Evaluation of the Incidence of Mycobacterium Tuberculosis Complex Associated with Soil, Hayfeed and Water in Three Agricultural Facilities in Amathole District Municipality in the Eastern Cape Province

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Abstract : Mycobacterium bovis and other species of Mycobacterium tuberculosis complex (MTBC) can result to a zoonotic infection known as Bovine tuberculosis (bTB). MTBC has members that may contaminate an extensive range of hosts, including wildlife. Diverse wild species are known to cause disease in domestic livestock and are acknowledged as TB reservoirs. It has been a main study worldwide to deliberate on bTB risk factors as a result and some studies focused on particular parts of risk factors such as wildlife and herd management. The significance of the study was to determine the incidence of Mycobacterium tuberculosis complex that is associated with soil, hayfeed and water. Questionnaires were administered to thirty (30) smallholding farm owners in the two villages (kwaMasele and Qungqwala) and three (3) three commercial farms (Fort Hare dairy farm, Middledrift dairy farm and Seven star dairy farm). Detection of M. tuberculosis complex was achieved by Polymerase Chain Reaction using primers for IS6110; whereas a genotypic drug resistance mutation was detected using Genotype MTBDRplus assays. Nine percent (9%) of respondents had more than 40 cows in their herd, while 60% reported between 10 and 20 cows in their herd. Relationship between farm size and vaccination for TB differed from forty one percent (41%) being the highest to the least five percent (5%). The highest number of respondents who knew about relationship between TB cases and cattle location was ninety one percent (91%). Approximately fifty one percent (51%) of respondents had knowledge about wild life access to the farms. Relationship between import of cattle and farm size ranged from nine percent (9%) to thirty five percent (35%). Cattle sickness in relation to farm size differed from forty three (43%) being the highest to the least three percent (3%); while thirty three percent (33%) of respondents had knowledge about health management. Respondents with knowledge about the occurrence of TB infections in farms were forty-eight percent (48%). The frequency of DNA isolation from samples ranged from the highest forty-five percent (45%) from water to the least twenty two percent (22%) from soil. Fort Hare dairy farm had the highest number of positive samples, forty four percent (44%) from water samples; whereas Middledrift dairy farm had the lowest positive from water, seventeen percent (17%). Twelve (22%) out of 55 isolates showed resistance to INH and RIF that is, multi-drug resistance (MDR) and nine percent (9%) were sensitive to either INH or RIF. The mutations at rpoB gene differed from 58% being the highest to the least (23%). Fifty seven percent (57%) of samples showed a S315T1 mutation while only 14% possessed a S531L in the katG gene. The highest inhA mutations were detected in T8A (80 %) and the least was observed in A16G (17%). The results of this study reveal that risk factors for bTB in cattle and dairy farm workers are a serious issue abound in the Eastern Cape of South Africa; with the possibility of widespread dissemination of multidrug resistant determinants in MTBC from the environment.

Keywords : hayfeed, isoniazid, multi-drug resistance, mycobacterium tuberculosis complex, polymerase chain reaction, rifampicin, soil, water
Conference Title : ICSRD 2020 : International Conference on Scientific Research and Development
Conference Location : Chicago, United States
Conference Dates : December 12-13, 2020