

Risk factors associated with bovine tuberculosis in some selected herds in Nigeria

S. I. B. Cadmus · C. A. Agada · I. I. Onoja ·
I. Salisu

Accepted: 17 September 2009
© Springer Science + Business Media B.V. 2009

Keywords Bovine tuberculosis · PPD · SCITT ·
Risk factors · Public health · Zoonosis · Nigeria

Introduction

Bovine tuberculosis (BTB) primarily caused by *Mycobacterium bovis* is controlled in farm animals in most industrialised countries, as a result of which infection is minimised. However, studies have confirmed the endemicity of BTB in cattle herds in Nigeria with the isolation of *M. bovis* from cow's milk (Cadmus and Adesokan 2007 and Ofukwu et al. 2008) and lesions of farm and abattoir animals (Cadmus et al. 2004; Cadmus et al. 2007). Due to lack of control measures and tuberculin screening of

cattle in Nigeria, we evaluated the status of the disease in some selected herds with a view to knowing the risk factors associated with it.

Materials and methods

In all, 1,360 cattle from 33 resident and pastoral herds (Table 1) in three out of the six geopolitical zones in Nigeria (i.e. northwest, north-central and southwest) were selected based on the cooperation of the owners and screened using the single comparative intra-dermal tuberculin test (Ameni and Erhikun 2007). The prevalence rate and herd level prevalence were determined and data analysed using chi-square (χ^2) test and unadjusted odds ratio (OR). A *P* value of <0.05 was considered significant.

Results and discussion

Out of the 1,360 cattle screened, 5.74% (78 out of 1,360) were positive comprising 7.66% (69 out of 901) females and 1.96% (nine out of 459) males (Table 1) with a herd prevalence of 45.45% (15 out of 33). The overall prevalence of 5.74% was, however, lower than the 10.5% reported by Cadmus et al. (2004). Reason adduced for this is the large number of herds with small- and medium-size farms used in this study as against the single large sample size used in the earlier one.

S. I. B. Cadmus (✉)
Department of Veterinary Public Health and Preventive
Medicine, University of Ibadan,
P.O. Box 21452, U.I. Post Office,
Ibadan, Nigeria
e-mail: sibcadmus@yahoo.com

C. A. Agada
Department of Veterinary Public Health and Preventive
Medicine, University of Agriculture,
Makurdi, Nigeria

I. I. Onoja · I. Salisu
Department of Veterinary Surgery and Medicine,
Ahmadu Bello University,
Zaria, Nigeria

Table 1 Association between the different risk factors and result of comparative intra-dermal tuberculin test of individual cattle

Variable	Number Tested	Number Positive (%) ^a	OR (95% CI)	χ^2
Sex				
Male	459	9(1.96)		46.15($P<0.005$)
Female	901	69(7.68)	3.92 (3.57–7.87)	
Age ^a				
≤24 months	120	8(6.67)	1.81 (–1.78–7.87)	40.92($P<0.05$)
25–48 months	489	18(3.68)	1.00	
≥49 months	751	52(6.92)	1.88 (0.52–5.46)	
Breed ^a				
Cross	131	5(3.82)	1.00	97.00($P<0.05$)
Zebu	1,148	67(5.83)	1.52 (–1.71–5.56)	
Taurines	77	6(9.09)	2.38 (–1.95–12.49)	
Zones ^a				
Northwest	887	26(2.93)	1.00	3.77($P>0.05$)
North-central	199	33(16.63)	5.68 (8.4–19.0)	
Southwest	274	19(6.93)	2.37 (3.43–9.84)	
Herd size ^a				
1–15	11	2(18.18)	1.00	10.33($P<0.005$)
16–30	5	1(20.0)	1.10	
31–80	15	9(60.0)	3.30	
81–171	3	3(100)	5.50	
Animal tested ^a				
1–15	113	2(1.77)	1.88 (–2.24–3.88)	10.33($P<0.005$)
16–30	105	1(0.95)	1.00	
31–80	721	24(3.33)	3.51 (1.22–3.54)	
81–171	421	51(12.11)	12.74 (7.53–14.79)	

^a The risk for each category has been compared with the least reacting group within the category and the numbers in parenthesis are the prevalence rates

The 45.45% (15 out of 33) herd prevalence showed that BTB is widespread in Nigerian herds. The infection is prevalent in the zones studied with rates ranging between 2.93% and 16.63% (Table 1), suggesting the existence of foci of infections, probably attributable to poor management practices, persistent presence and shedding of mycobacteria in the environment. Again, the proportions of positive reactors varied; the north-central zone having cattle with higher risk of positive reactors (OR 5.68, 95% confidence interval (CI) 8.4–19.0), though statistically insignificant ($\chi^2=3.77$, $P>0.05$; Table 1).

The female cattle had a higher risk of testing positive (OR 3.92, 95% CI 3.57–7.87, $\chi^2=46.15$, $P<0.005$) than the male (Table 1), as equally observed by Cadmus et al. (2004). This has a major public health implication since *M. bovis* is transmissible through consumption of dairy products and considering its isolation from unpasteurised cow's

milk in Nigeria (Cadmus and Adesokan 2007; Ofukwu et al. 2008).

We observed that as the herd size increases, so was the risk of cattle within the herd being positive ($\chi^2=10.33$, $P<0.005$; Table 1). Hence, with increase in herd size, the risk of introducing an infected animal into clean herd becomes higher. In the same vein, older cattle were significantly affected by BTB than the younger ones ($\chi^2=40.92$, $P<0.05$), since they have greater likelihood of exposure to *M. bovis*.

In this study, the breeds kept by the farmers were Zebus, with a few taurines (N'dama) and a negligible number of exotic breeds. However, the taurines had a higher risk of positive reactors which was significant (OR 2.34, 95% CI –1.95–12.49, $\chi^2=97.00$, $P<0.05$; Table 1). Hence, confirming reports in Ethiopia by Ameni et al. (2007), *Bos taurus taurus* cattle are more susceptible to BTB than *Bos taurus indicus*.

This study should be interpreted within the context of its limitations. We were unable to cover the six geopolitical zones in the country and had restrictions on herds screened. This notwithstanding, we showed that bovine tuberculosis is endemic in Nigeria and that cows, large cattle herds, and the taurines have higher risk of infection with the disease.

References

- Ameni, G., Erhikun, A., 2007. Bovine tuberculosis in small-scale dairy farms in Adama Town, central Ethiopia, and farmers' awareness of the disease. *Scientific and Technical Review of Office of International Epizootics*, **24** (3), 711–719.
- Ameni, G., Aseffa, A., Engers, H., Young, D., Gordon, S., Hewinson, G., and Vordermeier, M., 2007. High prevalence and increased severity of pathology of bovine tuberculosis in Holsteins compared to Zebu breeds under field cattle husbandry in central Ethiopia. *Clinical and Vaccine Immunology*, **14**, (10) 1356–61.
- Cadmus, S.I.B., Adesokan, H.K., 2007. Phenotypic characterization and spoligotype profiles of *Mycobacterium bovis* isolated from unpasteurized cow milk in Ibadan, Nigeria. *Tropical Veterinarian*, **25**, 65–72.
- Cadmus, S.I.B., Alonge, O.O. and Adesokan, H.K., 2007. Meat inspection and culture of mycobacteria as predictors of bovine tuberculosis in Ibadan, Nigeria. *Tropical Veterinarian* **25** (3) 101–105.
- Cadmus, S.I.B., Atsanda, N.N., Akang, E.E.U., 2004. Bovine tuberculosis in one cattle herd in Ibadan in Nigeria. *Veterinary Medicine—Czech*, **49**, 406–412.
- Ofukwu R.A., Oboegbulem S.I. & Akwuobu C.A. 2008. Zoonotic Mycobacterium species in fresh cow milk and fresh skimmed, unpasteurised market milk (nono) in Makurdi, Nigeria: implications for public health. *J Animl Plant Sci*, **1**, 21–25.