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PANORAMA

Thematic portfolio

Controlling bovine tuberculosis: a One Health challenge

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Control and eradication of bovine tuberculosis (bTB) is desirable for animal welfare, socio-economic and zoonotic reasons. Tuberculin potency affects test sensitivity and specificity. Therefore, accurate potency determination is critical for test performance. Eradication of bTB will undoubtedly continue to require a multifaceted approach if it is to be successful.

The Irish national bTB eradication programme commenced in 1954 with 80% herd and 17% animal (22% cows) prevalence rates [1]. **The single intradermal comparative tuberculin test using avian and mammalian tuberculin purified protein derivatives (PPDs)** addressed non-specific sensitisation by abundant environmental mycobacteria. Skin testing requires minimal technology (Fig. 1) and, being safe, allows testing from birth [1, 2]. Progress was dramatic to 1965 but stalled at ~30,000 reactors removed/year until 2000 (Fig. 2).

Programme milestones

- 1974, first tuberculous badger detected, by the 1980s infected badgers found countrywide;
- 1975-1976, programme interruption (fewer reactors);
- 1976-1977, bovine replaced human tuberculin PPD (more sensitive and specific);
- 1978-1979, tuberculin potency fell, affecting bTB detection (initiated routine potency assay on infected cattle as critical quality control);
- 1980, tuberculin supplier changed;
- 1989, TB investigation unit (now CVERA) founded to investigate bTB and improve eradication, using science-informed policy in a national context;
- 1990, endemically infected badgers recognised as tuberculosis maintenance host (culled since 2003 when epidemiological investigation associated them with bTB breakdowns);
- 1991, interferon-γ assay (using tuberculin) used in bTB herds to remove additional infected cattle (legally recognised 2005);
- 1992, PPD potency standardised for Irish programme at bovine 30,000 IU/ml, avian 25,000 IU/ml (giving optimal sensitivity/specificity). Studies showed imprecise guinea pig bio-assay potency estimates and a significant fall in the number of infected cattle detected using low potency tuberculin but if standard potency maintained there was no apparent impact from changing supplier/manufacturer [1, 3].

> Clinical bovine tuberculosis and human zoonotic tuberculosis are now uncommon in Ireland

The Irish programme uses tuberculin PPD and optimal test methodologies for bTB eradication; considers disease epidemiological profile, controls non-bovine maintenance hosts, pursues rigorous quality controls (including tuberculin potency assay), evaluates surveillance protocols, test performance, policy efficacy and outcomes, and is modified reflecting findings and scientific advances [2, 3]. Clinical bTB and human zoonotic tuberculosis [4] are now uncommon.

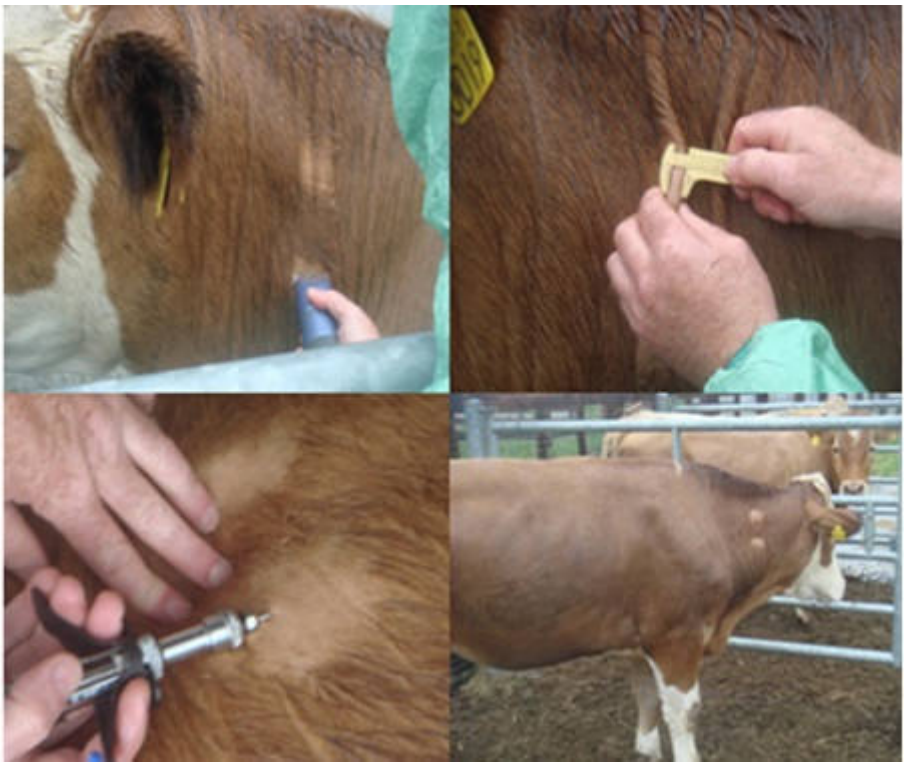

Fig. 1. Testing cattle: clip sites mid-neck; measure skin thickness; inject tuberculin – avian and bovine; 72-hours later measure and compare responses [2, 3]. ©A. Duignan

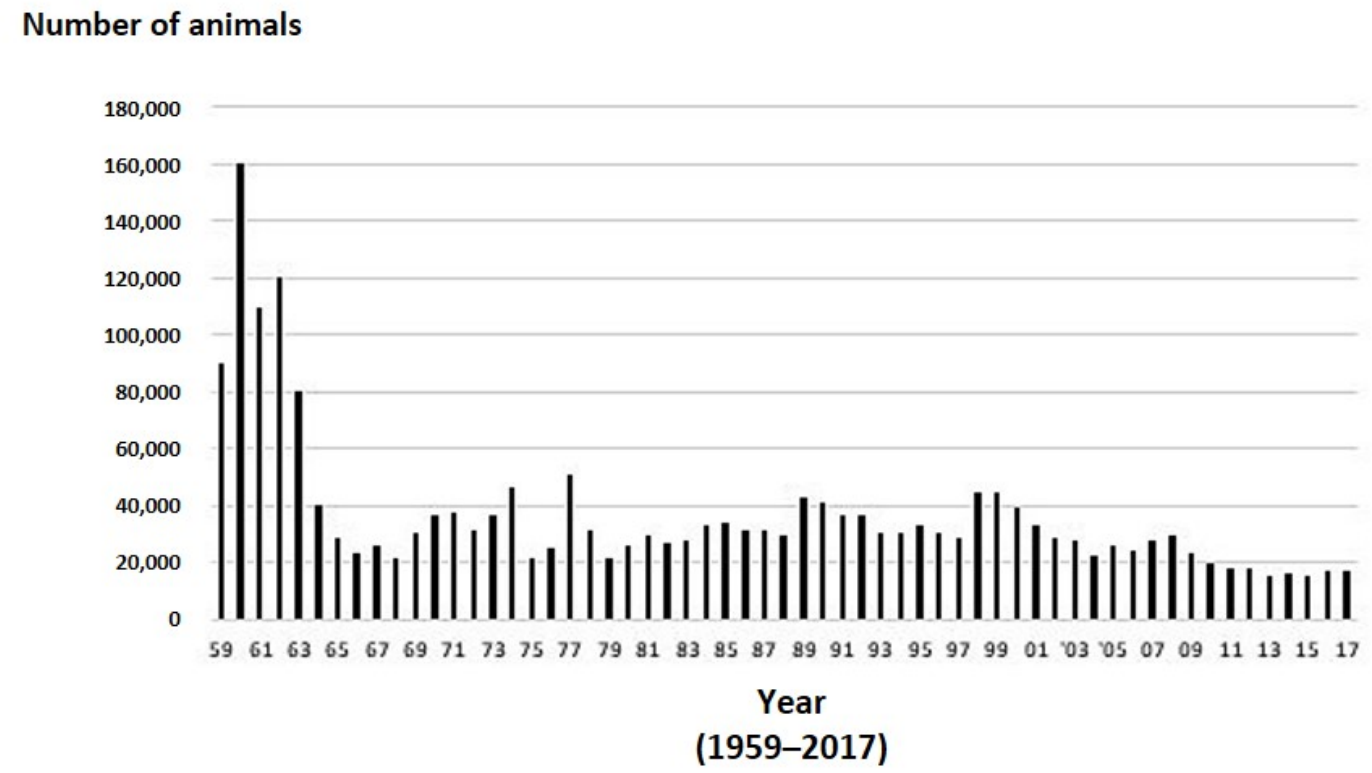

Fig. 2. Number of animals removed annually 1959 to 2017 inclusive under the Irish bovine tuberculosis eradication programme

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SUCCESS STORIES

The Irish experience of the tuberculin test in bovine tuberculosis eradication

KEYWORDS

#bovine tuberculosis, #eradication, #Ireland, #purified protein derivative (PPD), #tuberculin, #tuberculin potency.

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