

## **Anthrax infection in bone meal from various countries of origin**

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(Received 20 January 1972)

### SUMMARY

Using animal inoculation, three out of six Lebanese and three out of nine Argentinian and two out of two Pakistan separate commercial consignments of bone meal imported during 1970 were found to be infected with anthrax.

### INTRODUCTION

It is several years since the danger of anthrax due to imported dried bones from India and Pakistan was first reported by the Chief Inspector of Factories (1939). Consequent upon a decision by a firm of fertilizer manufacturers to cease handling Pakistan bones for safety reasons, the opportunity arose of examining consignments of bone meal from the Lebanon and Argentina for the presence of *Bacillus anthracis*, and also the final Pakistan shipments.

### MATERIALS AND METHODS

The test procedure has been detailed in an earlier paper (Davies & Harvey, 1955). Guinea-pigs, protected with gas gangrene and tetanus antitoxin, were inoculated with a suspension of bone meal which had been heated at 65° C. for 5 min. Each consignment tested consisted of two separate samples. From each sample two animals were inoculated.

The presence of anthrax in the inoculated animals was confirmed by post-mortem culture taken from the inoculation site, the spleen and heart blood.

### RESULTS

The proportion of bone meal samples found positive for *B. anthracis* is shown in Table 1.

Though the numbers are small, some estimate of the degree of infection of shipments from the various countries was possible. In the infected Lebanese specimens in two instances both samples of the same consignments were positive and once one sample only was positive. In infected Argentine bone meal in no

Table 1. *Isolation of Bacillus anthracis in bone meal*

Country of origin	Consignments tested	Consignments positive
Argentina	12	3
Lebanon	6	3
Pakistan	2	2

instance were both specimens from one consignment positive, twice one sample only was positive and once one sample was positive in only one of two animals inoculated. In the Pakistan material, however, both samples of each consignment were positive.

#### DISCUSSION

Imported bone meal is the only material potentially infected with anthrax to which the general public is exposed. It is also the cause of anthrax among cattle in this country because infected bone meal is incorporated in their feed, high cost greatly limiting its use as a fertilizer in agriculture.

There is little published information available concerning anthrax infection in bones and bone meal imported from countries of origin other than India and Pakistan. A positive shipload from Syria has been reported (Davies & Harvey, 1955).

The annual import of dried bones and bone meal into this country was no less than 68,000 tons in 1967 (Lovett & Falconer, 1969). As Pakistan bones constitute more than half of this importation (Veterinary Record, 1969) it would therefore seem impracticable to switch over to other sources of supply owing to world demand. It is now apparent that this alternative would not eliminate the risk of anthrax infection anyway. This depends on whether the bones originated from slaughterhouses or from fallen animals or were a mixture of the two.

The practical difficulties and cost of adequately heat treating all the bone and bone products entering this country would be very great. The total result of this trade is a fair but fluctuating amount of anthrax among cattle, and about ten or fewer human cases of infection reported every year in the United Kingdom. This is the price which has to be paid for this particular import. Human risks might be reduced further by such measures as the issue of warning notices with bone meal used as fertilizer, by the destruction of sacks employed in its conveyance instead of their repeated use and by more widespread immunization of workers at risk.

The difficulties of adequate sampling in the screening of bones and bone meal for *B. anthracis* is implicit in the instance of one Argentine consignment quoted, only one of four inoculated animals yielding a positive result. This irregularity in the distribution of anthrax spores has been noted by us before (Davies & Harvey, 1955). Inherent sampling errors would render it impracticable to select certain heavily infected bone meal batches for heat treatment, or indeed for the monitoring of treated bone as a test of safety. Perhaps a trial might be made of the South African technique (De Kock, Sterne & Robinson, 1940) in which the detection of clostridial spores served as indication that the material originated from fallen animals and might therefore be anthrax infected.

We are grateful to Mr F. N. Wilson for his co-operation, and to Mr A. R. Wood and Mr T. H. Price for their technical assistance.

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