

Brucellosis in humans and livestock in Uganda: Challenges and opportunities

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Uganda



- Small landlocked country; 241,000 sq km
- 1100 m above sea level
- Population 36 million
- Equatorial climate 24-30°C temperatures
- GDP > 50% on agriculture
- Capital City - Kampala

Brucellosis in livestock in Uganda

- Brucellosis is a zoonotic disease affecting people, livestock and wildlife
- Disease & economic losses
- High prevalence in cattle
 - Herd level up to 79%
 - Individual cow prevalence 5 to 46%
- Buffaloes in national parks sero-prevalence 1.82–26.67%
- High prevalence in goats
- Abortion storms in cattle, goats and pigs



Brucellosis prevalence in cattle

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Seroprevalence and potential risk of bovine brucellosis in zerograzing and pastoral dairy systems in Uganda

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Abstract A cross-sectional study was conducted in Uganda between November 2006 and February 2007 to assess the seroprevalence and risk of brucellosis in zerograzing and pastoral dairy systems; two major sources of milk in Uganda, 80% of which is sold unpasteurized to consumers through informal channels. A total of 723 cattle comprised of 497 animals from the pastoral system and 226 animals from the zerograzing system were tested for antibodies against natural *B. abortus* infection using the competitive enzyme-linked immunosorbent assay (C-ELISA). Herd-level seroprevalence was 100% in the pastoral system and 5.5% (95% CI: 1.8, 9.2) in the zerograzing system. The animal-level seroprevalence and within-herd range of brucellosis in cattle in the pastoral system were 34.0% (95% CI: 29.9, 38.1) and 8.1–75.9%, while for those in the zerograzing system were 3.3% (95% CI: 0.9, 5.7) and 0–9.0%. Abortion rates of 23% and 0% among seropositive cows vis-à-vis 5.4% and 1.9% among seronegative cows were recorded in the pastoral and zerograzing systems, respectively. The risk of natural *B. abortus* infection was higher among older cattle

(>24 m) (Odds ratio [OR]=1.83, 95% CI: 1.25–2.67) and dry cows (OR=2.01, 95% CI: 1.23–3.31) in the pastoral system, and in calves aged 0–6 m (OR=5.72, 95% CI: 1.04–31.41) in the zerograzing system. Implementing a culling program in the zerograzing system to eliminate the existing low risk of brucellosis and targeting calves in the pastoral systems for vaccination could avert the cost-related limitation of brucellosis control in Uganda.

Keywords Dairy cattle · Brucellosis risk · Zerograzing system · Pastoral system · Uganda

Introduction

Bovine brucellosis is a zoonotic disease caused by *Brucella abortus*, characterized by abortion, metritis, orchitis and epididymitis (Henry 1989) leading to impaired fertility in cattle. Brucellosis is of paramount public health importance in Uganda (Kabagambe et al. 2001; Faye et al. 2005; Kyebambe 2005; Epiphanyes 2007; Galiwango et al. 2007; Magona et al. 2007; Walubengo et al. 2007).



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Tuberculosis and brucellosis prevalence survey on dairy cattle in Mbarara milk basin (Uganda)

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Abstract

We determined the prevalence of tuberculosis and brucellosis reactors in the dairy herds in the Mbarara district of Uganda in 2002. This is one of the most important dairy-production areas of the country and includes both pastoral and agro-pastoral zones. A total of 340 (of 11,995) randomly selected herds were tested for tuberculosis, using the intradermal tuberculosis-skin test and 315 (of 10,562) herds tested for brucellosis using the serum Rose Bengal test.

The herd prevalence for tuberculosis reactors was 74.1% (95% confidence intervals 69, 78), the individual-animal prevalence was of 6.0% (5.6, 6.5) and within-herd range was 1–50% (up to 100% if suspicious reactors were included).

The herd prevalence for brucellosis was 55.6% (50, 61.2) individual-animal prevalence 15.8% (14.8, 16.7) and within-herd range 1–90%.

The reactor prevalence increased with the age of the animals for both tuberculosis and brucellosis. Tuberculosis reactor prevalences were higher in animals from the agro-pastoral zone. However, the individual-animal and herd prevalences of brucellosis seroprevalences were higher in the pastoral zone.

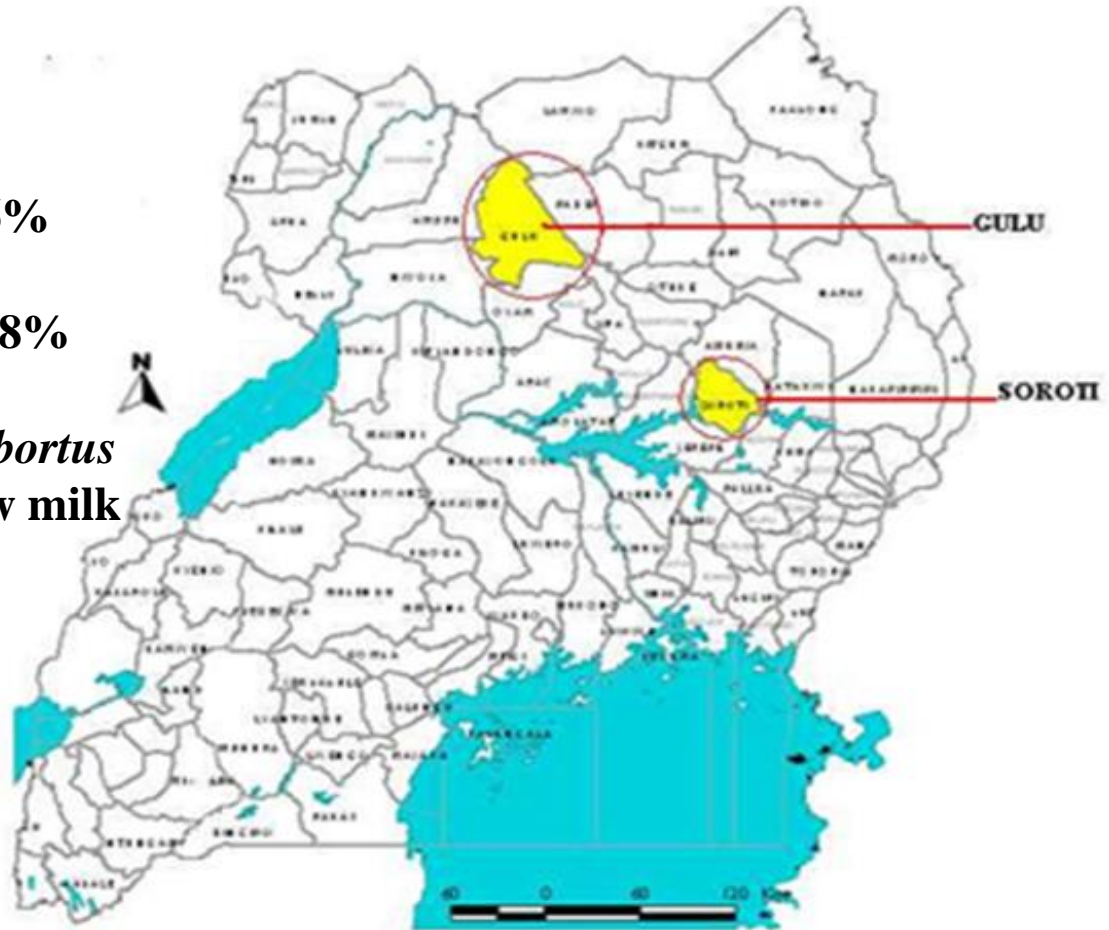
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Keywords: Dairy cattle; Tuberculosis; Brucellosis; Prevalence survey; Uganda

Urban and peri-urban cattle

iELISA

- Gulu town = 6%
- Soroti town = 8%
- *11 strains B. abortus*
Isolated from cow milk



Most knowledge about brucellosis

- Serological evidence
- Also through daily media



- **Uganda: Cattle Disease Hits Kibaale**
- **BY ISMAEL KASOOHA, 15 OCTOBER 2008**
 - Three people have contracted a highly contagious disease in Kagadi town, Kibaale district, after getting into contact with infected cattle
 - The district veterinary officer, Dr. Moses Amany, confirmed that the people had been infected with brucellosis

Other livestock affected

- E.g. goats



- Bacterial disease attacks Kyenjojo goats
Publish Date: Nov 02, 2008 (Brucellosis has attacked goats that the Government gave to farmers in Nyatungo sub-county in Kyenjojo district)

Brucellosis challenge in humans in Uganda

- Several reports of human brucellosis with complications (Galukande et al.,2005; Kyebambe 2005, 2012).
- A brucellosis seroprevalence of 12% and 7% in abattoir workers in Kampala and Mabarara district (Nabukenya et al. 2013)
- Mulago Hospital: 652 cases of brucellosis diagnosed between June 2004 and May 2006 (Makita et al. 2008)
- Frequent human cases could be a clear indication of disease burden in livestock

Sources of human infection

- Demand for animal products high
- Infection probably from animals and their products
- Occupational



Our research in Gulu

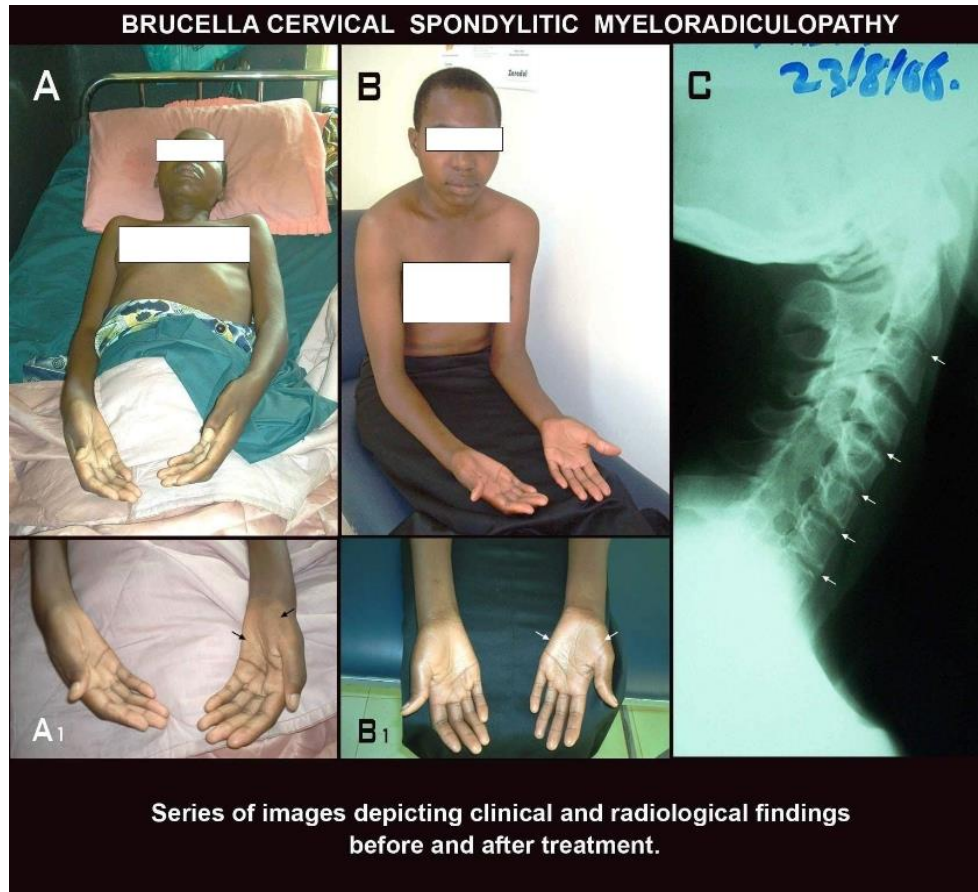
Poorly processed milk



Our research with SLU

Chronic brucellosis in a teenage Ugandan

- 18-year-old patient with 12-year history recurrent multiple joint and muscle pains, fevers and sweats
- Wasted pale teenager
- Marked weakness of upper limbs and inability to use her hands
- Difficulty in adducting and abducting fingers
- Reduced reflexes and muscle power



Brucellosis misdiagnosis

- Disease cases often masked by malaria
- Medical doctors don't have it as a forefront of health problems in Uganda

Medication in humans...

- Main source of treatment is herbal - from “traditional healers”
- The latter aggressively advertise treatment through local FM radio stations thus most people seek herbal remedies
- Herbal remedies may not be very effective and could also be responsible for late seeking of medical attention

Swine brucellosis study in Uganda

- In 2012, ILRI initiated a major engagement in Uganda to generate solutions and evidence for the development at scale of pro-poor smallholder pig value chains
- To identify challenges and options to allow pig farmers to improve their productivity and livelihoods, while increasing the supply of critical nutrients to their communities and urban centres.
- One area for immediate attention is infectious pig diseases
- Through ILRI, I got a small [DAAD/ILRI](#) postdoctoral Fellowship on swine brucellosis (Dec 2012 to May 2013)

Brucellosis effect on swine production

- Abortions
- Birth of weak piglets
- Infertility
- Arthritis
- Lameness
- Partial or total paralysis of hind quarters
- Orchitis



Approach



- Take residence in district
- Meeting district office discuss approach and prepare for activities

Sometimes meeting in village with farmers



The team



Smallholder pig farms



Smallholder pig farms



Sampling

- Questionnaires administered at each household
- Blood taken



Biosecurity measures on leaving farm



Lab team



Results

PCR on isolates from mesenteric lymph nodes from pigs in abattoir

District	Number of mesenteric lymph nodes*	No. of <i>Brucella</i> suspect isolates	PCR
Masaka	68	7	0
Mukono	2	0	0
Kamuli	30	8	0
Total	100	15	0

*Few pigs from Mukono were slaughtered during study period

Abattoir sero-prevalence of swine brucellosis

District	Number of sera	No. indirect ELISA positive
Masaka	332	0
Mukono	2	0
Kamuli	138	0
Total	472	0

Farm sero-prevalence of swine brucellosis

District	Village	Number samples*	No. brucellosis positive by iELISA	
			Makerere	FLI
Masaka	Kisoso	45(4)	1	0
	Ssenya	39(5)	0	0
	Lukindu	38(1)	0	0
	Kanoni-Bukunda	54(5)	0	0
	Senyange A	53(3)	0	0
	Kyamuyimbwa Kikalala	43(8)	0	0
	Butego	28(1)	0	0
	Kijjabwemi	45(2)	0	0
	Kyabakuza B	36(1)	0	0
Mukono	Kazo/Kalagala	60(9)	Nd	0
	Nsanja/Gonve	48(4)	Nd	0
	Bugoye/Kabira	48(0)	Nd	0
	Kyoga	54(2)	Nd	0
	Dundu	63(2)	Nd	0
	Kitete	58(3)	Nd	0
	Joggo	68(4)	Nd	0
Kamuli	Balubweneiwa	48(2)	Nd	0
	Bukyonza B	31(1)	Nd	0
	Butabala	41(1)	Nd	1
	Isingo A	70(0)	Nd	0
	Ntansi	114(9)	Nd	1
	Kantu zone	110(0)	Nd	0
Total	22	1193(67)	1	2

Brackets = no. of village boars

Ugandan swine sera brucellosis free

- Putative positive sera found negative for *Brucella* antibodies by CFT
- *Y. enterocolitica* antibodies detected in these sera by SAT
- 2 positive ELISA and 10 selected sera with high ODs in ELISA were negative for *Brucella* DNA by Real Time PCR

Conclusions

- Ugandan pigs appear free of *Brucella* infection
- Since samples were collected from individual households in the major pig producing districts, we can conclude that Ugandan pigs pose a low risk of brucellosis transmission to humans

Opportunities

- Brucellosis burden is high in humans and domestic ruminants
- But limited research and capacity
- Research urgently needed to understand:
 - the disease in domestic ruminant value chains
 - factors of its transmission and persistence in humans and animals
 - bacterial strains involved
 - disease burden in humans
 - reliable diagnostics
 - potency of herbals
- These are all opportunities for partnership

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Thank you

