovine samples come mainly from the abattoirs and are accompanied by documents with barcode generated in the AHCS. Results are registered in AHCS. Singleton reactors are prioritised in the processing. 52% of the histological examinations reveal TB granulomas, other lesions are caused by parasites, *Actinobacillus* etc. Culture is done on solid and liquid media in parallel, for up to 7 weeks. Molecular typing is done by spoligotyping, VNTR-MIRU and PFGE on IS6110. 80% of the reactors with no visible lesions are culture negative while 7.7% yield *M. bovis*. About 2200 cultures from badgers are processed every year. These come mainly from removal operations, but also from vaccine projects. Tuberculin potency testing and various test evaluations are also done by the lab. In addition to the central lab there are 6 regional laboratories, one in Dublin and 5 in other areas of the country. All official samples are sent to the central lab while the others specialise in different analyses such as GIF, badger necropsies etc.

It was discussed whether paratuberculosis was a problem in ROI. Serological studies indicate that the herd prevalence is about 30% but that the within-herd prevalence is usually low. There are few reported clinical problems and no indication that paratuberculosis is causing problems with TB eradication or test interpretation.

Darina O'Flanagan from the Health Protection Surveillance Centre (HPSC) described the human TB epidemiology in Ireland. There are 8 regional departments responsible for control and investigations in the field of public health. All TB cases are notified to the HPSC. There has been a steady decline in human TB since the 1950's but this has not been sustained in recent years and there are urban pockets of high incidence. The increase is due to an increase in the cases born in other countries (incidence rate 27.9), while the indigenous cases slowly decline (incidence rate 6.9). The current rates are the highest in >65 years, except as regards child meningitis. There are 13 laboratories that perform direct smears and culture, some of these do other analyses as well. There is a national BCG programme and the control and surveillance function well. There are only a few multidrug resistant cases. There have been some issues with low coverage of BCG vaccination in some areas that appears to be reflected in the distribution of indigenous cases, especially meningitis. Most cases of meningitis occur in teenagers or young adults.

4-12 cases of *M. bovis* have been detected each year for the past decade, >65% in the older age groups. There are more male than female *M. bovis* cases, the majority are indigenous. Some are associated with the consumption of raw milk, others are occupational and some have unknown origin. Culture is done on LJ medium, no molecular typing is done of *M. bovis* strains. All human cases of *M. bovis* infection are reported in the local zoonosis committee. In reactor herds, the VI advises the farmer to seek medical care if they consume raw milk on the farm or if aerosolisation of infection is suspected in confined quarters. If the farmer follows this advice, exposed people will be investigated.

The quality control system was presented by Anthony Duignan. All parts of the programme are included in the quality controls, from tuberculin, equipment (McLintock syringes), veterinarians in the field and abattoirs to the laboratory and the AHCS. Performance indicators (see above) are also part of the quality control system.

The tuberculin is bought, after a tender, from Prionics Lelystad as paired bovine (30,000 i.U.) and avian (25,000 I.U.) tuberculin. Batches, selected at random, are potency tested in naturally infected reactor cattle and the performance of different tuberculins has been evaluated.

Abattoir surveillance is performed by temporary VI's that are trained for 2 weeks. Their performance is monitored by the VI in charge of the slaughter plant inspections. Submission rates are also monitored and a new system for monitoring VI performance will be introduced shortly.

Farmers are required to provide adequate testing facilities and assistance and this is also checked. The TB handbook, that is a tool for field staff, is revised regularly. Veterinary practitioners must obtain annual approval for testing. This includes signed assertion that all instructions have been read. The first approval is only given after practical training. Re-training may be required if performance is not of sufficient standard. After training the testing veterinarians must demonstrate their testing skills to a supervising VI (including all aspects of testing). Audits and field inspections are performed continuously as well as evaluation of administrative work and detection performance. Individual performance is scored based on detection indicators such as rates of reactor detection, IR detection etc. Poor performance may be followed up by written warnings, re-training at own cost and even prosecution if fraud is suspected.

Tom Ryan talked about the AHCS in more detail. The system has been fully operational since 2005 and includes some 45 million animals and 78 million skin test records with full testing history at least 7 years back. It is used to manage all aspects of the TB programme. Herd profiles are retrieved from AIM and any discrepancies between the two systems are flagged and corrected. 90% of field veterinarians use a hand-held device to register testing data but a few still use paper records in the field. Based on test results, animals/farms are flagged if they are exempted from national trade or export and such data are sent to AIM. Access is determined based on user profile and is password protected, passwords must be changed every 30 days. Documents regarding skin tests, PM tests, lab tests, epidemiological investigations, inspections etc. are generated automatically or manually.

Damien Kelly from Veterinary Public Health presented the slaughterhouse activities within the programme. Veterinary Public Health is parallel to Animal Health under the Veterinary Inspectorate and CVO in the organisation (see figure 1). Some activities such as animal identification is integrated with Animal Health. The passports are scanned when animals arrive in the slaughterhouse and checked in AIM. Eartags are scanned twice, before and after stunning and bleeding. Meat inspection is performed by temporary VI's who must undertake training with the aid of a DVD. The use of the DVD training has improved slaughterhouse surveillance and is regarded as successful. VI's are encouraged to submit all lesions from non-reactors, regardless of whether TB is suspected or not. When samples are submitted to the lab, data on the lesions are entered on a submission form (retrieved from AHCS) and the passport is sent with the samples. Between 4-5000 lesions from 1.6-1.7 million carcasses are submitted yearly, giving a submission rate of about 0.25% or one in 400 animals. Not all these turn out to be TB but the appropriate rate of non-TB lesions is presently not known. Not all reactor animals are sampled, only if there is a particular interest. Singleton reactors are always sampled.

Finally, Eamonn Gormley gave a presentation on the use of GIF and vaccine development. GIF and tuberculin are used in parallel to maximise sensitivity, e.g. in high prevalence herds. There is about 80% correlation between the two tests in such herds. The GIF test used is the Bovigam and avian and bovine reactions are compared. The samples must reach the laboratory on the same day or the assay will not perform well. Several studies have been conducted on the performance of GIF in reactor herds.

In one study, 21% of GIF positive but tuberculin negative animals were reactors when tested with tuberculin after 18 months, while only 2% of the GIF negative animals became reactors in this period.

Since a new policy requiring justification for GIF tests was implemented, a higher proportion of GIF tests are positive, indicating use mainly in high risk animals. Some 77-90% of animals with visible lesions are GIF positive.

Badger research has covered TB diagnostics in badgers (1998-2009), pen studies with BCG vaccine (2002-2008) and a field trial (2009-2012). The plan is to continue with the field test and registration process to obtain a field vaccine by 2015.

In the BROCC captive badger facility captive badger studies can be performed on 24-30 badgers at a time. Studies have shown that BCG vaccine protects badgers from infection with low doses (similar to natural conditions) of *M. bovis*, and that it works even if administered orally. Two field studies are now conducted to assess field efficacy. One was described by James O Keeffe (see above) and the other is designed a little differently with a "gradient" of BCG vaccination intensity (using placebo for "dilution"). Badgers will be caught biannually and tested. Revaccination will be done yearly, to mimic a baiting situation where some animals will take in vaccine repeatedly.

The pen study with a low dose of *M. bovis* resulted in 4 vaccinated animals fully protected (no lesions) and 2 animals with the same appearance of lesions as the unvaccinated. In the high dose study, vaccinated animals developed lesions but they were less severe than in unvaccinated animals and the numbers of bacteria isolated from the lesions were lower. Some projects on badger-cattle interaction are also under way.

Conclusions and recommendations

The subgroup congratulates the Irish authorities on the many improvements made in the TB programme during the last decade.

The commitment to the goal of final eradication of bovine TB and the comprehensive approach to the problems are applauded. The holistic approach to the TB problem has made it possible to identify major issues and deal with them accordingly.

In particular, the submission rates for lesions detected at routine slaughter and the continuous use of data collected in the programme for identifying issues, analysing results etc. is appreciated. The use of performance indicators allows for follow-up and actions as problems arise. These activities should continue so that any problems are identified early and the efficiency of actions is ensured.

The quality control activities are to be commended and should also continue and be developed as they are essential for the efficiency of the programme.

The IT support systems that have been developed are excellent and allow for continuous monitoring of programme performance as well as efficient information and maximises the use of all resources including minimising staff deployed in the programme. It appears that the resources, including staff, are now optimised as far as possible for maintaining efficiency.

The routine for reactor herds, with “desktop epidemiology” investigations and visits from department staff for field quality control and epidemiology is also commended and should be maintained. It is important that the use of veterinarians in the more serious outbreaks is also continued. The epidemiological investigations play a very important part in the success and are essential for the continuous efficiency of the programme.

The decision to impose a movement ban on intermediate reactors is also encouraged. This may in practice, in the future, lead into the severe test interpretation being applied in all herds when the situation allows.

Additional comments and recommendations for further improvement of the TB programme:

The group finds the categorisation of high risk herds and areas, respectively, somewhat inconsistent as it appears that high risk areas may include low risk herds. If an area is categorised as high risk this must have some impact on the perceived herd risk. We would recommend that the different risk categories be used in a more hierarchical manner so that all herds in high risk areas are defined as high risk and that efforts are focused in preventing spread from high risk areas into low risk areas. This applies at herd level as well, where the focus is on protecting free herds and preventing spread from high risk herds.

Consequently it is recommended that the current testing strategies (as regards higher frequency and more severe test interpretation) in high risk herds and contiguous herds be maintained. Moreover, these testing strategies may be extended to all herds in the high risk areas, to be defined on an epidemiological basis (as a logical consequence of all herds in high risk areas being categorised as high risk herds).

In the same context, it is important to monitor all the potential sources of infection. The badger studies should be carried out as planned and the activities as regards badger control continued and monitored.

Moreover, animal movements between free herds of different risk categories should be monitored to detect any emerging risks that need to be dealt with.

To protect the free herds in low risk areas, the introduction of some type of "high risk pre-movement testing" (when moving animals from non-restricted high risk herds to low risk herds) could be considered. This would help protect the free herds and thus decrease herd incidence rate (as most of the positive herds each year are in fact new ones). The group realises that it may be too soon to aim for any free regions, as the TB prevalence in the badger population is quite significant even in low risk areas. However, if the strategies for controlling TB in badgers continue to work it will be useful to start planning for how to obtain (and maintain) regional freedom in some areas.

The slaughterhouse submission rates are satisfactory but it is recommended to look into the details of slaughterhouse submissions so that it can be determined what lesion rate would be the baseline (in the absence of TB). The number of submitted lesions where other causative agents are identified would give an indication of this.

Paratuberculosis does not appear to have an impact on tuberculin test performance at the moment but it is recommended that the paratuberculosis situation be monitored continuously to ensure that the prevalence of this infection does not affect the sensitivity of tuberculin testing in the future.

The continuous evaluation of testing data is encouraged as this will provide a solid basis for any changes in test interpretation or test application. If relevant, severe interpretation of the tuberculin test and/or single testing with only bovine tuberculin may then be applied where needed.

As the epidemiological unit is identified as the herd and every holding only contains one herd it is questionable that different testing strategies may be used in different animal groups in the same herd, although the restrictions apply to the entire herd.

The general principle is to use the same testing strategy (e.g. ancillary tests, severe interpretation, single test) in the entire epidemiological unit. This applies to restrictions, epidemiological investigations, backward and forward tracing of the infection as well. If the epidemiological investigation justifies a differentiation of the risk for different subsets of the herd, different control/eradication measures may be used for different groups of animals (e.g. partial slaughter of the herd).

If different subsets of an epidemiological unit are tested differently, e.g. ancillary tests only used in one group of animals, the detection sensitivity will be different in different groups of animals and this may lead to false conclusions about lower risk in animals that are tested less intensively. In such cases it is preferable to apply the ancillary tests to all animals and combine all data from testing and epidemiological investigation to determine what animals are high risk and thus must be subject to more severe eradication measures.

It is recommended that the principle of applying investigation measures to the entire epidemiological unit be enforced, while still allowing for differential handling of subsets of the herd that are determined to be at different levels of risk, based on the investigations.

It is also recommended that the case of the explosive outbreak with zoonotic spread that was presented at the meeting be described in publication so as to emphasise the zoonotic aspects of TB. This may be very useful in awareness campaigns for farmers and veterinarians.

The performance of PCR tests and their potential use for further improvement of the control should be continuously evaluated.

Finally the group would like to extend warm thanks to the Irish hosts for their hospitality, excellent presentations and interesting discussions.

ANNEX I

Participants:

Subgroup members:

Dr Susanna Sternberg Lewerin (Chairwoman), National Veterinary Institute, SE (Chair)

Dr Margaret Good, Dept. of Agriculture, Food & Rural Development, Dublin, IE (also host)

Dr José Luis Saez Llorente , General Subdirection of Animal Health, M.A.R.M, ES

Dr Maria Pacciarini, I Z S Lombardia e Emilia,Brescia, IT

Dr. Javier Bezos , TB CRL Madrid – Spain

Dr Linda Evans , Veterinary Business Partner (England), Exter Animal Health Office and Worcester Animals Health HQ, UK

Dr. Giorgio Zanardi, I Z S Lombardia e Emilia,Brescia, IT.

EU Commission (DG SANCO-Unit G5- Veterinary programmes):

Mr. Christophe Bertrand

Dr. Valentina Piazza

Irish hosts: Margaret Good, Martin Blake, Anthony Duignan, Richard Healy, Peter Maher, Tom McTague, James O Keeffe, Ian O'Boyle, John Higgins, Lorna Meaney, Tracy Clegg, Kevin Kenny, Darina O'Flanagan, Tom Ryan, Eamonn Gormley, Damien Kelly and others from DAFMs Regional and HQ services.

ANNEX II

AGENDA

MEETING OF THE BOVINE TUBERCULOSIS SUB-GROUP FOR MONITORING ANIMAL DISEASE ERADICATION, DUBLIN, 22-23 NOVEMBER 2011

Tuesday 22nd November

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| 9.00 | Welcome and Introduction (Chairperson) | Martin Blake DCVO |
| 9.10 | <i>Structure of ERAD/SVS/DVOs</i> (Eradication of animal diseases Division, State Veterinary Service and District veterinary offices.) | Martin Blake DCVO |
| 9.20 | An overview of the current Irish bTB eradication programme | A Duignan SVI |
| 9.55 | Legislative framework for BTB eradication and Financial review | Richard Healy PO |
| 10.15 | Herd registration/epidemiological unit. Cattle identification registration, movement system. | Peter Maher SVI |
| 10.35 | IT Supports for bTB eradication programme - AHCS/AIM/Herdfinder/AFIT | Tom McTague SVI |
| 11.00 | Coffee | |
| 11.15 | Movement controls and Animal level Risks. | James O Keffe SVI |
| 11.35 | Question time | |
| 11.45 | a. DVO – management of the programme | Ian O'Boyle SVI |
| 12.10 | b. Management of the reactor herd | John Higgins VI |
| | c. Use of ancillary blood tests | John Higgins VI |
| 12.45 | Discussion | |
| 13.15 | Lunch | |
| 14.15 | Epidemiological investigation of a BTB outbreak | Lorna Meaney VI |
| 14.30 | Wildlife programme – including routine population controls in the face of a bTB outbreak and vaccine initiative | James O Keffe SVI |
| 14.45 | Role of Centre for Veterinary Epidemiology and Risk Analysis - Analysis of Epidemiological data | Tracy Clegg |
| 15.15 | Central Veterinary Research Laboratory role in BTB eradication | Kevin Kenny RO |
| 15.45 | Epidemiology and diagnostics of Tuberculosis in humans | Darina O'Flanagan (NDSC)
on behalf of D. Health |
| 16.15 | Discussion | |

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| 9.00 | AHCS controls | Tom Ryan AP |
| 9.30 | Quality Control in the Irish TB programme | A Duignan SVI |

10.00 Blood tests and vaccine development
10.20 Slaughterhouse surveillance
10.45 Review
11.00 Discussion
11.30 Coffee
12.00 Meeting of TB Task Force
13.00 Conclusions of meeting

Dr Eamonn Gormley

Damien Kelly VI

M Blake DCVO