

# The Nature, Economics and Public Health Aspects of Bovine Brucellosis in Nigeria

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## SUMMARY

**BOVINE** Brucellosis is a disease of cattle which causes abortions, retained placenta, infertility and economic losses in calf production in the affected herds. This disease has been diagnosed in various parts of the country (Esuruoso, 1974). Although some herds were found to be free, others were moderately infected, while others still were heavily infected. Unfortunately, some of the heavily infected cattle herds were at the breeding centres from where animals were usually sold out to beginners about to start their own foundation herds. Therefore, a trail of brucellosis could be followed to many of these herds.

From currently available information (Esuruoso & Hill, 1971; Esuruoso & Van Blake, 1972; Esuruoso 1974a & 1974b) it is estimated that direct losses due to bovine brucellosis alone in Oyo State is around ₦200,000 per 10,000 adult female cattle per annum. Losses in other parts of the country have been shown to be heavy in some places and low in others (Banerjee and Bhatt, 1970; Esuruoso, 1974b; Esuruoso, 1975; Nuru and Dennis, 1975) but can only be properly estimated when more work has been done to find out the status of most of the herds in relation to the incidence; only a very small percentage of herds in the northern state (Esuruoso, 1974b; Nuru and Dennis, 1975) have been investigated.

## The Nature of Bovine Brucellosis

Bovine brucellosis is caused usually by *Brucella abortus*, but other brucellae (*B. melitensis*, *B. suis*) may also infect cattle (Laing, 1976). *Brucella abortus* is an intracellular parasite. The infection of cattle is usually through ingestion, but contamination of fresh wounds and mucous membranes of the eye, the nose, the mouth and of the vagina of susceptible animals, may also lead to the establishment of the disease.

When the organisms enter the body of their host, a transient bacteraemia

occurs by which they circulate to various organs of the body. Eventually, they settle in the cells of the lymphoid system of the animal and then multiply. This process is followed either by a prolonged period of bacteraemia or a quiescent period during which the bacteria are usually not detectable in the blood.

When the infected female animal (heifer or cow) becomes pregnant, the organisms are attracted to the pregnant uterus, (probably because the foetal fluid is rich in a saccharide alcohol called erythritol which is known to enhance the growth of *Brucella abortus* (Soltys, 1963) where they multiply, causing placentitis, and abortion in non-resistant animals. In resistant animals, they still invade the uterus but the damage done may not be severe enough to cause abortion.

When the infected animal aborts or calves normally, the bacteria are usually present in large numbers in the uterine and vaginal discharges during and a few days before and after parturition or abortion. This is the usual source of infection to other animals and man. The organism could also reach other animals and man through the milk of infected heifers and cows; young calves may receive natural immunization through this medium or they may become patently infected depending on many factors. These factors include the level of acquired immunity at the time of infection, the virulence of the infecting organisms, the load of infection and failure to vaccinate susceptible calves at the recommended age of 3 months.

## Brucellosis in Man

Brucellosis in man is caused by *Brucella melitensis*, *Brucella abortus*, *Brucella suis* and

*Brucella canis*, and presumably others (*Brucella ovis* and *Brucella neotomae*). It is a crippling disease which constitutes an occupational hazard for farmers, veterinarians, butchers and all those who handle animals and their meat products. Many working hours of this group of people may be lost due to the crippling effect of this disease. This aspect should be considered of both economic as well as public health importance. In man an early treatment may produce complete cure, otherwise the disease develops and may assume various forms causing both physical and mental damage to the affected (Spink, 1956). When the disease is prevented in animals, man does not usually become infected; the disease is usually not transmitted directly from man to man. This emphasises the importance of controlling the disease in domestic animals.

### Economics of Bovine Brucellosis

This disease caused "abortion storms" in groups of young pregnant heifers, which may be responsible for up to 50% losses of calves in a virgin herd being infected *de novo*. This means a great loss in the calf crop for the year and a disruption of the breeding programme of the farm. If for example instead of one hundred heifers producing 80 calves only 40 calves are produced in that year, and if the market value of each calf is estimated to be only ₦20,000 at birth, the loss from one hundred breeding animals being approximately 40 calves will amount to  $40 \times 20$  Naira, (Total ₦800,000). If we have 10,000 such animals, the loss will amount to  $20 \times 40 \times 10000$ . This is equivalent to a loss of 80,000 Naira (80,000) (a) in terms of calves lost in abortion alone.

Aborting animals are also likely to retain their placenta and to suffer long periods of sterility. It means also therefore, that all such animals may lose one to three years of calving. In fact, if only 50 percent of 40 aborting animals in every group of 100 heifers/cows become infertile for three consecutive years following abortion and retention of placenta, the additional immediate and direct losses in calf production in a ranch carrying 10,000

breeding females will amount to  $50/100 \times 40/100 \times 10,000$  (2,000) calves per annum. At ₦20 per calf at birth the annual losses will amount to  $2000 \times ₦20$  (₦40,000). In three years the invisible, the immediate and direct financial losses will therefore amount to not less than  $₦40,000 \times 3$  i.e. ₦120,000 (b) but this is only part of the story.

Projected losses, which will include losses of replacement heifers and bull calves which may have been produced but were lost as aborted foetuses during a period of three years and the general financial implications of the disruption of breeding and the overall farm programme, which will be difficult to calculate directly, may in fact amount to some ₦100,000 (c) over a period of three years in a ranch carrying 10,000 breeding female cattle.

Aborting animals are also spreading the disease to all other susceptible animals in the herd. This group naturally includes recently introduced animals, young heifers in infected herds and other animals grazing on the same field with the affected herd. Consequently, the prevalence of the disease may increase annually and so will the economic losses. It has been known in some herds in Nigeria where an incidence of less than 3% in 1973 has now increased to a prevalence of 76% in 1975 (Esuruoso and Ayanwale, 1976). This constitutes an enormous financial loss in terms of direct, immediate and projected estimations (a, b, & c) as calculated above, and also greater chances of spreading and maintaining the disease in the environment. Even wildlife may become infected to such an extent that subsequent removal of infected livestock may not prevent the infection of otherwise clean but newly introduced animals in the same locality. However, since it is known that infected animals may abort only once or twice and that they are later able to carry subsequent pregnancies to terms, a stage is usually reached when in an infected herd calf crop may increase to about 60%. In this case, only young animals becoming pregnant for the first time will abort; the cows may calf normally. This situation may give rise to complacency and a

false sense of security on the part of the farmer thinking that, because there are now fewer abortions the diseases must be either absent or eradicated. But infact not only will any newly introduced animal be exposed but also that the farmers themselves and their farm labours and cattlemen are having greater chances of contracting the disease. It is important that all cattle owners should be familiar with this aspect of the nature, the public health implications and the economic importance of bovine brucellosis.

### Public Health Aspects of Bovine Brucellosis

As stated above, the infected animal is the main source of human infection. As also noted earlier, the occupational hazard group of men include the farmers, the cattlemen, the farm labours, the veterinarians, the butchers and others who may have anything to do with infected cattle. But apart from this there are people who come into contact with meat from such animals either during the process of washing before cooking or following ingestion of undercooked or contaminated meat. Although it is known that cooking is usually well done in Nigeria, this does not eliminate the contamination of the dish or even the food once brucella infected meat has been brought into the kitchen or other areas of the household. Those who drink fresh unpasturised milk from infected stock are also likely to be infected, although the acidity of sour milk may militate against the survival of the organism in that medium.

Now that the disease has been recognised and we know areas of heavy infection, it is certain that when doctors begin to investigate the incidence in the general public and in specific high risk groups, representatives of all the groups will be found to have been infected. This will include groups of people in areas where infected animals have recently been introduced as well as those in other areas already studied by Esuruoso (1974 a & b). The diagnosis will then be easy and probably early enough to allow such treatments as may lead to complete recovery. But in the meantime, unless doctors go specifically looking for the

disease, many cases may be passing undetected because of the nature of the abortus disease in man; like other fevers the differential diagnoses are multiple.

The economic losses due to undulant fever in man is difficult to estimate. But since it is known that the effects of the disease are progressive and cumulative, it could be argued that if up to 10 percent of the personnel in high risk areas as Fashola, Upper Ogun, Akunnu and Pota are infected, the loss of man working hours may approach 3% of the labour force on the ranch. This may be accounted for in terms of decreasing efficiency and mental capacity, reduced productivity and absenteeism during bouts of illness and attendance at clinics and hospitals.

In conclusion, it is estimated that, there are at least 10,000 female cattle of breeding age in Oyo State alone, where many of the heavily affected herds with regard to bovine brucellosis were found (Esuruoso, 1974). Therefore, if at the beginning of any year or at any point in time, 40% of the young pregnant animals abort and if only 50 percent of these (40 percent) suffer prolonged periods of sterility of up to 3 years—which is quite common (Esuruoso and Ayanwale, 1976), the financial losses due to this disease will amount to an estimated (a, b & c above) sum of ₦300,000 in three years provided all the young heifers that reached calving age during the last two years of this period calve normally. This is infact impossible, and the loss in milk yield by aborting animals must be taken into account. It is therefore, estimated that the cumulative losses over this period may be at least double this amount, that is,  $₦300,000 \times 2 = ₦600,000$ .

An annual loss of ₦200,000 per 10,000 female cattle of breeding age due to brucellosis alone and the attendant suffering due to human infection should be considered enormous and serious enough to justify positive action towards the control of that disease (see Esuruoso in a letar paper).

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## REFERENCES

- BANERJEE, A. K. and BHATTY, M. A. (1970). A Survey of Bovine Brucellosis in Northern Nigeria—A Preliminary Communication. *Bull. epizoot. dis Afr.* **18**, 333-338.
- ESURUOSO, G. O. and HILL, D. H. (1971) A Sero-epidemiological Survey of Bovine Brucellosis in the Dairy Herds in the Western State of Nigeria. *Niger. Agric. J.* **8**, 147-154.
- ESURUOSO, G. O. and VAN BLAKE, E. HENRY, (1972), Bovine Brucellosis in two Southern States of Nigeria. I. An Investigation of Selected Herds. *Bull. epizoot. is Afr.* **20** (46), 269-274.
- ESURUOSO, G. O. (1974a) Bovine Brucellosis in two Southern States of Nigeria: The Incidence and Implications of Infection in Range Cattle. *Bull. epizoot. dis Afr.* **22** (1), 35-40.
- ESURUOSO, G. O. (1974b) Bovine Brucellosis in Nigeria, *Vet. Rec.* **95**, 54-58.
- ESURUOSO, G. O. (1975) Effect of Brucellosis on Livestock Production in Nigeria. *Proc. 20th Wld. Vet. Congr., Thessalonkiki, Greece* **1**, 239-240.
- ESURUOSO, G. O. and AYANWALE, F. O. (1976) Bovine Brucellosis and Infertility in Lagos State. (in press).
- LAING, J. A. (1970) *Fertility and Infertility in Domestic Animals*, 480 pp. (publ. Bailliere, Tindall and Cassell, London).
- NURU, S. and DENNIS, S. M. (1975) Bovine Brucellosis in Northern Nigeria: A Serological Survey. *J. Nig. Vet. Med. Ass.* **4** (1), 3-8.
- SOLTYS, M. A. (1963) *Brucella in Bacteria and Fungi Pathogenic to man and Animals* pp. 366-379. (Publ. Bailliere, Tindall & Cox, Edinburgh) 500 pp.
- SPINK, W. W. (1956) *The Nature of Brucellosis*, 464 pp. (Publ. The University of Minosota Press, Minneappolis).