

SCREENING TEST FOR BOVINE TUBERCULOSIS AMONGST CATTLE POPULATION IN ZARIA AREA USING SINGLE CAUDAL-FOLD TECHNIQUE.

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(Received 24 August 1991, accepted 14 October 1991)

ABSTRACT

Five hundred out of 732 heads of cattle in twenty selected herds in Zaria and its environs, were screened for tuberculosis using the single caudal fold (SCF) tuberculin test. Fifty nine (11.8%) heads of cattle were detected to be reactors, while 43 (8.6%) and 398 (79.6%) were suspects and non-reactors respectively. Only one herd had no reactors nor suspects. Amongst reactors, the incidence increased with age, with 6.9% reactors in 0-1 year age group, while those over 5 years old had 28 (20.9%) reactors. The difference was statistically significant ($P < .05; \chi^2$). Management system had an effect on the incidence of tuberculin test reactors with purely nomadic animals showing a greater number of reactors (72.88%) than intensively (0.0%) and semi-intensively (27.12%) managed farms. Sex had no effect on reactor rates as 13 (11.4%) of 114 males and 46 (11.9%) of 386 females were reactors. The difference was not statistically significant ($P < 0.05; \chi^2$). It is therefore concluded that cattle in nomadic Fulani herds harbour *Mycobacteria* which serve as a potential source of tuberculosis to man and other animals.

INTRODUCTION

Tuberculosis is a chronic debilitation disease of man and other animals caused by *Mycobacteria* referred to as "tubercle bacillus" (Colins *et al.*, 1984). In addition to being of public health significance, tuberculosis is a major zoonotic disease in Nigeria Journal of Animal Production 18 (1991)

importance (Karlson and Carr, 1970; Damsker *et al.*, 1974; Idrisu and Schnurrenberger, 1977; Festerstein, 1984 Goldman, 1987), *Mycobacteria* have also been recognised to be of great economic significance to the livestock industry (Francis, 1968; Alhaji, 1976; Collins and Grange, 1983).

Although the epidemiology of tuberculosis remained poorly understood for quiet sometime (Anon, 1982), a lot of progress has been made towards its eradication in a number of developed countries. However, little or no progress has been made in the developing countries (Allen, 1984).

In Nigeria, the habit of consumption of raw unpasteurised milk and living in close association with animals could serve as a potential source of tuberculosis. Since most of the few epidemiologic surveys conducted in Nigeria were restricted to government farms, it becomes imperative to extend investigations to Fulani herds from where the bulk of the milk consumed by the local populace comes. This paper therefore attempts to determine the prevalence of tuberculosis in Fulani herds in Zaria and its surroundings, using the single caudal fold (SCF) tuberculin test.

MATERIALS AND METHODS

Animals

Five hundred heads of cattle from twenty representative Fulani herds (nomadic, semi-nomadic and intensive) in and around Zaria

were selected and tuberculin tested. Nomadic and the semi-nomadic animals were mainly of white Fulani or Bunaji breed while those intensively managed were mainly the Sokoto Gudalis.

Antigen

Purified Protein Derivative (PPD)_{Mycobacterium bovis} (United States of America) at the concentration of 1 milligram per millilitre was used for the test.

Tuberculin test procedure

Test procedure and interpretations of the Michigan Department of Agriculture (1962) were used with slight modifications. Animals were restrained and properly identified by serial numbering on the rump region prior to injection of the tuberculin. A site one-third of the distance from the base of the tail on the right side was chosen and clean with dry cotton wool. 0.1ml of PPD (*M bovis*) at the concentration of 1mg/ml was carefully injected intradermally using a two millilitre McLintock automatic syringe (Astra product, Warford herts, England).

Evaluation of tuberculin test

Seventy two hours post injection, sites were examined by visualization, palpation and measurement using Verniers Callipers and response recorded. Animals were grouped as reactors and non-reactors based on the nature and extent of diffuse swellings.

In additions to the tuberculin test, data pertaining to breed, sex and age of each animal tested were obtained. Information from herdsmen and the cornual ring method were used to determine the conservative ages of animals. Animals were further grouped into three based on management system as follows-nomadic (animals always on the move and graze in the field with little or no supplementation in diet), semi- intensive (those partly kept indoors but at times graze in the field with partial supplementation in diet) and intensive (where animals are permanently kept indoor with full supplementation in diet).

RESULTS

The tuberculin test results and the effects of management systems on the tuberculin test are shown in Table 1. Fifty nine (11.8%) of 500 animals tested from twenty selected Fulani herds were reactors and 398 (79.6%) were non-reactors, while 43 (8.6%) were suspect reactors.

In cattle kept under the nomadic system, 43(13.7%) of 315 tested were reactors, while 16 (10.3%) of 155 cattle managed semi-intensively were reactors. None of the 30 heads of cattle intensively managed were reactors, nor were there suspect reactors in the group. Animals kept under the nomadic system had a significantly higher ($P < 0.05; \chi^2$) reactor rates than those intensively managed.

Age distribution of animals and their tuberculin test results are shown in Table 2. More

TABLE 1: TUBERCULIN TEST REACTIONS AND THE EFFECT OF MANAGEMENT ON THE REACTIONS.

Management System	No. of Herds Tested	No. of animals Tuberculin Tested	No. (%) of Positive Reactors	No. (%) of Inconclusive Reactors**	No. (%) of non-reactors***
Purely nomadic	13	315	43(13.7)	29(9.2)	243(77.1)
Semi intensive	6	155	16(10.3)	14(9.0)	125(80.7)
Intensive	1	30	0(0.0)	0.(0.0)	30(100.0)
Total	20	500	59(11.8)	43(8.6)	398(79.6)

*Animals with 4 millimeters tuberculin reaction

**Animals with less than 4 millimetres tuberculin reaction

***Animals with no reaction at all.

TABLE 2: AGE DISTRIBUTION OF ANIMALS TESTED AND THEIR TUBERCULIN TEST REACTIONS.

Age (Years)	No. of animals Tuberculin Tested	No. (%) of Positive Reactors	No. (%) of Inconclusive Reactors	No. (%) of Non-reactors
0-1	131	9(6.9)	9(6.9)	113(86.2)
>1-2	35	2(5.7)	3(8.6)	30(87.7)
>2-3	32	2(6.2)	3(9.4)	27(84.4)
>3-4	84	7(8.3)	4(4.8)	73(86.9)
>3-5	84	11(13.8)	7(8.3)	66(78.6)
>5	134	28(20.9)	17(12.7)	89(66.4)
Total	500	59(11.8)	43(8.6)	398(79.6)

than half of the animals tested were in 0-1 and over 5 years age groups. A general increase in prevalence rate with age was observed as animals above the age of 5 years had highest reaction rate of 28 (20.9%) out of 134 tested in that group. Similarly, the highest number of suspect reactors were also found in this age group. The reactor rates amongst cattle older than 5 years were statistically significant than in other age groups ($P < 0.05; \chi^2$).

The sex distribution of animals and their reaction to the tuberculin injection are shown in table 3 where 13(11.4%) of 114 males and 46(11.9%) of 386 females tested, reacted positively to the test. The difference was not statistically significant ($P < 0.05; \chi^2$).

DISCUSSION

The single caudal fold technique used in the present study, has earlier been found more convenient than any other tuberculin test under the Nigerian method of husbandry (Alhaji, 1976a). This is because it is easier to apply, required less labour and just as accurate as the single cervical technique.

The tuberculin test results in the present study which established that 11.8% of cattle tested in Fulani herds were reactors suggests that 59 of 500 heads of cattle screened have probably been exposed to *Mycobacteria*. It is however realised that a typical *Mycobacteria* as well as other microorganism like *Jone* is bacillus and some soil

TABLE 3: SEX DISTRIBUTION OF ANIMALS TESTED AND THEIR TUBERCULIN TEST REACTIONS.

Sex	No. of animals Tuberculin Tested	No. (%) of Positive Reactors	No. (%) of Inconclusive Reactors	No. (%) of Non-reactors
Males	114	13(11.4)	13(11.4)	88(77.2)
Females	386	46(11.9)	30(7.8)	310(80.3)
Total	500	59(11.8)	43(8.6)	398(79.6)

saprophytes could also elicit delayed hypersensitively reactions (Macauley, 1958; Johnson *et al.*, 1961). However, reactions due to these organisms may not reach the 4 millimetre diameter or more as obtained for positive cases in the present study and this suggests that reactions were probably due to *M. bovis* in the present study.

The 11.8% tuberculin reactor rate recorded in this study is much higher than 7.7% and 0.2% rates reported earlier from a semi-nomadic farm and a government farm in Zaria using the same technique (Alhaji, 1976a). It is also much higher than 1.5% reactor rate reported from semi-settled and settle herds in North-Western parts of Nigeria (Eid, 1976). Similarly, it is slightly higher than 7.8% cumulative reactor rate recorded in a University farm in the southern part of Nigeria (Ayanwale, 1984). Although the result is similar to what was reported from Iran (Keyhani *et al.*, 1973), it is much lower than 50% and 53% rates reported from India (Nagaraja *et al.*, 1973) respectively. These differences could be attributed to differences in breed and management since in the later countries animals particularly cattle are worshiped or used as beast of burden such that they are always in close contact with human beings and others animals that could serve as a source of infection to them. Management of cattle herd has been shown to influence the spread of tuberculosis, more so that the principal route of transmission of *Mycobacteria* is by *aerogenous means* (Collins and Grange, 1983).

Tuberculin reactor rate of 13.7% in the present study was recorded from purely nomadic herds, while all the heads of cattle intensively managed were negative (0.0%). This finding may probably be due to the fact that cattle under the nomadic management system are always on the move and are exposed to animals of unknown health status from other herds while grazing or at watering points, particularly during the dry season. This practice will definitely increase exposure potential to *Mycobacterium* species from infected animals (Blood and Radostits, 1989) and human being (Stenius, 1938). Intensively managed farms may however keep off *Mycobacteria* out of their herds if introduction of newly purchased

animals is controlled and the health of such animals checked.

It is of interest to observed that there is a general increase in tuberculin reactor rate with age in the present study with the higher rate of 20.9% in cattle over 5 years old. This has epidemiologic and public health implications because the Fulanis are so culturally attached to their animals that they hardly part away with them. Old and moribund members of the herd are usually the ones disposed off for slaughter. This practice could facilitate the spread of tuberculosis to other herds or the general public through local abattoirs or private slaughter houses where proper meat inspection is not routinely done. Tuberculosis has been demonstrated to be transmitted by oral means (Luke, 1958).

A high tuberculin reactor rate in nomadic herds observed in the present study and the fact that these herds serve as the major source of raw milk and milk products to the public make these finding of public health importance particularly in the rural and semi-urban communities, where milk is consumed raw. Cases of tuberculosis in man following the consumption of raw unpasteurised milk have been reported elsewhere (Kaison and Carr, 1970, Wigle *et al.*, 1972).

This study shows that tuberculosis is widely spread amongst cattle population in Zaria areas. It is therefore imperative to screen animals for tuberculosis from other areas and to examine milk from such animals and the sputum of herdsmen for *Mycobacteria*. Such information will serve as a baseline for the formulation of tuberculosis eradication policies.

ACKNOWLEDGEMENT

The authors acknowledged the contributions made by Professor P.B. Addo, Dr. A.A. Adesiyun and Dr. S.N.A. Sa'idu of Ahmadu Bello University Zaria. The work was part of L.M. Shehu's Masters thesis submitted to Ahmadu Bello University Zaria, Nigeria. The financial assistance of University of Maduguri and Wellcome Nig. Trust Fund are gratefully acknowledged.

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