

Field evaluation of Specific Mycobacterial Proteins-Based Skin Test for the Differentiation of Mycobacterium bovis-Infected and Bacillus Calmette Guerin-Vaccinated Crossbred Cattle in Ethiopia

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Abstract

Bovine tuberculosis (bTB) challenges intensive dairy production in Ethiopia and implementation of the test and slaughter control strategy is not economically acceptable in the country. Vaccination of cattle with Bacillus Calmette-Guerin (BCG) could be an important adjunct to control, which would require a diagnostic test to differentiate Mycobacterium bovis (M. bovis)-infected and BCG-vaccinated animals (DIVA role). This study describes evaluation of a DIVA skin test (DST) that is based on a cocktail (DSTc) or fusion (DSTf) of specific (ESAT-6, CFP-10 and Rv3615c) M. bovis proteins in Zebu-Holstein crossbred cattle in Ethiopia. The study animals used were 74 calves (35 BCG-vaccinated and 39 unvaccinated) aged less than three weeks at the start and 68 known bTB positive cows. Six weeks after vaccination, the 74 calves were tested with DSTc and the single intradermal cervical comparative tuberculin (SICCT) test. The cows were tested with DSTc and SICCT test. Reactions to DSTc were not observed in BCG-vaccinated and unvaccinated calves while SICCT test reactions were detected in vaccinated calves. DSTc reactions were detected in 95.6% of the cows and single intradermal tuberculin (SIT) positive reactions were found in 98.2% (95% confidence interval, CI, 92.1–100%). The sensitivity of DSTc was 95.6% (95% CI, 87.6–99.1%), and significantly ($P < 0.001$) higher than the sensitivity (75%, 95% CI, 63.0–84.7%) of the SICCT test at 4mm cutoff. DSTf and DSTc reactions were correlated ($r = 0.75$; 95% CI = 0.53–0.88). In conclusion, DSTc could differentiate M. bovis-infected from BCG-vaccinated cattle in Ethiopia. DST had higher sensitivity than the SICCT test. Hence, DSTc could be used as a diagnostic tool for bTB if BCG vaccination is implemented for the control of bTB in Ethiopia and other countries.

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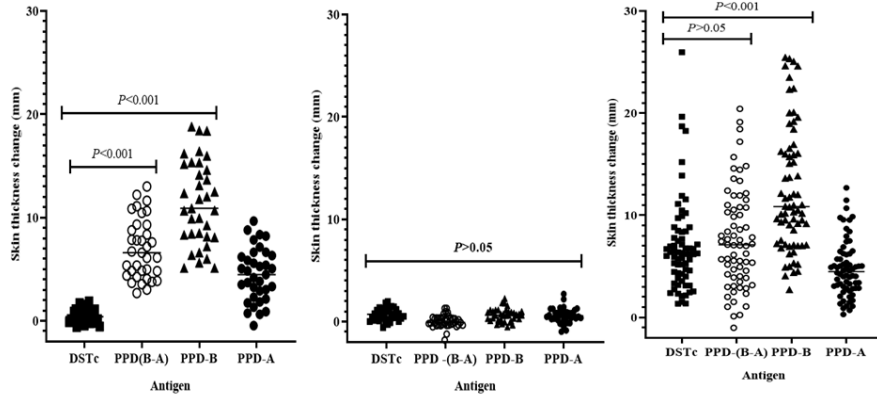


Figure 1.

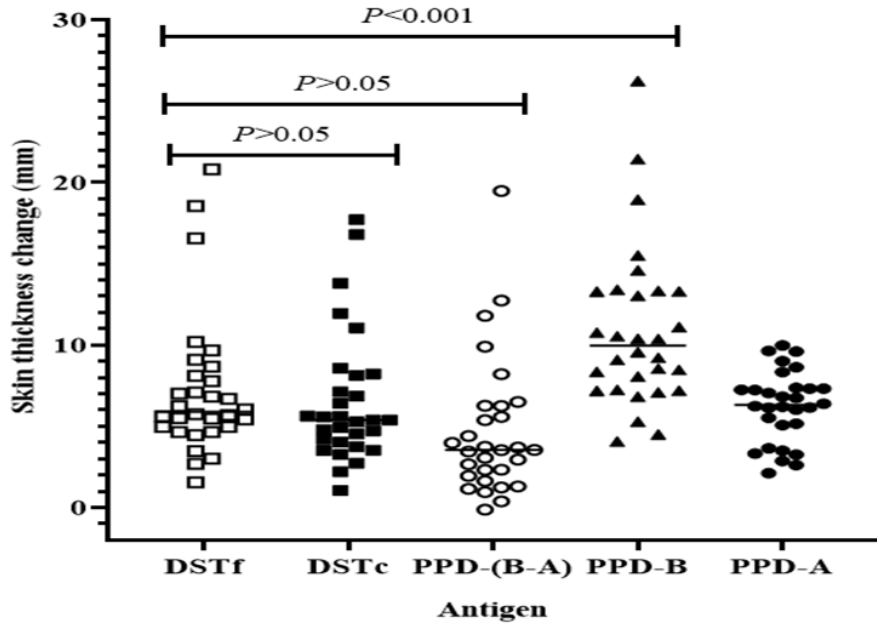


Figure 2

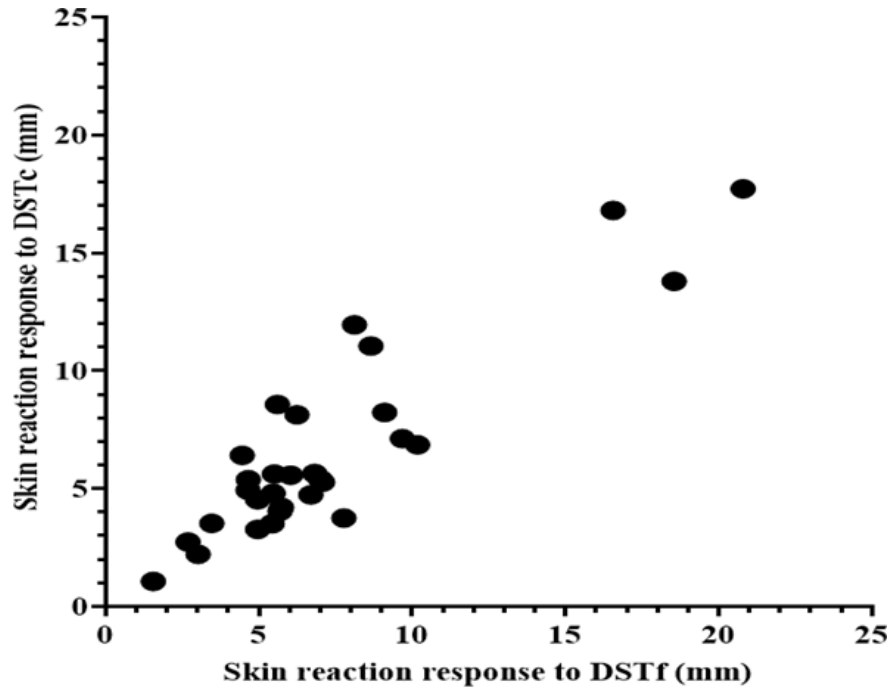


Figure 3

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