



**Australian Government**

**Department of Agriculture, Fisheries and Forestry**

# Now you C. Bovis



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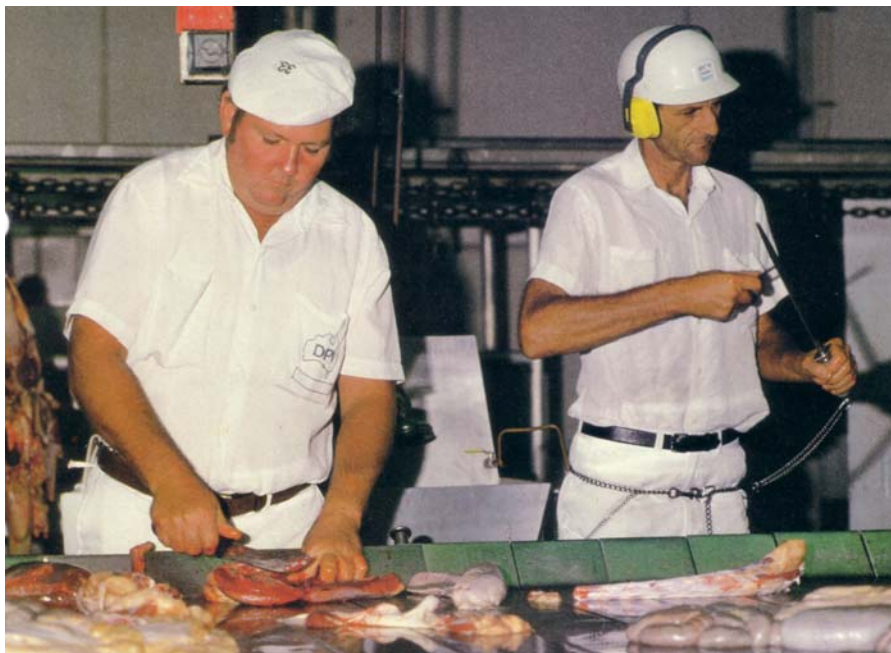
..... and now you don't



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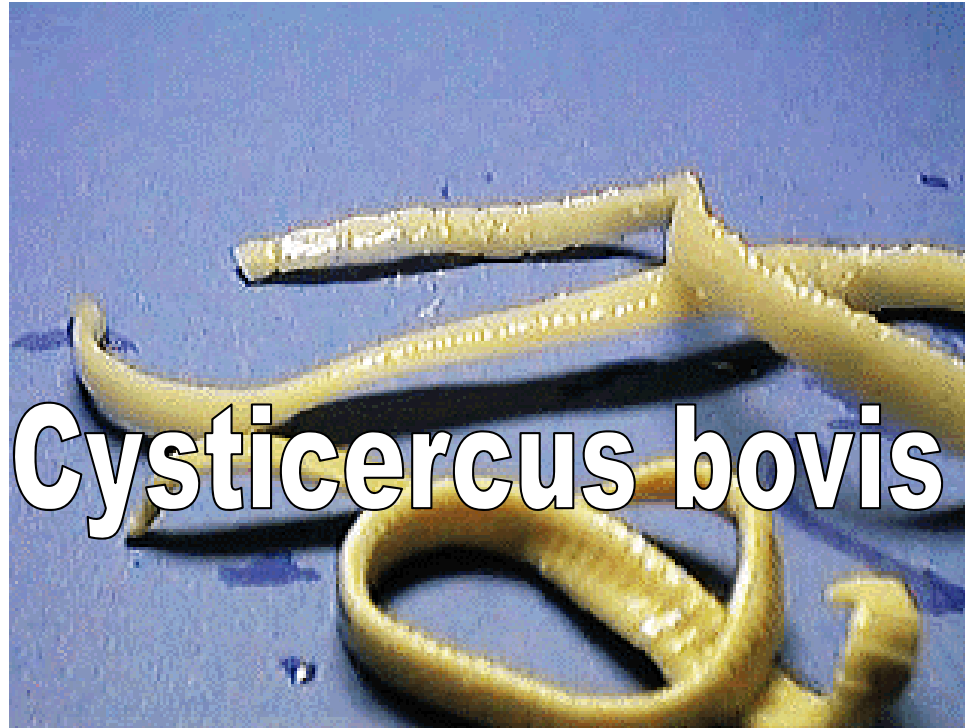


Australian standard for the hygienic production and transportation of meat and meat products for human consumption (AS 4696:2007):

Procedure for post-mortem inspection of cattle:

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



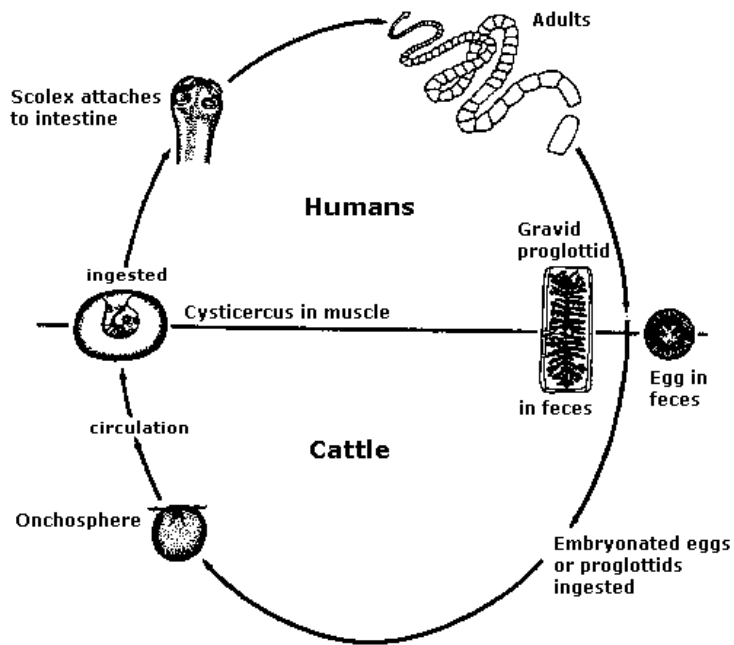


# Cysticercus bovis

*Courtesy: University of Pennsylvania, School of Veterinary Medicine.*



## A zoonotic parasite of cattle and man



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

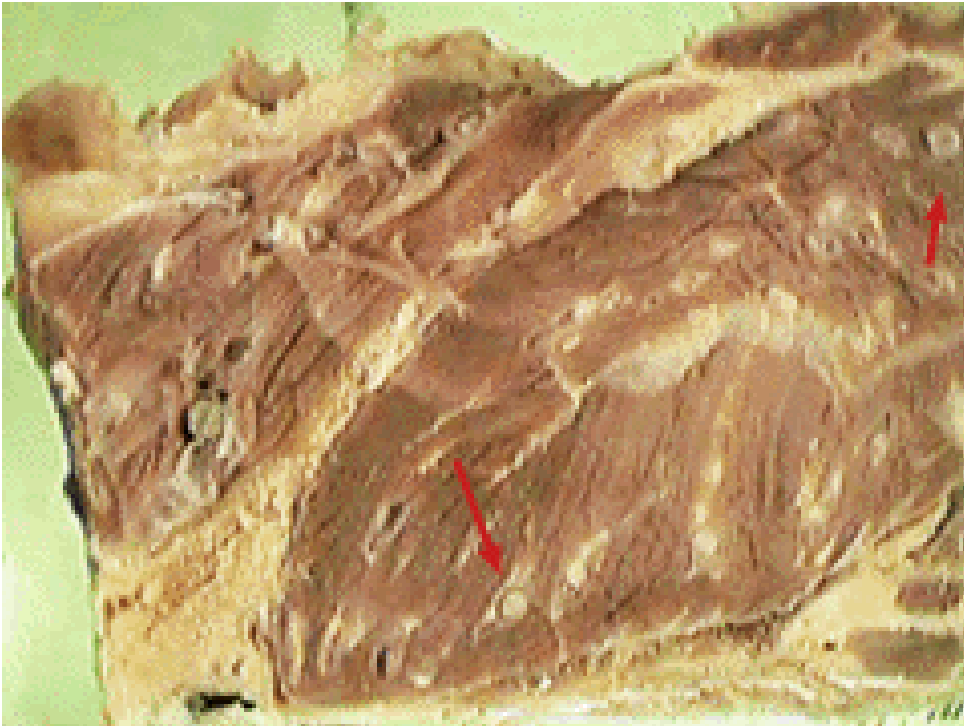


## Cysts of Larval Cestodes of Cattle

after King and Hutchinson, 2007

Cysts/Larval Stage	Intermediate hosts	Location	Size	Appearance	Tapeworm	Definitive Host
<b>Beef measles</b> ( <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.	<i>Taenia saginata</i> , 4-10 m, small intestine	Human
<b>Hydatid cyst</b> ( <i>Echinococcus granulosus</i> )	Sheep, cattle, goat, pig, wallaby, kangaroo, human, deer, camel, wombat	Liver, lung, kidneys, spleen, heart, brain, bone	4-5 mm at 3 months; 20 mm at 6 months	Viable cysts enclosed within laminated fibrous capsule and embedded in substance of affected organ. If fertile, contain many protoscolices (hydatid sand). Degenerated cysts contain caseous material that “shells out”.	<i>Echinococcus granulosus</i> , 4-6 mm (4-6 segments), small intestine.	Dog, dingo, fox



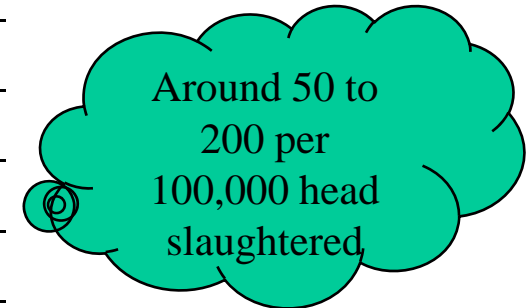


*Bovine muscle showing C. botulis (arrowed) Courtesy: University of Pennsylvania, School of Veterinary Medicine.*



## Abattoir prevalence of *Cysticercus bovis* in south-eastern Australia

Area	Year	Prevalence
Victoria/Tasmania	1966 <sup>1</sup>	0.0020
NSW	1970-72 <sup>2</sup>	0.0005-0.0006
Central-West NSW	1972-73 <sup>3</sup>	0.0017



1. Fewster GE. The incidence of *Cysticercus bovis* in cattle in Victoria and Tasmania. Aust vet J 1967;43:450
2. Rickard MD and Adolph AJ. The prevalence of cysticerci of *Taenia saginata* in cattle reared on sewage-irrigated pasture. Med J of Aust 1977;1:525
3. Downing RJ. Survey of the incidence of *C. bovis* in the central west of New South Wales. NSW Vet J 1974;10:33



# National *C. bovis* survey

## Description

- Determine the number of cases of *C. bovis* in Australian slaughter cattle using gross pathology, histo-path and PCR
- Identifying the location of parasitic cysts at post-mortem examination
- Using National Livestock Identification System (NLIS) to identify farm of origin of infected cattle
- Two surveys
  - July 2007 relying on OPV/MI diagnosis
  - Feb 2008 laboratory confirmation



# National abattoir survey July 2007

## *Cysticercus bovis*, (OPV/MI diagnosis)

	Qld	NSW	Vic	SA	WA	Tas	Grand Total
<b>Cattle Killed</b>	247782	142345	61420	22478	22550	14879	511454
<b>% Cattle killed</b>	49	28	12	4	4	3	
<b>Number C. bovis cases</b>	0	1	8	0	0	0	

Overall prevalence: 0.0000176 or 1.8 per 100,000 cattle slaughtered



# National abattoir survey Feb 2008

## *Cysticercus bovis*, (lab confirmation)

	Qld	NSW	Vic	SA	WA	Tas	Grand Total
<b>Cattle Killed</b>	206831	137331	85200	21501	26464	15989	493316
<b>% Cattle killed</b>	42	28	17	4	6	3	
<b>Number C. bovis cases</b>	0	0	0	0	0	0	

95% Confidence Interval: 0 – 0.000007



# Laboratory confirmation results

- 24 lesions submitted
- No *C. bovis*
- Hydatid, Actino, metastases
- 10 unknown – calcified lesions (no evidence of parasitic involvement)
- Further attempts to amplify larval cestode DNA from unknown group unsuccessful



## University of Queensland, School of Veterinary Science, Diagnostic Services

Date Requested: 30 Jun 2008

**HISTORY:** A female beef cow for slaughter noted to have a cardiac lesion.

**GROSS PATHOLOGY:** The specimen presented consists of 20mm X 20mm, square, brown tissue with a 2mm white tissue (fat) on one margin. Within the myocardium, subjacent to the endocardium is a discrete, 5mm, cream coloured nodule.

**HISTOLOGY:** Surrounding a thick, eosinophilic, folded membrane containing eosinophilic granular material with some basophilic spheroids are large numbers of macrophages, eosinophils and small numbers of multinucleate histiocytic giant cells. In some fields the mass is partially encapsulated by mature fibrocytes. Fibrous tissue and small numbers of inflammatory cells encapsulate the lesion and extend into the surrounding myocardium, separating myocardial fibres. The lesion extends to the margins of this section.

**DIAGNOSIS:** Myocarditis, granulomatous and eosinophilic, chronic-active, focal, severe, with an intralesional cestode stage (*Cysticercus*) and peripheral fibrosis, heart.

**COMMENT:** The histological appearance of this section is consistent with an inflammatory focus centred on a cestode larva, most likely *Cysticercus bovis*. The larval stage is degenerate and largely infiltrated by inflammatory cells.

Alison Gillespie BVSc. Pathology Intern.

Janet Patterson-Kane BVSc, PhD, DACVP , Supervising Pathologist



## Further work to be done

- Redo the risk assessment, based on the NZ model, (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)
- Publish results in refereed journal
- Present paper at ISVEE Durban, 2009
- Propose reform to current Australian meat inspection procedures based on regional freedom and low prevalence in affected regions



# Acknowledgments

- Dr John Langbridge (AQIS) for managerial support and research champion
- Dr Rebecca Traub and Dr Andrew Davis, University of Queensland Veterinary School for PCR and histology of pathology samples submitted as part of the *C. bovis* survey
- Paul Vanderlinde (AQIS) for assistance with the *C. bovis* survey data entry software and statistical support

