



Australian Government

Department of Agriculture, Fisheries and Forestry

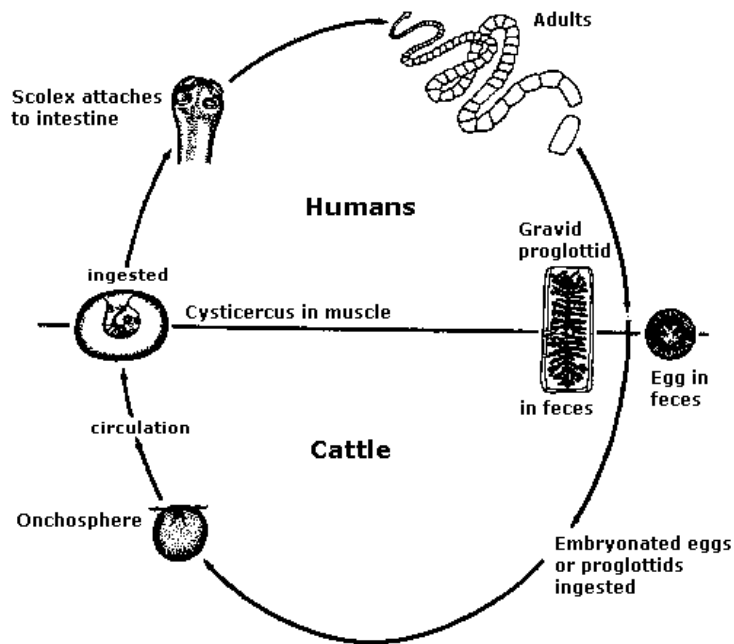
Cysticercus bovis in Australia



Baden Pearse* and Paul Vanderlinde

*Area Technical Manager
Meat Exports Program
PO Box 222
HAMILTON CENTRAL QLD 4007
42-44 QANTAS Drive
Eagle Farm Qld
Ph: 07 3246 8764
Fax: 07 3246 8653

A zoonotic parasite of cattle and man



Lifecycle of *Taenia saginata*
(Wanzala et al, 2003)



Table 1. Cysts of Larval Cestodes of Cattle
after King and Hutchinson, 2007

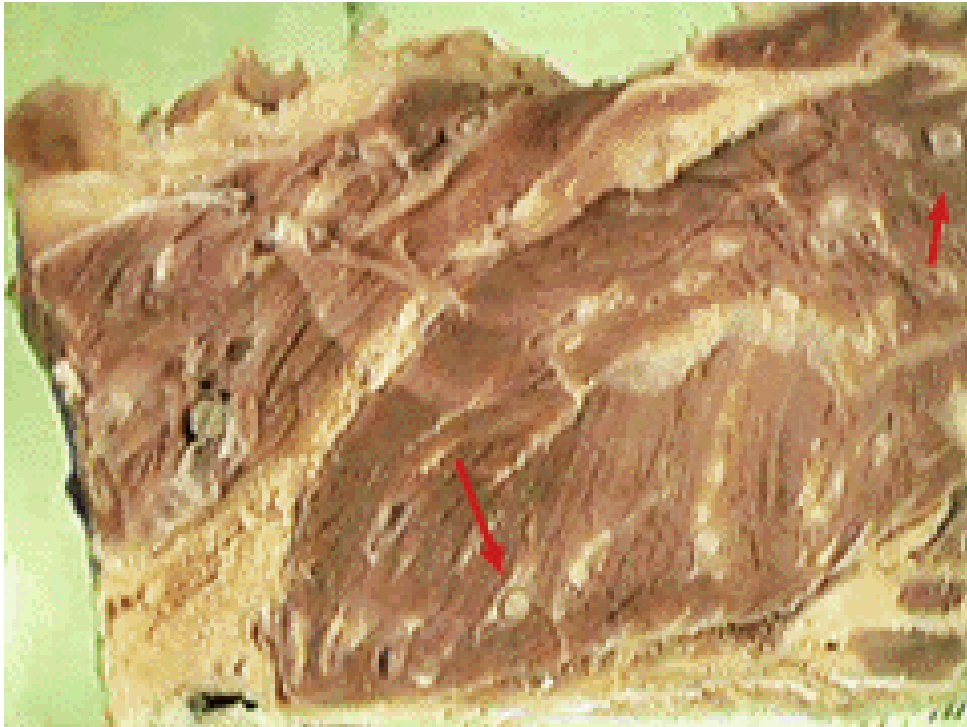
Cysts/Larval Stage	Intermediate hosts	Location	Size	Appearance	Tapeworm	Definitive Host
Beef measles (<i>Cysticercus bovis</i>)	Cattle, buffalo, deer, llama, wild ruminants including giraffe	Heart, tongue, masseter muscles, diaphragm, all striated muscle	Variable in size:2-20 mm; average 5 mm. Fully developed in 16 weeks	Viable cysts contain fluid and a single protoscolex. Degenerated cysts become caseous and calcified.	Taenia saginata, 4-10 m, small intestine	Human





Portion of a Taenia saginata tapeworm removed from human intestine. Courtesy: University of Pennsylvania, School of Veterinary Medicine.





Bovine muscle showing C. bovis (arrowed) Courtesy: University of Pennsylvania, School of Veterinary Medicine.





Australian standard for the hygienic production and transportation of meat and meat products for human consumption (AS 4696:2007):

Procedure for post-mortem inspection of cattle:

- **Masticatory muscles** (internal and external)
– incise
- **Heart:** Palpate. Incise internal musculature three to four times



Table 2. Abattoir prevalence of *Cysticercus bovis* in south-eastern Australia

Area	Year	Prevalence	Author
Victoria/Tasmania	1966	0.20%	Fewster, 1967
NSW	1970-72	0.05-0.06%	Rickard and Adolph, 1977
Central-West NSW	1972-73	0.17%	Downing, 1974

In 1964, an abattoir survey detected cases in South Australia, New South Wales, Queensland and Western Australia. No cases were found in Northern Territory or Tasmania



National *C. bovis* survey

Description

- Determine the number of cases of *C. bovis* in Australian slaughter cattle using gross pathology
- Identifying the location of parasitic cysts at post-mortem examination
- Using National Livestock Identification System (NLIS) to track the movement of infected cattle
- Collect demographic data on infected cattle

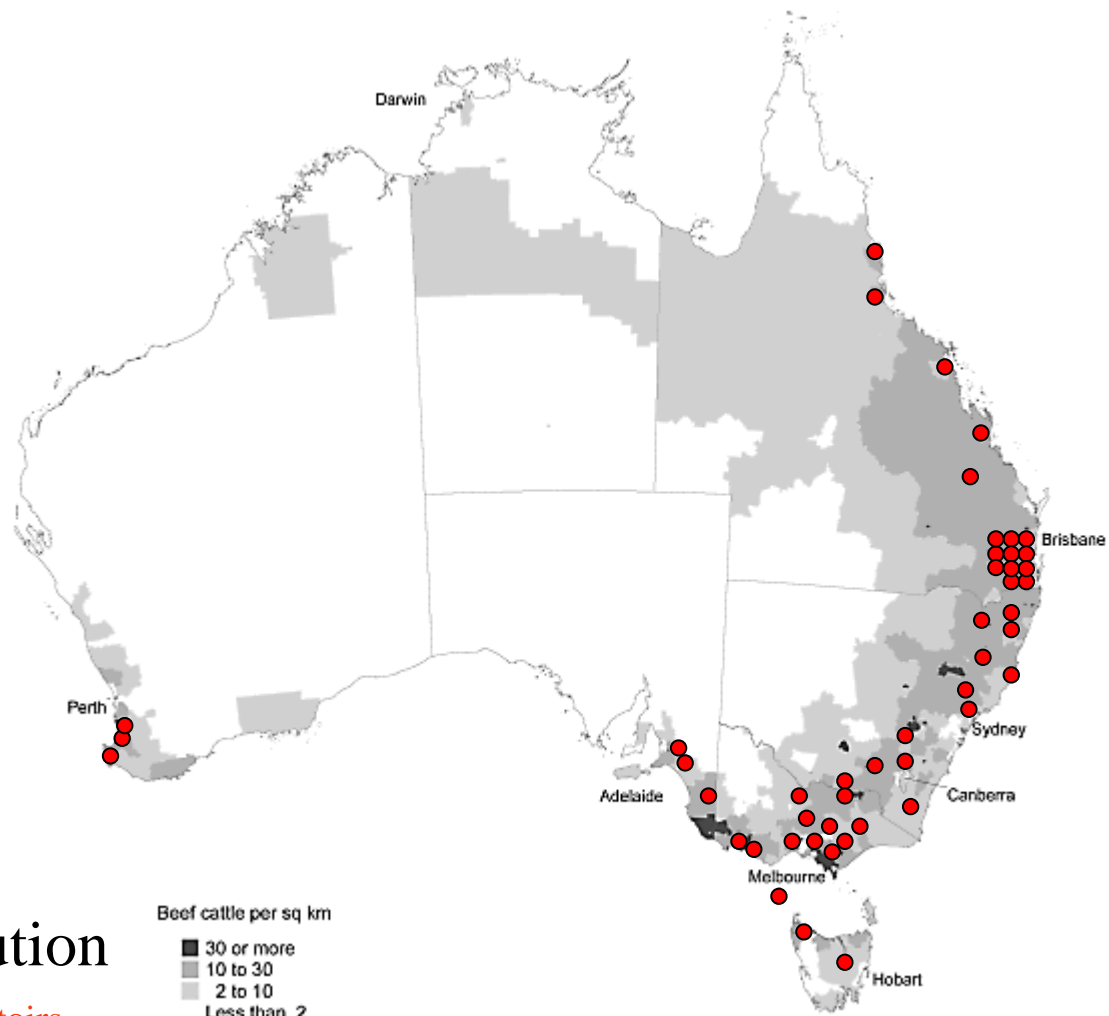


National *C. bovis* survey

Aims

- Determine the prevalence in cattle
- Ascertain if the masseter muscle incision is warranted
- Identify affected shires within affected states
- Propose an epidemiological model of infection in cattle





Cattle Distribution

● Export Abattoirs



Microsoft Excel - Cysticercus Submission Form v1-6

File Edit View Insert Format Tools Data Window Help

Type a question for help

A1 Bovine Cysticercosis Submission Form

1 **Bovine Cysticercosis Submission Form** File name: H:\C:\bovis\Cysticercus Submission Form v1-6.xls

2 Today's Date 2/07/2007

3

4 Establishment number Number of entries to-date 0

5

6 **Animal information**

7 Production System Grain E-mail Form Help

8 Grass E-mail to

9 NLIS ID / TailTag Number Baden.Pearse@aqis.gov.au

10 Dentition

11

12

13

14 **Pathology**

15 Was the cyst a suspect and sent to the University of Queensland for confirmation?

16

17 Please tick all sites where lesions were found in the carcass. Tick multiple sites when cysts were found in multiple areas.

18 **Location of the cysts** Yes

19 Heart No

20 Masseter

21 Tongue

22 Other

23

24 **Viability of cysts**

25 Viable

26 Partially Degenerated

27 Calcified

28

29

30

31

32

33

34

35

36

37

38

39

40

41

Submission / Data /

Draw / AutoShapes

Ready Sum=39265 NUM

start

3 Microsoft Off... Microsoft Excel... Solitaire 2 Microsoft Off... Google Scholar... Microsoft Power... 4:12 PM



Examples of data error checking in the submission form

```
If Sheet1.CheckGrain.Value = "True" And Sheet1.CheckGrass.Value = "True" Then BothTrueResult = MsgBox("You have both grass and grain selected?", vbCritical, "Error")
```

```
If BothTrueResult = 1 Then End
```

```
If Sheet1.CheckGrain.Value = "False" And Sheet1.CheckGrass.Value = "False" Then BothFalseResult = MsgBox("You must select either grass or grain fed", vbCritical, "Error")
```

```
If BothFalseResult = 1 Then End
```

'Checking that an Establishment number has been entered

```
If Sheet1.Abattoir.Value = "" Then AbattoirResult = MsgBox("You must enter an Establishment number from the list", vbCritical, "Error")
```

```
If AbattoirResult = 1 Then End
```

'Error checking for Dentation

```
If Sheet1.Dentition.Value = "" Then DentitionResult = MsgBox("You must enter a Dentition score from the list", vbCritical, "Error")
```

```
If DentitionResult = 1 Then End
```

'Error checking for Pathology - lesion site

```
If Sheet1.CheckHeart.Value = "False" And Sheet1.CheckMasseter.Value = "False" And Sheet1.CheckTongue.Value = "False" And Sheet1.CheckOther.Value = "False" Then PathologyResult = MsgBox("You must select an infections site!", vbCritical, "Error")
```

```
If PathologyResult = 1 Then End
```



Cysticercus bovis in Australia

Baden Pearse BVSc MVSc MPVM PhD MACVSc, AQIS, Area Technical Manager
PO Box 222, Hamilton Central, Qld 4007 Ph: 07 3246 8764

Life Cycle

Cysticercus bovis is found worldwide and is the cause of cysticercosis in Australian cattle. This zoonotic parasite (family Taeniidae, subclass Cestoda) has an indirect life cycle, with humans being the definitive host and the intermediate host being cattle and some other ruminants (see Table 1 below). The adult tapeworm lives in the human intestine and is called *Taenia saginata*. Previously, the larvae and tapeworms were thought to be different species, hence the two separate names for the one organism.

Figure 1. Lifecycle of *Taenia saginata* (Wanzala et al, 2003)

Cattle acquire infection from pasture, supplementary feed or water contaminated with human faeces containing tapeworm eggs while transmission to humans is from consuming raw or undercooked infected beef (Collins, 1990). Heating meat to a minimum of 56°C throughout will kill cysticerci in the muscle (The Center for Food Security and Public Health, 2005) as will freezing to below minus 6°C (van der Logt et al, 2004).

Immigrants from third world countries where sanitation is poor, or where raw or undercooked beef is consumed, may carry the parasite when they settle in this country. Most over-the-counter anthelmintics, used to treat the more common threadworm, are not efficacious so eggs may continue to enter sewerage treatment plants (praziquantel is the drug of choice). Where secondary treatment and ponding of sewerage water is practiced, eggs sediment out and the waste water is relatively safe for use as irrigation for cattle pastures (Pearse, 1994). In cosmopolitan communities where untreated sewerage is discharged onto cattle pastures, there is a high risk that cattle will acquire cysticercosis.



Expected Outcomes

- Survey runs from July 1, 2007 to July 31, 2007 – 400,000 cattle
- Conduct risk assessment based on regional prevalence – expect WA, SA, NT, QLD to be free of disease or extremely low prevalence
- In NSW and VIC, expect reduced prevalence since last survey 30 years ago
- Use a risk assessment model, similar to van der Logt, Hathaway and Vose, to determine the number of human cases at risk if masseter muscles are no longer *routinely* incised (maintain heart muscle incision)
- Expect to be able to make a recommendation to Food Safety Australia and New Zealand (FSANZ) to modify meat inspection procedures
- This will reduce inspection costs on the cattle producers and processors

