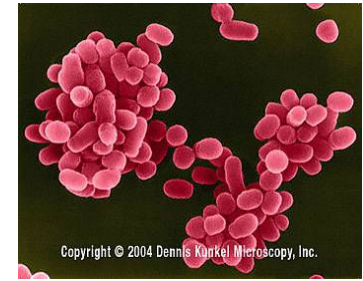
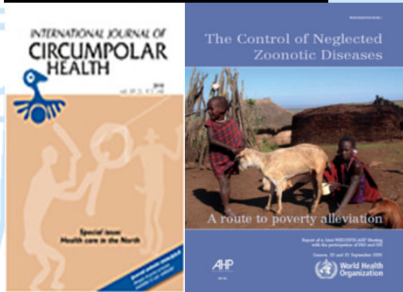




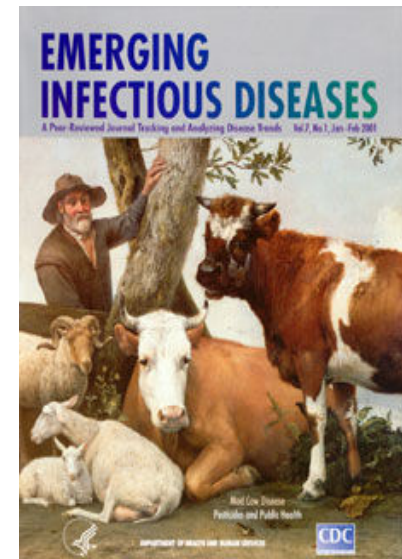
Need to monitor brucellosis globally



from the Arctic to the Antarctic



Jacques Godfroid
DVM, MSc, PhD



CARMA
December 4th 2012
Vancouver, Canada



VAR

1990-2004



2004-2007

University of Pretoria



©1997 MAGELLAN GeographixSM
(805) 685-3100 www.maps.com



Norges veterinærhøgskole

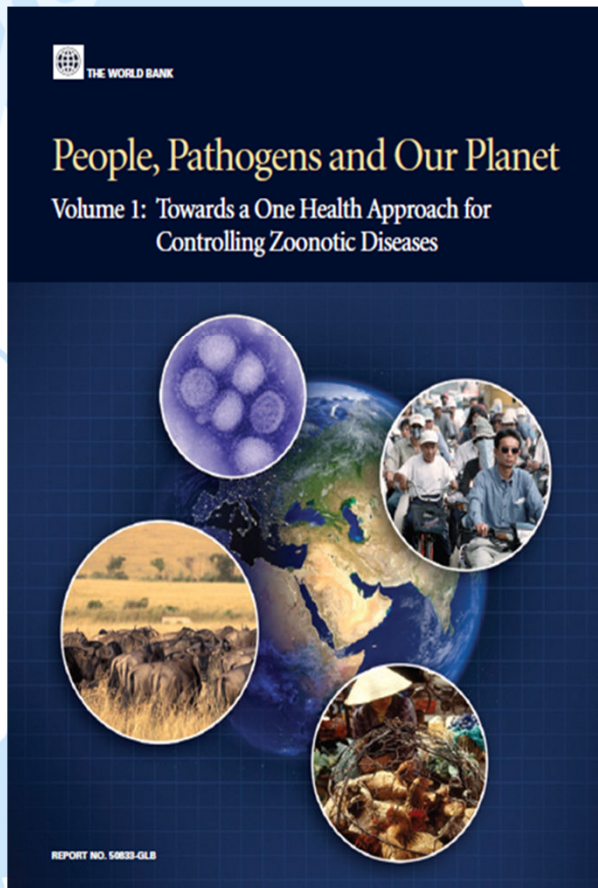
Norwegian School of Veterinary Science

Since January 2008

Seksjon for arktisk veterinærmedisin

Section of Arctic Veterinary Medicine

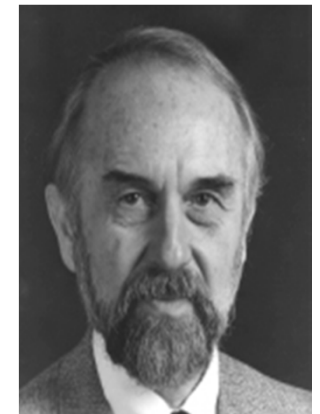
« One Health »



<http://www.onehealthglobal.net/>

Calvin W Schwabe: veterinary epidemiologist (1927-2006)

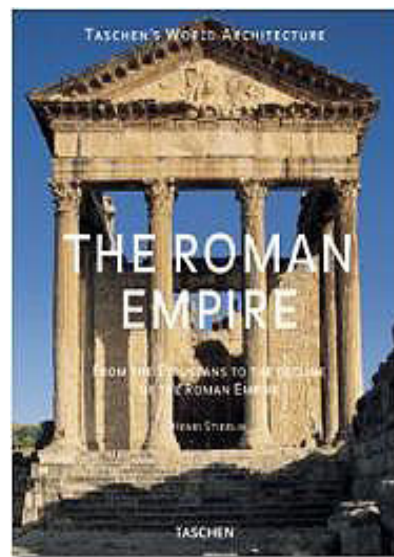
“Veterinary Medicine and Human Health” (1984)



« Brucellosis is the most common bacterial zoonosis, with over 500 000 new cases globally every year »

**Pappas G, Papdimitriou P, Akritidis N, Christou L, Tsianos EV.
The new global map of human brucellosis.
Lancet Infect Dis 2006;6:91-99.**

Transmission at the wildlife - livestock - human interface



Roman GOAT CHEESE

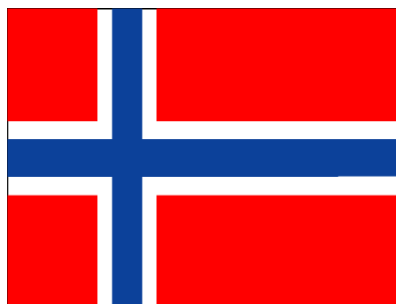
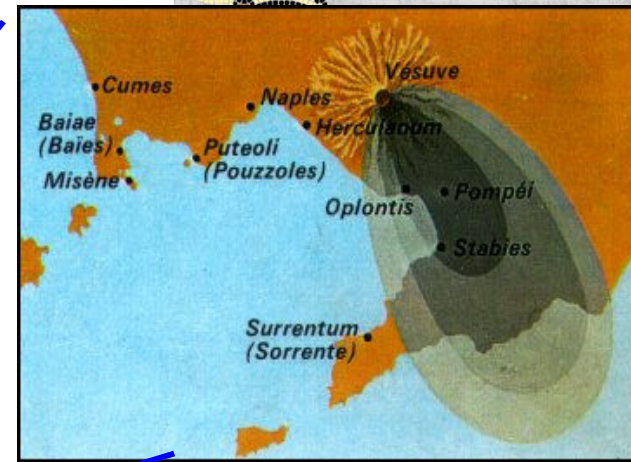


Figure 2. A Roman sculpture showing the milking of a goat (data).



What happened in Pompeii and Herculaneum

August 24, 79 after Christ ?

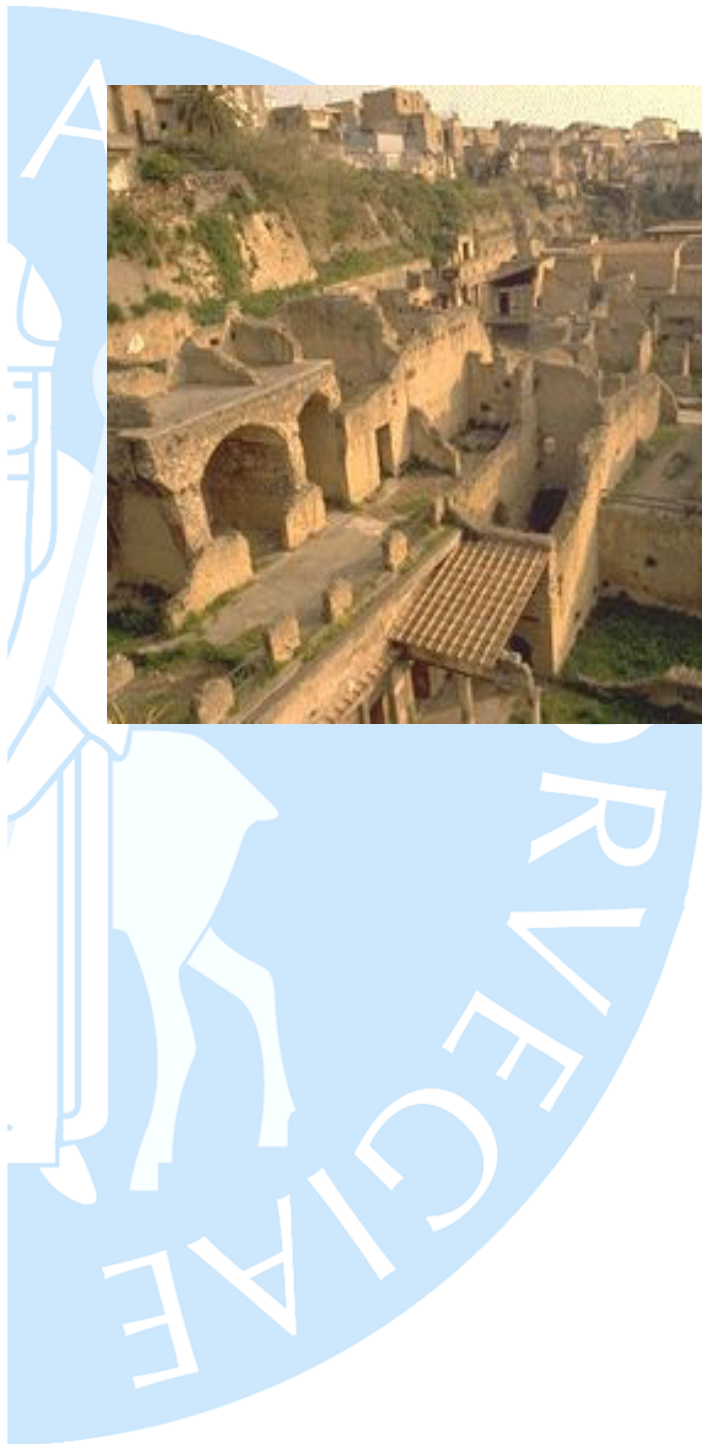
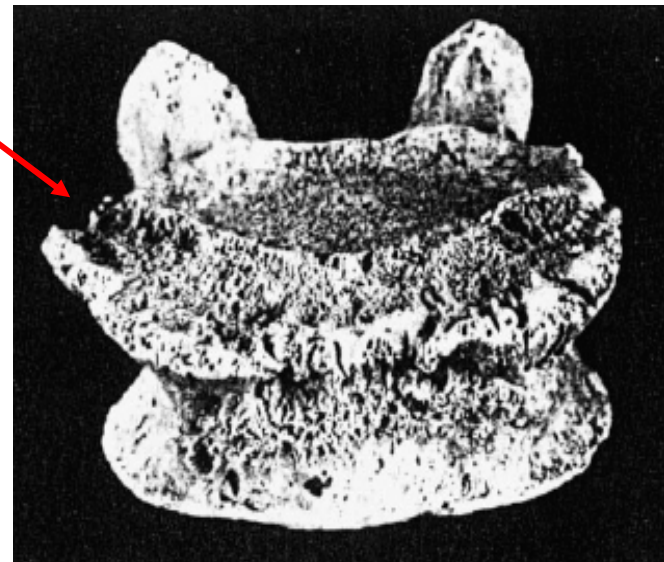
WORK

deer health









Bacteria in Two-millennia-old Cheese, and Related Epizoonoses in Roman Populations

L. Capasso

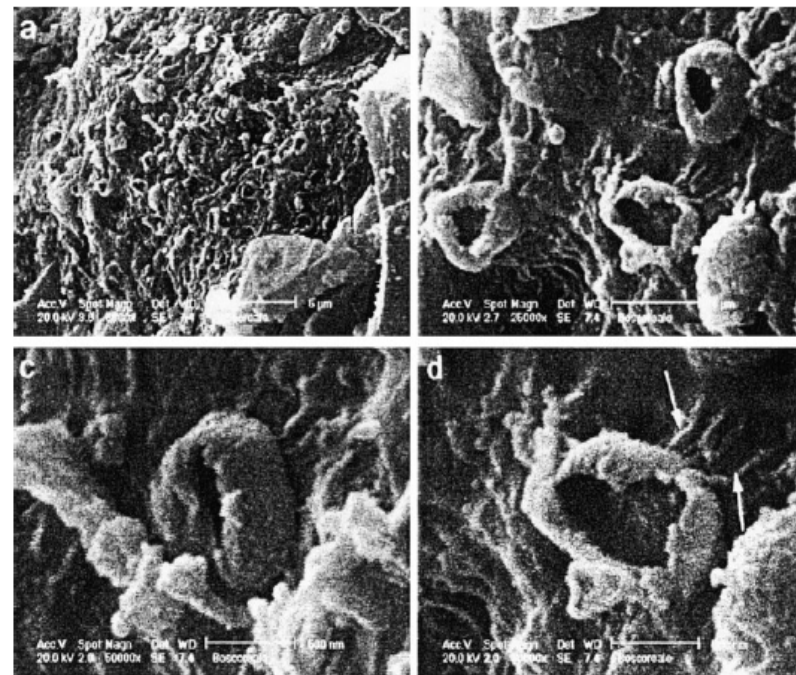
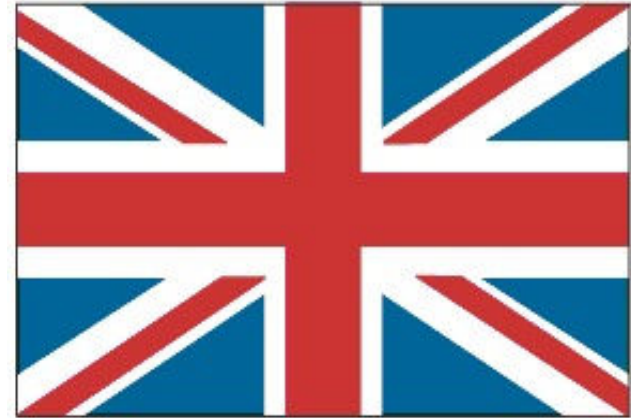
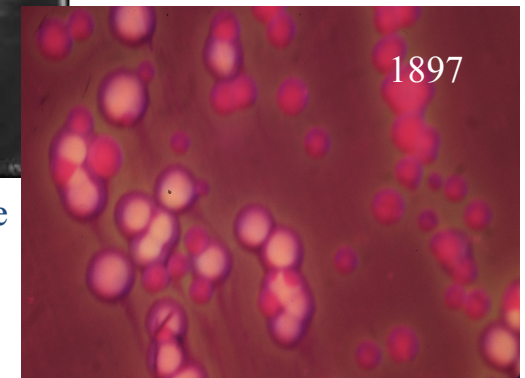
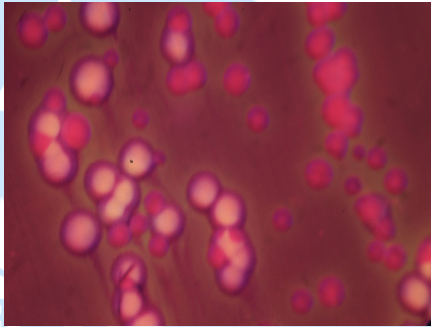


Figure 5. Cocci-like bacterial particles in a high-density colony (a: 5000 \times) in the Herculaneum carbonized cheese (79 AD); The monomorphic and monodimensional cocci (around 0.8 μ) show large holes with invaginated borders (b: 25,000 \times). In some case we can estimate the thickness of bacterial-wall (about 10 nm) (c: 50 000 \times), and we can demonstrate the presence of proteinic bridges between the bacterial walls and the cheese mixture (arrows in d: 50,000 \times). These remain of bacterial walls are morphologically comparable with *Streptococci* or *Brucellae*.



Sir David Bruce



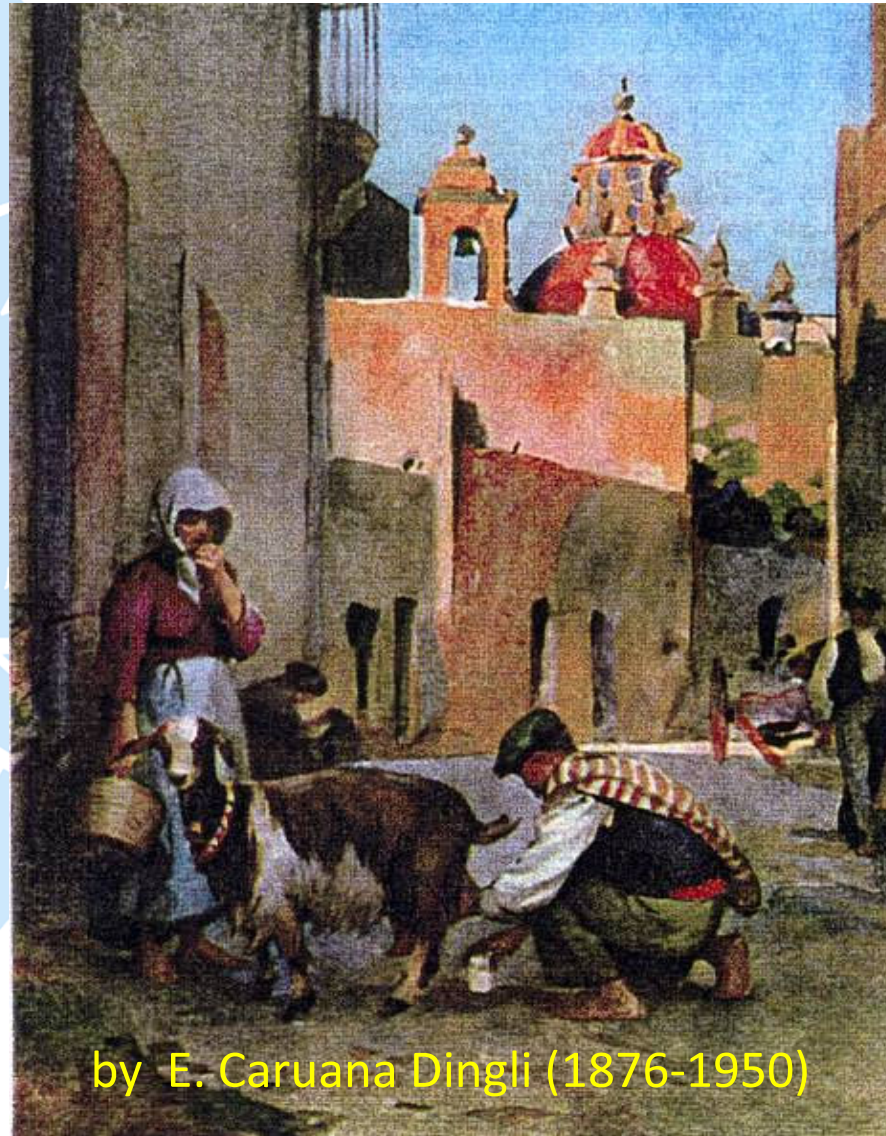


Brucellosis

The Maltese goat



Transmission
route



by E. Caruana Dingli (1876-1950)



Sir Temi Zammit

Classification of the genus *Brucella*



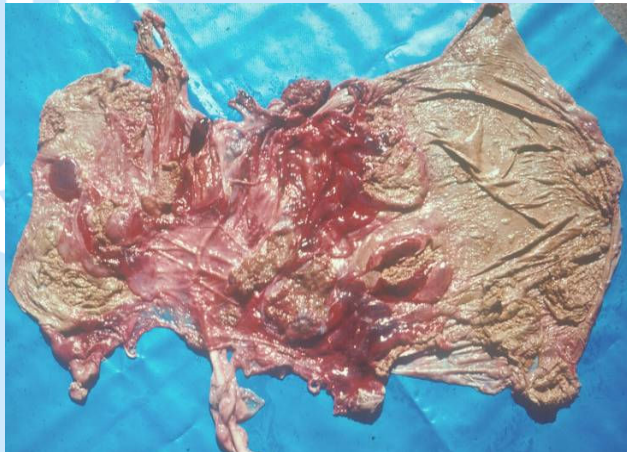
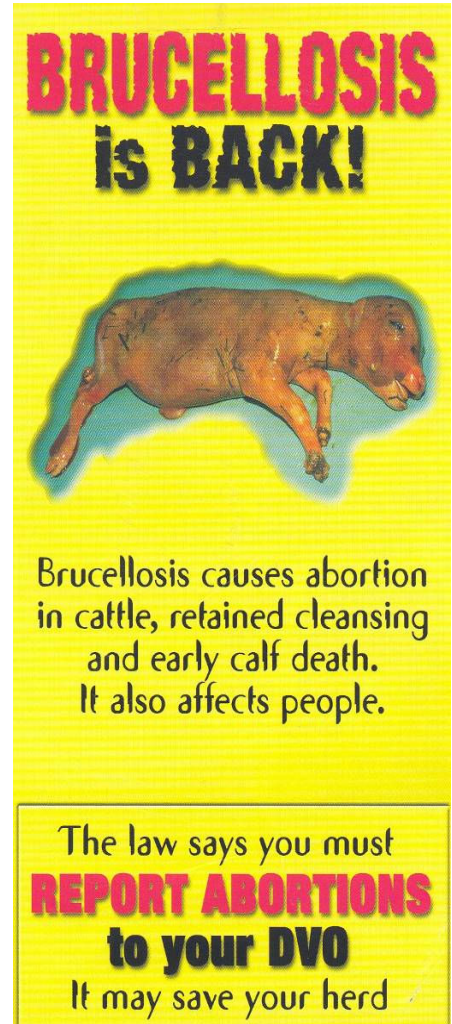
Species	Biovar(s)	Morphology colonies	Host(s)	Pathogenicity humans
<i>B. melitensis</i>	1-3	smooth	sheep, goat	high
<i>B. abortus</i>	1-6, 9	smooth	cattle	average/high
<i>B. suis</i>	1 and 3	smooth	pig	high
	2	smooth	pig, hare	not
	4	smooth	reindeer, caribou	average/high
	5	smooth	rodents	high
<i>B. neotomae</i>	-	smooth	desert rat	not
<i>B. ovis</i>	-	rough	ram	not
<i>B. canis</i>	-	rough	dog	low

<i>B. ceti</i>	smooth	cetaceans	average/?
<i>B. pinnipedialis</i>	smooth	pinnipeds	average/?/not
<i>B. microti</i>	smooth	soil, vole, fox	?
<i>B. inopinata</i>	smooth	human	?

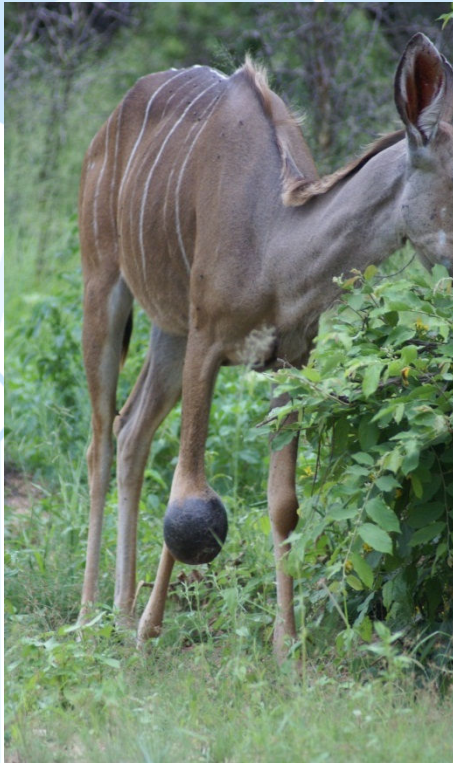
Symptoms in acute brucellosis - cattle



P. Nicoletti



Symptoms in chronic brucellosis – wildlife (1)



Brucella abortus



Pictures: courtesy of Dr. Roy Bengis, Chief State Veterinarian, Skukuza, Mpumalanga, South Africa

Symptoms in chronic brucellosis – wildlife (2)

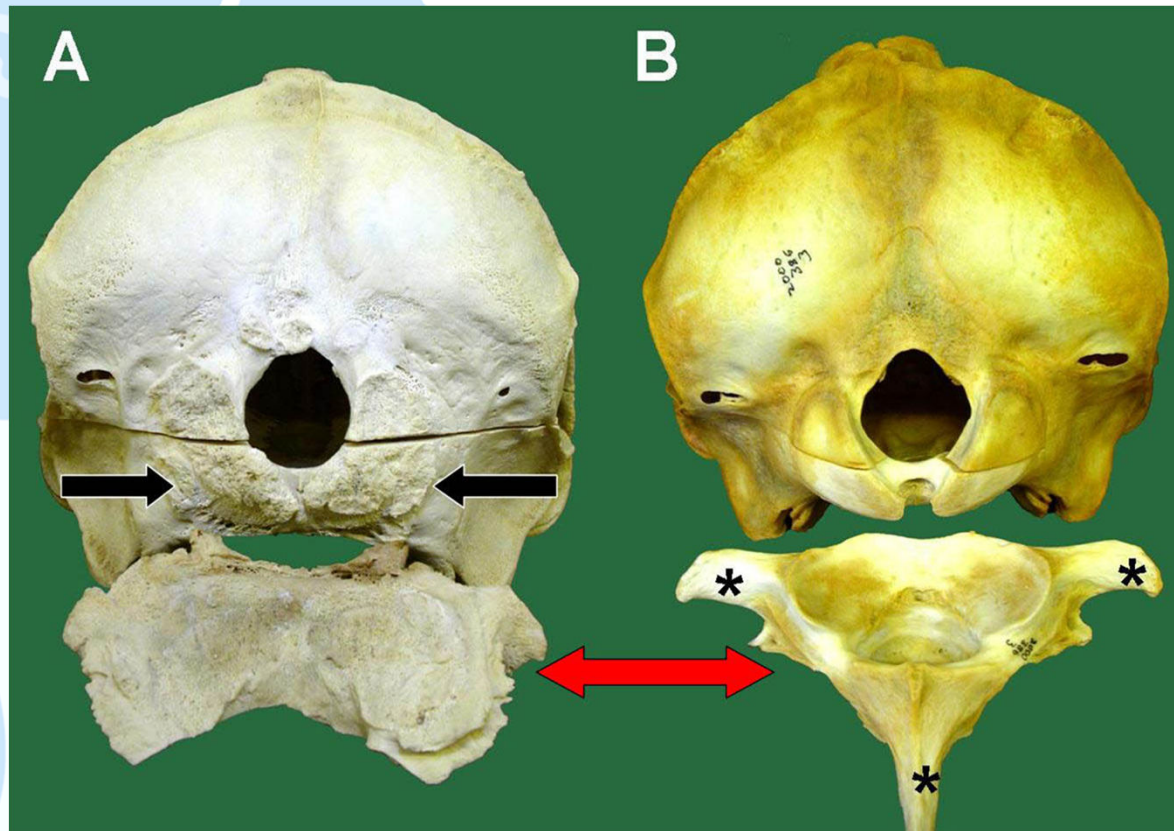


Pictures: courtesy of Dr. Malcolm McFarlane, Chief State Veterinarian, Graaff Reinet, Eastern Cape, South Africa

Brucella melitensis



Symptoms in chronic brucellosis – wildlife (3)



Brucella ceti

Dagleish MP, Barley J, Howie FE, Reid RJ, Herman J, Foster G. Isolation of *Brucella* species from a diseased atlanto-occipital joint of an Atlantic white-sided dolphin (*Lagenorhynchus acutus*). Vet Rec. 2007 Jun 23;160(25):876-8.

Symptoms in chronic brucellosis – wildlife (4)



Brucella suis...
biovar 4



Copyright Department of Veterinary Pathology,
Western College of Veterinary Medicine



I HAVE WINGS, BUT I CAN'T FLY.
SANTA'S REINDEER DO NOT HAVE WINGS,
BUT THEY CAN FLY. CAN YOU EXPLAIN
THIS TO ME????



© 1999 Randy Glasbergen. www.glasbergen.com



Brucellose enzootique (*Brucella suis* biotype 2) chez le sanglier (*Sus scrofa*) en Belgique. Ann. Med. Vet., 138: 263-268. Godfroid J., Michel P., Uytterhaegen L., De Smet K., Rasseneur F., Boelaert F., Saegerman C., Patigny X., 1994.

Biovars 1 & 3

Biovar 2



Brucella suis

!



Biovar 4

A screening ELISA for brucellosis in reindeer.
Zentralbl Veterinarmed B. 1999 Nov;46(9):649-57.

Asbakk K, Gall D, Stuen S.

Norwegian School of Veterinary Science, Department of Arctic Veterinary Medicine, Tromsø, Norway.

Abstract

An enzyme-linked immunosorbent assay (ELISA) for the screening of brucellosis in reindeer was developed. The assay, which utilizes s-LPS from *Brucella abortus* as antigen and biotin-labelled rabbit antibody to reindeer immunoglobulin as detecting antibody, has a high specificity and sensitivity, as indicated in a validation with sera from reindeer cultured positive for *Brucella suis* biovar 4 and sera from **reindeer free of brucellosis.**



Brucellosis – Reindeer – Alaska / Canada

GEOGRAPHIC PATTERN OF SERUM ANTIBODY PREVALENCE FOR *BRUCELLA* SPP. IN CARIBOU, GRIZZLY BEARS, AND WOLVES FROM ALASKA, 1975–1998

Randall L. Zarnke,^{1,3} Jay M. Ver Hoef,^{1,2} and Robert A. DeLong¹

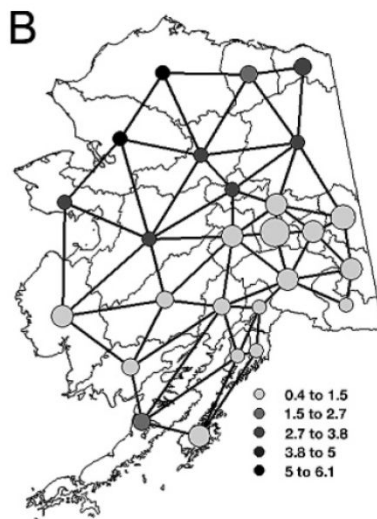
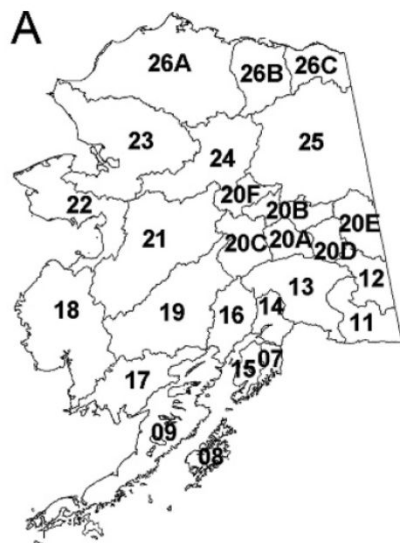
¹ Alaska Department of Fish and Game, 1300 College Road, Fairbanks, Alaska 99701-1599, USA

² Current address: NOAA National Marine Mammal Lab, 7600 Sand Point Way NE, Bldg 4, Seattle, Washington 98115-6349, USA

³ Corresponding author (email: ltrap2@acsalaska.net)

ABSTRACT: Blood samples were collected from 2,635 caribou (*Rangifer tarandus*), 1,238 grizzly bears (*Ursus arctos*), and 930 wolves (*Canis lupus*) from throughout mainland Alaska during 1975–98. Sera were tested for evidence of exposure to *Brucella* spp. Serum antibody prevalences were highest in the northwestern region of the state. In any specific area, antibody prevalences for caribou and wolves were of a similar magnitude, whereas antibody prevalence for bears in these same areas were two to three times higher.

Key words: Alaska, *Brucella* spp., caribou, grizzly bear, wolf.



RANGIFERINE BRUCELLOSIS ON BAFFIN ISLAND

Michael A. D. Ferguson

Department of Resources, Wildlife and Economic Development, Government of the Northwest Territories, Pond Inlet, Northwest Territories X0A 0S0, Canada

Southampton island

FILTER-PAPER BLOOD SAMPLES FOR ELISA DETECTION OF *BRUCELLA* ANTIBODIES IN CARIBOU

Patricia S. Curry,^{1,6} Brett T. Elkin,² Mitch Campbell,³ Klaus Nielsen,⁴ Wendy Hutchins,⁵ Carl Ribble,¹ and Susan J. Kutz¹



<http://www.anthc.org/chs/ces/climate/upload/CCH-Bulletin-No-5-Brucellosis-Understanding-an-Important-Arctic-Infectious-Disease-2.pdf>



Brucellosis: Understanding an Important Arctic Infectious Disease



This bulletin and sea mair history of bi implications

Brucellosis: Answers to Frequently Asked Questions Center for Climate and Health

Michael Brubaker MS, James Berner MD, Jay Butler MD, Michael Bradley DVM
CCH Bulletin No. 6, November 30, 2010



This bulletin describes brucellosis, an infectious disease caused by bacteria found in some land and sea mammals, including species that are important food resources. As climate change is providing new opportunities for the spread of infectious disease, ANTHC developed this bulletin

Where does it occur?

Brucellosis is most commonly associated with the four Arctic caribou herds: the Western Arctic, the Teshekpuk, the Central Arctic, and the Porcupine. These herds occupy parts of Norton Sound, the Northwest Arctic Borough, the North Slope Borough, the Interior, and across the border into Canada's Northwest Territory. Brucellosis is also reported in other caribou and reindeer herds in Alaska.

Brucellosis – Reindeer – Russian Federation

- Clinical problems of the brucellosis of reindeer in man

Belov GF, Gudoshnik AN, Zakharov VV, Chernukha AD, Gorbacheva NP. Klin Med (Mosk). 1980 Feb;58(2):38-40.

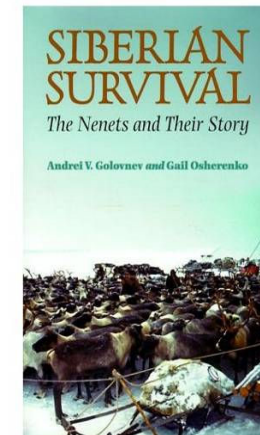
- Brucellosis in Siberia and the Far East

Kalinovskii AI, Repina LP, Innokent'eva TI. Med Parazitol (Mosk). 1995 Oct-Dec;(4):42-5.

- To plan antibrucellosis efforts, it is necessary to take into account the incidence of human infection, as well as the insidious circulation of the bacillus in the stock farms.



« The reindeer are vaccinated against diseases, especially against brucellosis»





Yamal-Nenets Autonomous Area ■



« The basis of the Nenets way of life is reindeer herding. Reindeer mean EVERYTHING to Nenets -- food, clothing, transportation. We are nomads, and the reindeer are so important to our way of life that they are almost like part of our families! Groups of reindeer numbering up to several hundred are owned by each extended family group. »



pooka.nunanet.com/~oxana/page2.html



Research on climate change and infectious diseases (zoonoses included) in the Arctic

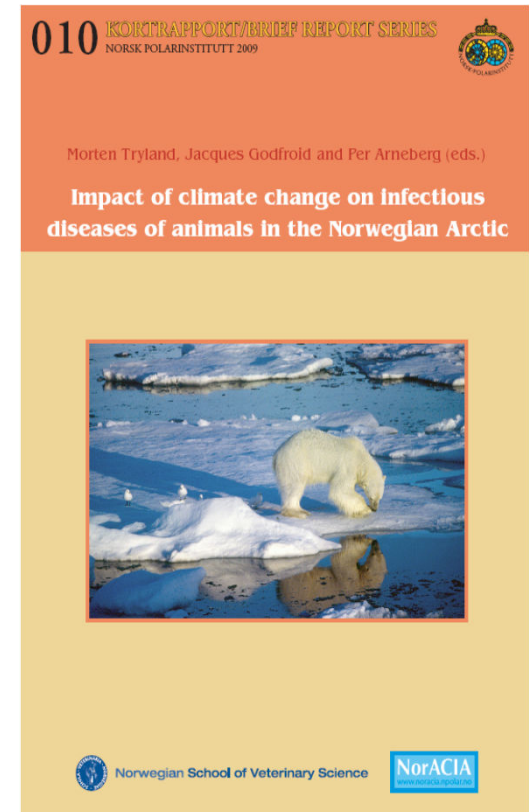
Where do we stand?

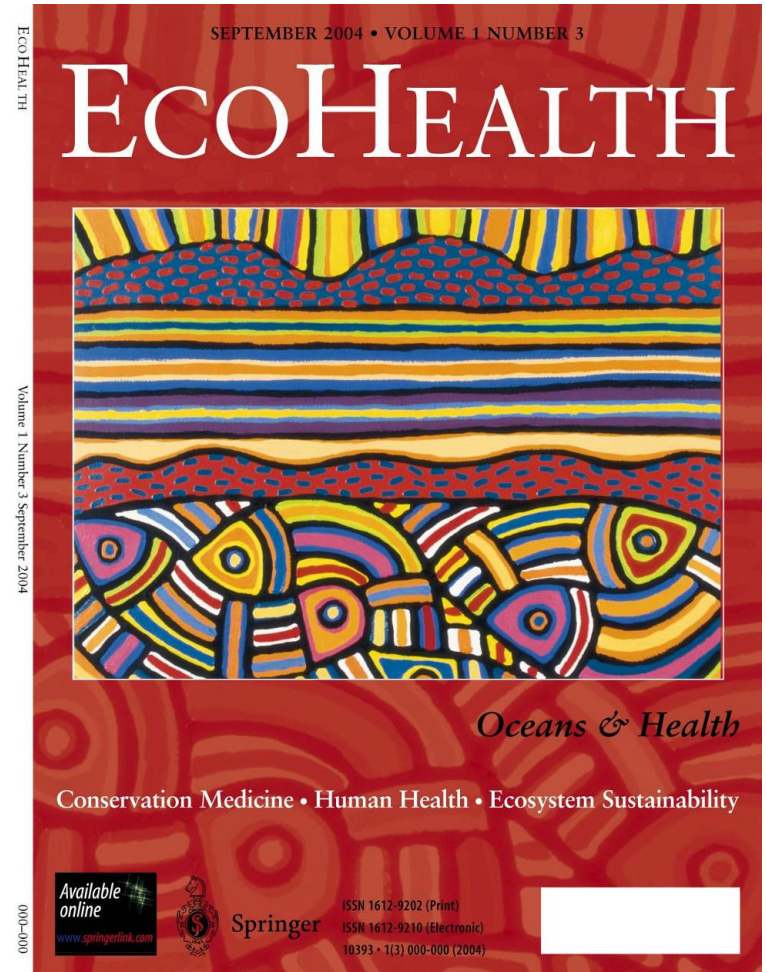
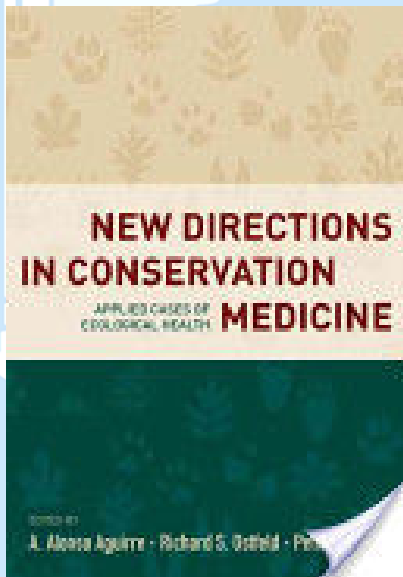


Public health research is needed to determine the baseline prevalence of potential climate-sensitive infectious diseases in both human and animal hosts in regions where emergence may be expected

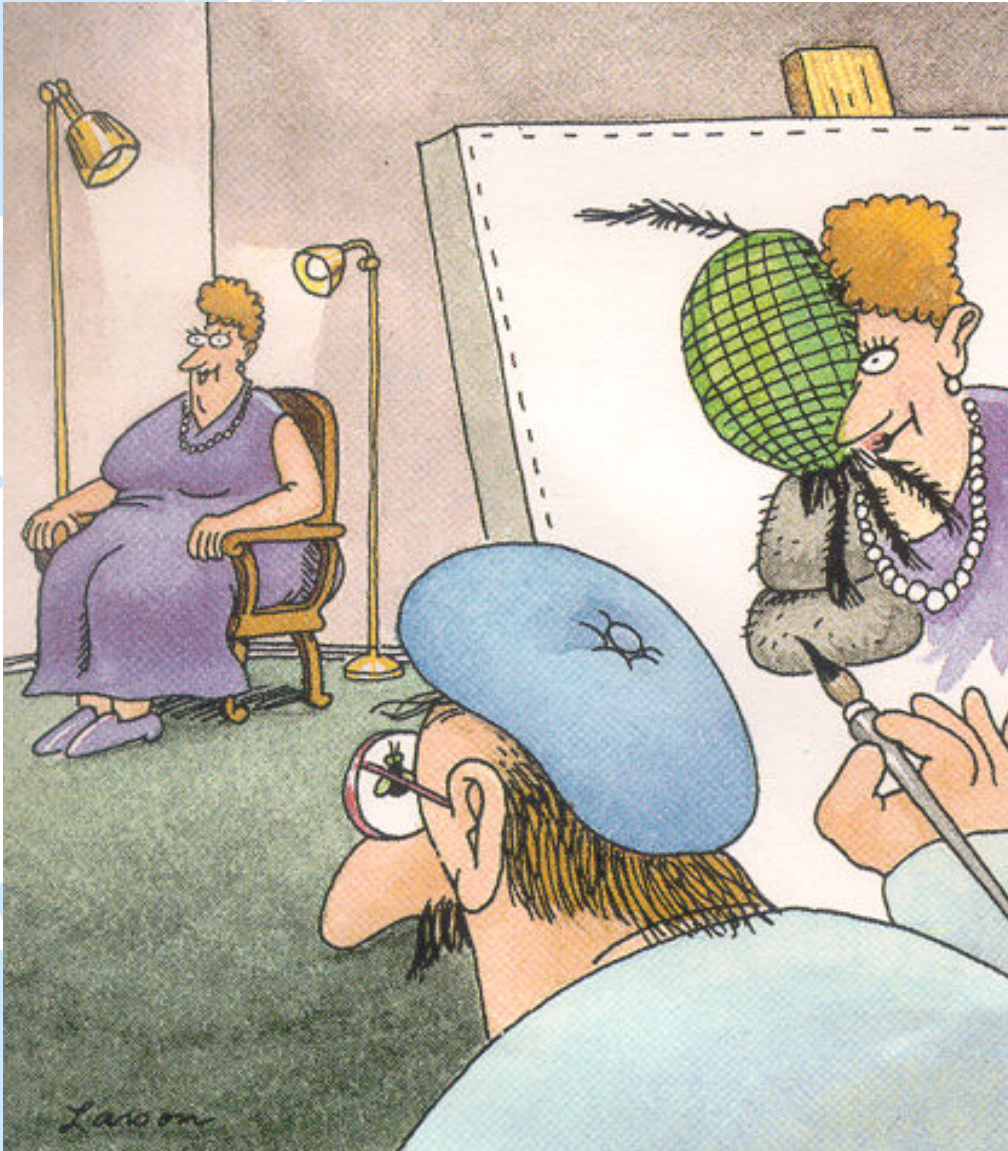


<http://noracia.npolar.no/noracia-prosjekter-2/rapport-veths-2007-workshop>





What is your diagnosis ?



Thank you for your attention

Merci pour votre attention

Jacques.godfroid@nvh.no

