



UK Health
Security
Agency

Prevalence of latent tuberculosis (TB) infection in occupational groups who have prolonged indoor contact with cows

A rapid review

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Main messages

1. The purpose of this rapid review was to identify and assess the available evidence for the prevalence of latent tuberculosis (TB) infection within the UK, Ireland, and Western Europe in farmers and farm workers, vets, abattoir workers, and any other occupation that involves prolonged indoor contact with cows (search date: up to 19 May 2023).
2. In total, 3 studies were included, all looking at screening for TB in farmers, farm workers, and people with close contact with cattle after outbreaks of bovine TB in cattle herds in the UK between 1993 and 2004.
3. No studies were identified that looked at vets, abattoir workers, or any other occupations with prolonged indoor contact with cows.
4. There were no diagnosed cases of latent TB within the 3 studies, however, it is unclear whether all potential cases of latent TB would have been diagnosed based on the tests performed in the studies (Heaf and Mantoux, and any subsequent follow-up tests). The studies also included a relatively small numbers of participants, which would make it difficult to detect latent TB if the prevalence was low.

Purpose

The purpose of this rapid review was to identify and assess the available evidence for the prevalence of latent tuberculosis infection within the UK, Ireland, and Western Europe in the following occupational groups:

- farmers and farm workers
- vets
- abattoir workers
- any other occupation that involves prolonged indoor contact with cows

Methods

Full details on the methodology are provided in the protocol in [Annexe A](#). No deviations from the protocol were made.

A rapid review was conducted, following streamlined systematic methodologies to accelerate the review process (1). A literature search was undertaken to look for relevant primary studies, published (or available as preprint) up to 19 May 2023.

Screening on title and abstract was undertaken in duplicate by 2 reviewers for 20% of the eligible studies, with the remainder completed by one reviewer. Screening on full text was undertaken by one reviewer and checked by a second. Studies excluded on full text screening are available with the reasons why in [Annexe B](#). As stated in the protocol, risk of bias assessment was not conducted as all included studies were descriptive rather than analytical.

All studies reporting on the prevalence of latent TB infection in the UK, Ireland and Western Europe were eligible for inclusion. Any test used for screening of active or latent TB infection was eligible for inclusion, including the Mantoux tuberculin skin test and an Interferon Gamma Released Assay test. Latent TB infections caused by any species were included. Studies solely in people with active TB infections, that is, infections with symptoms of TB, were excluded.

For the purposes of this review, Western Europe was defined as the following countries: Austria, Belgium, France, Germany, Liechtenstein, Luxembourg, Monaco, Netherlands, and Switzerland, in addition to the UK and Ireland.

Evidence

In total, 5,068 primary studies were screened at title and abstract and 58 studies were screened at full text. Of these, 3 studies met the inclusion criteria, all looking at screening for TB in farmers, farm workers, and people with close contact with cattle after outbreaks of bovine tuberculosis in herds in the UK between 1993 and 2004 ([2 to 4](#)).

Chalmers and others conducted TB screening on 17 people (aged between one and 90 years) who had contact (lived on or visited the farm, had direct contact with the cattle, or consumed unpasteurised milk) with 2 herds of cattle that experienced outbreaks of bovine TB in South West Scotland in 1992 ([2](#)). The contacts had a standard Mantoux test, read at 72 hours, or a standard Heaf test, read at one week, with further action determined by the results of these tests, the contact's age, their history of the BCG vaccine, and whether they had direct exposure to the cattle or unpasteurised milk. In total, 10 of the 17 contacts (59%) had positive first or second Mantoux or Heaf tests (9 responses of 8mm and above, one response of Heaf 2), 5 of which had previous BCG vaccines, though all 11 chest X-rays performed were normal. Overall, 6 contacts received chemoprophylaxis (all with positive first Mantoux tests), one contact had a letter sent to their GP, one contact had X-rays at 4 month intervals for one year (the results of which were all clear), and the remaining contacts were discharged.

Dodds and others conducted a study looking at the incidence of bovine TB infection in 72 farmers and farm workers from 25 herds within Devon who were referred to a chest clinic in 2004 ([3](#)). In total, 89% of farmers and farm workers attended the chest clinic and had either a Heaf test or an X-ray. No cases of bovine TB infection were identified, although one X-ray indicated exposure to pulmonary TB, with no active disease seen.

Smith and others conducted a study looking at the incidence of bovine TB infection in 138 people (aged between 2 and 72 years, mean age 32 years) who had contact (close working contact with the herd, or consumed unpasteurised milk) with herds of cattle that had experienced outbreaks of bovine TB in North Staffordshire between 1993 and 1997 (4). All contacts received a Heaf test. Contacts were offered a chest X-ray and clinical examination for lymphadenopathy if they had a Grade 2 Heaf test result and no history of a BCG vaccination, a Grade 3 or 4 Heaf test result, or symptoms of possible TB. In total, 31 people (22%) had a Grade 2 Heaf test result, 5 people (3.6%) had a Grade 3 Heaf test result (2 had previous BCG vaccinations), and no people had a Grade 4 Heaf test result. Fifteen people (11%) did not receive a Heaf test, and 10 people (7.2%) had an uncertain Heaf test result. In total, 22 chest X-rays were performed, with one showing evidence of old TB (it is unclear if the original TB infection was latent), another showing paratracheal lymphadenopathy (unchanged at one year for both chest X-ray and Heaf test), one showing bilateral hilar lymphadenopathy (however, this person was lost to follow-up). The remaining 19 X-rays showed no evidence of active disease. Overall, no cases of bovine TB infection were identified.

Overall, across all 3 studies, none of the screened farmers, farm workers, herd contacts, or people who drank unpasteurised milk were diagnosed with latent TB.

Limitations

Sources of evidence searched included databases of peer-reviewed and preprint research, but an extensive search of other sources was not conducted (such as websites of public health organisations). As the studies were all descriptive, risk of bias assessments were not conducted.

It is unclear whether all potential latent TB cases would have been diagnosed based on the tests performed in the included studies (Heaf and Mantoux, and any subsequent follow-up tests), or only whether active TB cases would have been diagnosed. One study identified a person with “old TB”, and it is unclear whether the original TB infection was latent. The 3 studies also included relatively small numbers of participants, which would make it difficult to detect latent TB if the prevalence was low.

No studies were identified that looked at vets, abattoir workers, or any other occupations with prolonged indoor contact with cows.

Conclusion

There were no diagnosed cases of latent TB across 3 studies looking at the incidence of bovine TB infections in people who had contact with herds infected with bovine TB in the UK between 1993 and 2004. However, it is unclear whether latent TB would have been diagnosed based on

the tests performed in the studies, and the studies included relatively small numbers of participants, which would make it difficult to detect latent TB if the prevalence was low.

Acknowledgment

We would like to thank colleagues within the Clinical and Public Health Response function who either reviewed or input into aspects of the review.

Disclaimer

The UK Health Security Agency (UKHSA)'s rapid reviews aim to provide the best available evidence to decision makers in a timely and accessible way, based on published peer-reviewed scientific papers, unpublished reports and papers on preprint servers. Please note that the reviews: i) use accelerated methods and may not be representative of the whole body of evidence publicly available; ii) have undergone an internal, but not independent, peer review; and iii) are only valid as of the date stated on the review.

In the event that this review is shared externally, please note additionally, to the greatest extent possible under any applicable law, that UKHSA accepts no liability for any claim, loss or damage arising out of, or connected with the use of, this review by the recipient or any third party including that arising or resulting from any reliance placed on, or any conclusions drawn from, the review.

References

1. World Health Organization (WHO) and others. '[Rapid reviews to strengthen health policy and systems: a practical guide](#)' 2017
2. Chalmers JW and others. '[An outbreak of bovine tuberculosis in 2 herds in South West Scotland: veterinary and human public health response](#)' Journal of Public Health Medicine 1996: volume 18, issue 1, pages 54 to 58
3. Dodds SEA and others. '[Is contact tracing of any value for farmers and farm workers who have been in contact with bovine tuberculosis?](#)' Thorax 2005: volume 60, page 160
4. Smith GE and others. '[Results of follow-up of human contacts of bovine tuberculosis in cattle during 1993 to 1997 in North Staffordshire](#)'. Epidemiology and Infection 2001: volume 127, issue 1, pages 87 to 89

Annexe A. Protocol

Review question

There is one review question:

1. What is the prevalence of latent tuberculosis (TB) infection within the UK, Ireland, and Western Europe in the following occupational groups:
 - a. farmers and farm workers
 - b. vets
 - c. abattoir workers
 - d. any other occupation that involves prolonged indoor contact with cows

A search for primary evidence to answer these review questions will be conducted up to 19 May 2023.

All studies reporting on the prevalence of latent TB infection in the UK, Ireland and Western Europe will be eligible for inclusion. Detection of latent TB infection can be through any test, including the Mantoux tuberculin skin test and an Interferon Gamma Released Assay test. Latent TB infection caused by any species will be included. Studies solely of active TB infections, that is, infections with symptoms of TB, will be excluded.

Western Europe includes the following countries: Austria, Belgium, France, Germany, Liechtenstein, Luxembourg, Monaco, Netherlands, and Switzerland.

[Table A.1](#) shows the inclusion and exclusion criteria for this review.

Table A.1. Inclusion and exclusion criteria

	Included	Excluded
Population	All	Animals
Settings	UK, Ireland, and Western Europe	Other countries
Context	The following occupational groups: <ul style="list-style-type: none">• farmers and farm workers• vets• abattoir workers• any other occupation that involves prolonged indoor contact with cows	Other occupations

	Included	Excluded
Intervention or exposure	Latent TB infection caused by any tuberculum species and identified by any test, including the Mantoux tuberculin skin test and an Interferon Gamma Released Assay test	Active TB infection (with symptoms of TB), other infections
Outcomes	Prevalence	
Language	English	
Date of publication	Up to 19 May 2023	
Study design	<ul style="list-style-type: none"> • interventional studies • observational studies (cohorts, case control, and cross-sectional studies, as well as case reports and series) 	<ul style="list-style-type: none"> • systematic or narrative reviews • guidelines • opinion pieces • modelling studies • laboratory studies • ecological studies
Publication type	Published and preprint	

Identification of studies

We will search OVID Medline, OVID Embase, medRxiv, and Research Square (via Europe PMC) for studies published up to 19 May 2023. The search strategy will be checked by another information specialist.

Screening

Screening on title and abstract will be undertaken in duplicate by 2 reviewers for at least 20% of the eligible studies, with the remainder completed by one reviewer. Disagreement will be resolved by discussion.

Screening on full text will be undertaken by one reviewer and checked by a second.

Data extraction

Summary information for each study will be extracted and reported in tabular form. Information will include country, study period, study design, participants, results, and any relevant contextual data. This will be undertaken by one reviewer and checked by a second.

Risk of bias assessment

As the studies are expected to be descriptive rather than analytical, risk of bias assessment may not be performed. If analytical studies are present, the quality criteria checklist will be used to assess risk of bias. This will be completed by one reviewer and checked by a second.

Synthesis

A narrative synthesis may be written to describe the results from this review.

Variations across populations and subgroups, for example cultural variations or differences between ethnic or social groups will be considered, where evidence is available.

Search strategy

Search strategy Ovid Medline (1946 to 19 May 2023)

1. exp Tuberculosis/ (205839)
2. ((laten* or undiagnos* or un-diagnos*) adj3 tubercul*).tw,kf. (5967)
3. LTBI.tw,kf. (3052)
4. ((laten* or undiagnos* or un-diagnos*) adj3 TB).tw,kf. (3057)
5. Tuberculin Test/ (14281)
6. (tuberculin adj3 (react* or sensitiv* or positiv* or test* or screen*)).tw,kf. (12101)
7. (mantoux adj2 (inject* or test*)).tw,kf. (1108)
8. (tst adj3 (react* or sensitiv* or positiv*)).tw,kf. (1425)
9. ((Interferon-Gamma Release Assay or IGRA) adj3 positiv*).tw,kf. (522)
10. QTF-Plus.tw,kf. (3)
11. QuantiFERON-TB Gold Plus.tw,kf. (161)
12. Mycobacterium bovis/ (13922)
13. M* bovis.tw,kf. (10689)
14. MTC positiv*.tw,kf. (25)
15. (bovine TB or bovine tubercul*).tw,kf. (3259)
16. zoono* TB.tw,kf. (53)
17. or/1-16 (225170)
18. Farmers/ (3950)
19. Farms/ (5482)
20. (farm* adj5 (own* or occupation* or work* or employee* or labo?r* or personnel* or staff* or profession*)).tw,kf. (8950)
21. farmwork*.tw,kf. (1223)
22. pastoralist*.tw,kf. (1293)

23. ((live stock or livestock) adj5 (handl* or own* or occupation* or work* or employee* or labo?r* or personnel* or staff* or profession*)).tw,kf. (1195)
24. exp Animal Husbandry/ (22651)
25. animal husbandry.tw,kf. (2891)
26. (animal* adj5 handl*).tw,kf. (2052)
27. ((cow* or sheep* or goat* or Cattle) adj5 own*).tw,kf. (654)
28. ((cow* or sheep* or goat* or Cattle) adj5 breed*).tw,kf. (11210)
29. (Herdsmen* or herdsman*).tw,kf. (301)
30. shepherd*.tw,kf. (3000)
31. Dairying/ (13732)
32. (dairy or dairying or dairies).tw,kf. (67629)
33. Pasteurization/ (1180)
34. pasteur*.tw,kf. (8769)
35. Agriculture/ (51537)
36. (agricultur* adj5 (own* or occupation* or work* or employee* or labo?r* or personnel* or staff* or profession* or communit* or population*)).tw,kf. (10571)
37. Abattoirs/ (6367)
38. abattoir*.tw,kf. (4533)
39. (slaughter house* or slaughterhouse*).tw,kf. (5581)
40. Meat-Packing Industry/ (1110)
41. (meat* adj3 pack*).tw,kf. (1010)
42. (meat* adj3 process*).tw,kf. (5365)
43. (meat* adj3 industr*).tw,kf. (1526)
44. butcher*.tw,kf. (1796)
45. Veterinarians/ (5499)
46. veterinarian*.tw,kf. (13227)
47. (veterinary adj5 (occupation* or work* or employee* or labo?r* or personnel* or staff* or profession* or assistant* or doctor* or Dr or Drs or nurs*)).tw,kf. (5514)
48. *Rural Health/ (11524)
49. exp Veterinary Medicine/ (26149)
50. or/18-49 (246892)
51. 17 and 50 (2265)

Search strategy Ovid Embase (1974 to 18 May 2023)

- 1 exp tuberculosis/ (222968)
- 2 ((laten* or undiagnos* or un-diagnos*) adj3 tubercul*).tw,kf. (8454)
- 3 LTBI.tw,kf. (4512)
- 4 ((undiagnos* or un-diagnos* or laten*) adj3 TB).tw,kf. (4769)
- 5 tuberculin test/ (19118)
- 6 (tubercul* adj3 (react* or sensitiv* or positiv* or test* or screen*)).tw,kf. (27480)
- 7 (mantoux adj2 (inject* or test*)).tw,kf. (1772)
- 8 (tst adj3 (react* or sensitiv* or positiv*)).tw,kf. (2144)
- 9 ((Interferon-Gamma Release Assay or IGRA) adj3 positiv*).tw,kf. (973)

- 10 QTF-Plus.tw,kf. (7)
- 11 QuantiFERON-TB Gold Plus.tw,kf. (280)
- 12 exp Mycobacterium bovis/ (13041)
- 13 M* bovis.tw,kf. (11467)
- 14 MTC positiv*.tw,kf. (32)
- 15 (bovine TB or bovine tubercul*).tw,kf. (3086)
- 16 zoono* TB.tw,kf. (54)
- 17 or/1-16 (244328)
- 18 agricultural worker/ (26657)
- 19 exp agricultural land/ (22382)
- 20 (farm* adj5 (own* or occupation* or work* or employee* or labo?r* or personnel* or staff* or profession*)).tw,kf. (10699)
- 21 farmwork*.tw,kf. (1261)
- 22 pastoralist*.tw,kf. (1399)
- 23 ((live stock or livestock) adj5 (handl* or own* or occupation* or work* or employee* or labo?r* or personnel* or staff* or profession*)).tw,kf. (1397)
- 24 exp animal husbandry/ (62940)
- 25 animal husbandry.tw,kf. (3345)
- 26 (animal* adj5 handl*).tw,kf. (2726)
- 27 ((cow* or sheep* or goat* or Cattle) adj5 own*).tw,kf. (755)
- 28 ((cow* or sheep* or goat* or Cattle) adj5 breed*).tw,kf. (12139)
- 29 (Herdsmen* or herdsman*).tw,kf. (339)
- 30 shepherd*.tw,kf. (3649)
- 31 dairy industry/ (2532)
- 32 (dairy or dairying or dairies).tw,kf. (76577)
- 33 pasteur*.tw,kf. (8700)
- 34 agriculture/ (54173)
- 35 (agricultur* adj5 (own* or occupation* or work* or employee* or labo?r* or personnel* or staff* or profession* or communit* or population*)).tw,kf. (11232)
- 36 (dairy or dairying or dairies).tw,kf. (76577)
- 37 exp meat industry/ (14371)
- 38 abattoir*.tw,kf. (5246)
- 39 (slaughter house* or slaughterhouse*).tw,kf. (6776)
- 40 (meat* adj3 pack*).tw,kf. (845)
- 41 (meat* adj3 process*).tw,kf. (6264)
- 42 (meat* adj3 industr*).tw,kf. (1387)
- 43 butcher*.tw,kf. (2141)
- 44 exp veterinarian/ (7849)
- 45 exp veterinary medicine/ (64904)
- 46 veterinarian*.tw,kf. (16115)
- 47 (veterinary adj5 (occupation* or work* or employee* or labo?r* or personnel* or staff* or profession* or assistant* or doctor* or Dr or Drs or nurs*)).tw,kf. (6637)
- 48 *rural health/ (855)

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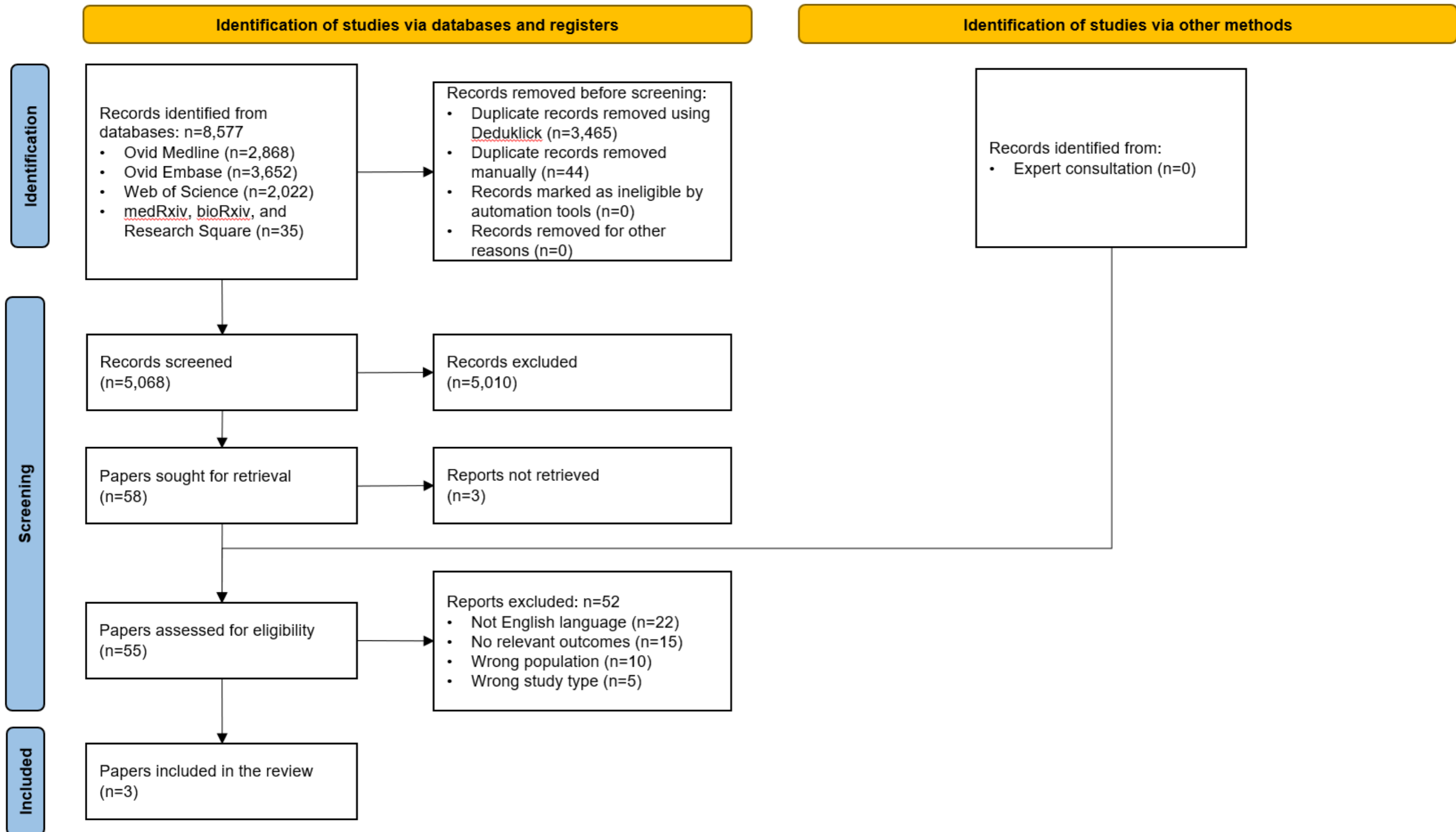
49 or/18-48 (334023)

50 17 and 49 (3015)

Search strategy for Research Square, MedRxiv and BioRxiv via Europe PMC

(TITLE_ABS:"latent TB" OR TITLE_ABS:LTBI OR TITLE_ABS:"latent tuberculosis" OR "bovine TB" OR TITLE_ABS:"bovine tuberculosis" OR TITLE_ABS:"Mycobacterium bovis" OR TITLE_ABS:"M bovis") AND (TITLE_ABS:farm* OR TITLE_ABS:abattoir* OR TITLE_ABS:"slaughter house" OR TITLE_ABS:slaughterhouse* OR TITLE_ABS:veterinary OR TITLE_ABS:veterinarian*)

Figure A.1. PRISMA diagram



Text version of Figure A.1. PRISMA diagram

A PRISMA diagram showing the flow of studies through this review, ultimately including 3 studies.

From identification of studies via databases and registers, n=8,577 records identified from databases:

- Ovid Medline (n=2,868)
- Ovid Embase (n=3,652)
- Web of Science (n=2,022)
- medRxiv, bioRxiv, Research Square (n=35)

From these, records removed before screening:

- duplicate records removed using Deduklick (n=3,465)
- duplicate records removed manually (n=44)
- records marked as ineligible by automation tools (n=0)
- records removed for other reasons (n=0)

n=5,068 records screened, of which n=5,010 were excluded, leaving n=58 papers sought for retrieval, of which n=3 were not retrieved.

No studies were identified from identification of studies via other methods: n=0 studies were identified from expert consultation.

Of the n=55 papers assessed for eligibility, n=52 reports were excluded:

- not English language (n=22)
- no relevant outcomes (n=15)
- wrong population (n=10)
- wrong study type (n=5)

n=3 papers included in the review.

Annexe B. Excluded full texts

Not English language (n=22)

1. Anonymous. 'Tbc in farmers: occupational disease? [German]'. Fortschritte der Medizin 1990: volume 108, page 15
2. Badalik L and others. 'The occurrence of the tuberculosis caused by *M. bovis* in Slovakia during the period 1972 to 1992' [Slovak] Studia Pneumologica et Phtiseologica 1995: volume 55, pages 26 to 30
3. Badalik L and others. '[Surveillance of tuberculosis caused by Mycobacterium bovis in Slovakia](#)' Journal of the Royal Society of Health 1995: volume 115, issue 5, pages 310 to 313
4. Golanov VS. '[Characteristics of the incidence of tuberculosis in Orenburg oblast](#)' Problemy Tuberkuleza 1989, issue 7, pages 6 to 8
5. Jindrichova J. '[Occupational Tuberculosis in Agriculture in Eastern Bohemia](#)' Pracovni Lekarstvi 1964: volume 16, pages 214 to 216
6. Kolar J and others. 'Tuberculosis in agricultural workers of East Bohemia' [Czech] Studia Pneumologica et Phtiseologica Cechoslovaca 1974: volume 34, pages 542 to 546
7. Parnas J. '[Contribution to the Problem of Animal-Borne Tuberculosis](#)' Gru'zlica: Organ Polskiego Związku Przeciwwgru'zliczego 1963: volume 31, pages 741 to 743
8. Pavlas M and others. '[The epizootiological significance of positive bacteriological findings on Mycobacterium tuberculosis and Mycobacterium bovis in humans](#)' Veterinarni Medicina 1982: volume 27, issue 11, pages 641 to 649
9. Piaggio AA and others. '[Follow-up of 341 cases of active tuberculosis diagnosed in 5 industrial groups: state shops and telephones, meat packing, breweries, glass industry, textiles](#)' Hoja Tisiologica 1951: volume 11, issue 2, pages 139 to 142
10. Picotto P. 'Tuberculosis in the veterinary environment' [Italian] Lotta Contro la Tuberculosis e le Malattie Polmonari Sociali 1995: volume 65, pages 247 to 251
11. Rao M and others. 'Evidence of a possible mycobacterium bovis infection in veterinary service staff of a local health unit' [Italian] Giornale Italiano di Medicina del Lavoro ed Ergonomia 2006: volume 28, pages 75 to 76
12. Sadownik J and others. '[Examination of man and animals for tuberculosis in the Bialystok Region in 1960 and 1962. II](#)' Gru'zlica: Organ Polskiego Związku Przeciwwgru'zliczego 1963: volume 31, pages 738 to 741
13. Schliesser T. '[Bovine-type tuberculous infection as an occupational disease \(author's translation\)](#)' Praxis und Klinik der Pneumologie 1979: volume 33, issue 2, pages 105 to 110
14. Schroeder KJ. '[On the problem of occupational tuberculosis infection of veterinarians following the tuberculinization of cattle]' Deutsche Gesundheitswesen 1959: volume 14, pages 1,480 to 1,484
15. Schuppert. '[Pulmonary tuberculosis as an occupational disease of butchers](#)' Zeitschrift fur Tuberkulose 1956: volume 109, issue 1, pages 28 to 32

16. Schuppert R. '[Pulmonary tuberculosis as an occupational disease in butchers and persons employed in agriculture](#)' Zeitschrift fur Arztliche Fortbildung (Jena) 1958: volume 52, issue 10, pages 417 to 422
17. Starzycki Z. '[Cutaneous tuberculosis treated at the Dermatological Clinic, Medical Academy, in Cracow 1963 to 1987. I. Epidemiological analysis](#)' Przegląd Dermatologiczny 1990: volume 77, issue 1, pages 34 to 39
18. Suntych F. 'Occupational infections of workers in agriculture' [Czech] Pracovni Lekarstvi 1974: volume 26, pages 103 to 108
19. Tibor B. 'Epizootiological observations in the period after having finished the eradication of bovine tuberculosis' Magyar Allatorvosok Lapja 1995: volume 50, issue 3, pages 174 to 175
20. Ursov IG. '[Relationship between tuberculosis of farm animals and man](#)' Problemy Tuberkuleza 1976: volume 3, pages 10 to 14
21. Vaganova EM and others. '[Relation of tuberculosis incidence in people to its prevalence among cattle and the performance of veterinary tuberculosis prevention measures](#)' Problemy Tuberkuleza 1986, issue 9, pages 11 to 12
22. Wolff F. '[Occupational diseases and job-related problems in animal husbandry](#)' Monatshefte fur Veterinarmedizin 1970: volume 25, issue 16, pages 615 to 621

No relevant outcomes (n=15)

1. Acke S and others. '[Global infectious disease risks associated with occupational exposure among non-healthcare workers: A systematic review of the literature](#)' Occupational and Environmental Medicine 2022: volume 79, pages 63 to 71
2. Badalik L and others. 'Surveillance of zoonosis, bovine tuberculosis and other types of mycobacteriosis in Slovakia in 1990 and at present' [Slovak] Lekarsky Obzor 2006: volume 55, pages 359 to 361
3. Lesslie IW and others. '[The prevalence of bovine type tuberculous infection in man in the English rural population](#)' Tubercle 1972: volume 53, issue 3, pages 198 to 204
4. Parnas J and others. '[Zoonotic tuberculosis in rural areas]' Annales Universitatis Mariae Curie-Sklodowska - Sectio d - Medicina 1953: volume 8, pages 101 to 115
5. Pavlas M. '[The 30th anniversary of eradication of bovine tuberculosis in cattle in Czechoslovakia](#)' Acta Veterinaria Brno 1999: volume 68, issue 2, pages 155 to 162
6. Pavlik I and others. '[Mycobacterium bovis in human population in 4 Central European countries during 1990 to 1999](#)'. Veterinarni Medicina 2003: volume 48, issue 4, pages 90 to 98
7. Peplonska B and others. '[Epidemiological analysis of infectious diseases identified as occupational diseases in Poland, 1998 to 2002](#)' [Polish] Medycyna Pracy 2003: volume 54, pages 521 to 528
8. Perez-Lago L and others. '[Current knowledge and pending challenges in zoonosis caused by Mycobacterium bovis: a review](#)' Research in Veterinary Science 2014: volume 97, pages S94 to S100

9. Robert J and others. '[A national survey of human Mycobacterium bovis infection in France](#)' International Journal of Tuberculosis and Lung Disease 1999: volume 3, pages 711 to 714
10. Rodriguez E and others. '[Human tuberculosis due to Mycobacterium bovis and M. caprae in Spain, 2004 to 2007](#)'. International Journal of Tuberculosis and Lung Disease 2009: volume 13, issue 12, pages 1536 to 1,541
11. Romero B and others. '[Humans as source of Mycobacterium tuberculosis infection in cattle, Spain](#)' Emerging Infectious Diseases 2011: volume 17, issue 12, pages 2,393 to 2,395
12. Sanchez A and others. '[Zoonoses in veterinary students: A systematic review of the literature](#)' PLoS ONE 2017: volume 12
13. Smith RMM and others. '[Mycobacterium bovis Infection, United Kingdom](#)' Emerging Infectious Diseases 2004: volume 10, pages 539 to 541
14. Steele JH. '[Occupational health in agriculture. Animal-borne diseases](#)' Archives of Environmental Health 1968: volume 17, issue 2, pages 267 to 285
15. Streeton JA. '[Mycobacterium bovis as an occupational hazard in abattoir workers: reply](#)' Australian and New Zealand Journal of Medicine 1989: volume 19, issue 4, page 410

Wrong population (n=10)

1. Bose M. '[Natural reservoir, zoonotic tuberculosis and interface with human tuberculosis: An unsolved question](#)' Indian Journal of Medical Research 2008: volume 128, pages 4 to 6
2. Bua A and others. '[Usefulness of the QuantiFERON-TB-Gold in tube in a population at risk of bovine tubercular infection](#)' Acta Microbiologica et Immunologica Hungarica 2009: volume 56, issue 4, pages 369 to 373
3. Clarke WG and others. '[Results of a chest X-ray survey in the Vale of Glamorgan; a study of an agricultural community](#)' Tubercle 1956: volume 37, issue 6, pages 417 to 425
4. Harris KA and others. '[Bovine TB infection status in Great Britain in 2016](#)' Veterinary Record 2018: volume 182, issue 19, pages 538 to 544
5. Harris KA and others. '[Bovine TB infection status in cattle in Great Britain in 2015](#)' Veterinary Record 2017: volume 180, issue 7, pages 170 to 175
6. Pavlik I and others. 'Occurrence of bovine tuberculosis in animals and humans in the Czech Republic in the years 1969 to 1996' Veterinarni Medicina 1998: volume 43, issue 7, pages 221 to 231
7. Sjogren I and others. '[The risk of tuberculous infection in Sweden](#)' Tubercle 1975: volume 56, issue 2, pages 97 to 112
8. Snider DE, Jr. and others. '[Tuberculosis and migrant farm workers](#)' JAMA 1991: volume 265, issue 13, pages 1,732
9. Torgerson PR and others. '[Public health and bovine tuberculosis: what's all the fuss about?](#)' Trends in Microbiology 2010: volume 18, issue 2, pages 67 to 72

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10. Villarino ME and others. ['Purified protein derivative tuberculin and delayed-type hypersensitivity skin testing in migrant farm workers at risk for tuberculosis and HIV coinfection'](#) AIDS 1994: volume 8, issue 4, pages 477 to 481

Wrong study type (n=5)

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