Resurgence of contagious bovine pleuropneumonia in Nigeria

D.R. NAWATHE *

Summary: Epidemiological reports and post mortem examination of slaughtered cattle indicate that prevalence of contagious bovine pleuropneumonia (CBPP) in Nigeria is on the increase, despite annual mass vaccinations and other protection measures. The number of reported outbreaks increased from 20 in 1981 to 64 in 1988, 114 in 1989, 82 in 1990 and 52 in 1991 (January to June).

Post-mortem examinations conducted between January 1988 and June 1991 at the abattoir in Maiduguri, capital of Borno State (Nigeria) revealed that of 122,567 slaughtered cattle, 6,008 (4.9%) had pneumonia and 777 (0.6%) had gross lesions suggestive of CBPP. Only 22 sporadic outbreaks were reported over this period within the catchment area of Borno State. Probable reasons for the deteriorating situation of CBPP in Nigeria are discussed.

KEYWORDS: Africa - Cattle diseases Disease prevalence - Mycoplasma mycoides Nigeria Pleuropneumonia.

INTRODUCTION

Contagious bovine pleuropneumonia (CBPP) is a highly contagious respiratory disease of cattle caused by *Mycoplasma mycoides mycoides* (small colony variant). CBPP was eradicated many years ago in the United States of America, most of Europe and South Africa by a slaughter policy alone, and more recently from Australia (1973) and China (1985) by annual mass vaccination followed by a slaughter policy. Currently, CBPP is enzootic in sub Saharan Africa (except South Africa), Portugal, Kuwait and the Assam Province of India. Spread of CBPP is occasionally reported from these areas into neighbouring countries, such as Egypt, Spain, France, Italy, Bangladesh and Myanmar.

In Africa, CBPP has been recognised since time immemorial (11). For centuries, graziers (Fulani, Masai, etc.) have practised native methods of immunisation by rubbing infected lung lymph onto the muzzles of cattle to protect them against CBPP. This crude method of vaccination was often accompanied by severe recrudescence. The first laboratory prepared vaccine for CBPP in Nigeria was made available in 1928 by Professor Kearney, by sub-culturing the causal agent isolated locally. Subsequently, various types of vaccines were introduced but, finally, egg-adapted T1 vaccine was recommended for mass vaccination campaigns (10, 11).

The economic significance of CBPP in Africa is second only to that of rinderpest. As early as 1971, the Organisation of African Unity (OAU) launched a campaign “Joint Project 28” (JP28) against CBPP which partly succeeded, as the incidence...
of CBPP dropped considerably. In Nigeria, after a decade of the JP28 campaign, the number of reported outbreaks dropped from 100-200 per year to 10-20 per year by 1979/1980. Unfortunately, in the late 1980s the number rose again from 20 in 1981 to 64 in 1988, 114 in 1989, 82 in 1990 and 52 in 1991 (January to June).

Since 1985, the JP28 campaign has been merged with the Pan African Rinderpest Campaign (PARC) which envisages eradication of both rinderpest and CBPP from Africa. At a meeting held in October 1991, the coordinator of PARC in Nigeria lamented the deteriorating situation of CBPP and called for continued concerted effort against the disease.

Borno State in Nigeria is at risk from epizootics of contagious diseases. The panzootic of rinderpest in 1983-1987 entered Nigeria through Borno State, which has common borders with Cameroon, Chad and Niger. Incidence of CBPP has always been highest in Borno State (5).

**MATERIALS AND METHODS**

Epidemiological and abattoir data were collected from Federal and State Veterinary Services as well as the National Veterinary Research Institute (NVRI) in Vom.

Visits were made every two weeks between November 1990 and April 1991 to the abattoir in Maiduguri, and 104 samples of pneumonic lungs were collected.

One portion was kept fresh on ice and another was preserved in 10% buffered formol saline. From fresh samples, triangular filter paper strips were soaked, labelled and air-dried.

The agar gel diffusion test (AGDT) for detecting CBPP antigen in the lung samples was performed as described by Griffin (4), except that the immune serum was obtained from sheep instead of rabbits. The serum was supplied by Mr Pam of NVRI, together with negative serum and control antigens.

Histopathological examination and isolation of the causal agent from a few samples was carried out as described by Hudson (6).

**RESULTS**

The epidemiological situation of CBPP over the past decade is detailed in Table I. It is evident that the situation has considerably deteriorated recently, to match the pre-JP28 period. This is mainly due to poor vaccination coverage. The estimated cattle population of Nigeria is 15 million, and annual vaccination coverage ranges between 27 and 42%.

Borno State harbours 4.5 million cattle, but vaccination coverage appears to be between 4 and 11% (Table II). Between January 1988 and June 1991, 122,567 cattle were slaughtered at the Maiduguri abattoir, of which 6,008 (4.9%) had pneumonia and 777 (0.6%) had gross lesions of CBPP. Over the same period, only 22 sporadic outbreaks of CBPP were reported, although perhaps many more occurred but were not detected and not reported.
### Table I

**Situation of contagious bovine pleuropneumonia in Nigeria**

<table>
<thead>
<tr>
<th>Year</th>
<th>Outbreaks reported</th>
<th>Herds affected</th>
<th>Cattle involved</th>
<th>Died or slaughtered</th>
<th>Vaccinations (thousands)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1981</td>
<td>20</td>
<td>51</td>
<td>2,175</td>
<td>277</td>
<td>5,900</td>
</tr>
<tr>
<td>1982</td>
<td>36</td>
<td>55</td>
<td>4,735</td>
<td>415</td>
<td>6,083</td>
</tr>
<tr>
<td>1983</td>
<td>24</td>
<td>36</td>
<td>2,025</td>
<td>223</td>
<td>4,066</td>
</tr>
<tr>
<td>1984</td>
<td>28</td>
<td>51</td>
<td>2,875</td>
<td>304</td>
<td>3,641</td>
</tr>
<tr>
<td>1985</td>
<td>30</td>
<td>41</td>
<td>2,384</td>
<td>255</td>
<td>4,917</td>
</tr>
<tr>
<td>1986</td>
<td>46</td>
<td>64</td>
<td>6,293</td>
<td>343</td>
<td>6,898</td>
</tr>
<tr>
<td>1987</td>
<td>49</td>
<td>60</td>
<td>5,133</td>
<td>559</td>
<td>4,980</td>
</tr>
<tr>
<td>1988</td>
<td>64</td>
<td>75</td>
<td>5,584</td>
<td>531</td>
<td>3,748</td>
</tr>
<tr>
<td>1989</td>
<td>114</td>
<td>122</td>
<td>10,871</td>
<td>812</td>
<td>2,987</td>
</tr>
<tr>
<td>1990</td>
<td>82</td>
<td>101</td>
<td>9,326</td>
<td>579</td>
<td>4,046</td>
</tr>
<tr>
<td>1991*</td>
<td>52</td>
<td>82</td>
<td>7,323</td>
<td>696</td>
<td>1,039</td>
</tr>
</tbody>
</table>

* January to June

### Table II

**Prevalence of contagious bovine pleuropneumonia (CBPP) at Maiduguri abattoir in Borno State, Nigeria**

<table>
<thead>
<tr>
<th>Year</th>
<th>Cattle slaughtered</th>
<th>Total lungs discarded</th>
<th>Lungs showing CBPP lesions</th>
<th>Outbreaks reported</th>
<th>Vaccinations (thousands)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No.</td>
<td>(%)</td>
<td>No.</td>
<td>(%)</td>
<td></td>
</tr>
<tr>
<td>1988</td>
<td>31,572</td>
<td>1,587 (5.0)</td>
<td>243 (0.8)</td>
<td>5</td>
<td>496</td>
</tr>
<tr>
<td>1989</td>
<td>31,903</td>
<td>1,273 (4.0)</td>
<td>176 (0.6)</td>
<td>6</td>
<td>188</td>
</tr>
<tr>
<td>1990</td>
<td>36,462</td>
<td>1,906 (5.2)</td>
<td>228 (0.6)</td>
<td>8</td>
<td>419</td>
</tr>
<tr>
<td>1991*</td>
<td>22,630</td>
<td>1,242 (5.5)</td>
<td>130 (0.6)</td>
<td>3</td>
<td>204</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>122,567</td>
<td>6,008 (4.9)</td>
<td>777 (0.6)</td>
<td>22</td>
<td>1,307</td>
</tr>
</tbody>
</table>

* January to June

Of 104 samples of pneumonic lungs, 30 showed varying degrees of gross lesions of CBPP, and 25 were positive to the AGDT. Both formalin treated and soaked filter paper samples also gave lines of precipitation, but they were less sharp and required additional time for incubation in a humid chamber.

Twelve isolates of the small colony variant of *M. mycoides mycoides* were obtained, and identified by biochemical, growth inhibition and immunofluorescence tests at the NVRI using the technique described by Karst (8).

Ten samples were examined histopathologically and showed thickening of interlobular septa due to infiltration of fibrinous exudate. Bronchioles and alveoli were filled with fibrin, mucous, neutrophils and desquamated cells, and lymphatics showed thrombi and cellular infiltration. Fibrinous pleuritis was also seen.
DISCUSSION

The AGDT for detecting CBPP antigen is specific and easy to perform in the field. It also appears to be adequate for initial survey work. Counter immunoelectrophoresis (9) is far more sensitive, but requires special equipment and a power supply. Similarly, other tests such as histopathology, isolation of the causal agent and the complement fixation test are relatively cumbersome, time-consuming and expensive. Detection of CBPP antigen by AGDT is possible only 6-10 weeks after infection (11). It is unable to detect chronic carriers, which are responsible for spreading the disease undetected. The actual prevalence of CBPP therefore is definitely higher than that demonstrated by AGDT.

Griffin and Laing (5) reported incidence of CBPP at 0.51% from post-mortem examination of 6,500 cattle at the Maiduguri abattoir about 30 years ago. On the same basis, the present study places the incidence at 0.6%, which is even higher, indicating complete failure of the campaigns.

Control of CBPP is not given due attention because the disease usually occurs in sporadic and chronic forms, and its impact is not as spectacular as that of rinderpest. Many outbreaks go undetected and are found only at post-mortem examination at the abattoir. CBPP is associated with movements of cattle, and outbreaks occur in herds along cattle trade routes, the disease being introduced by newly-purchased cattle.

Explosive outbreaks of CBPP have also been observed in settled herds of both zebu and exotic breeds of cattle. Some of the ranches have had to be depopulated after giving positive serological tests. Outbreaks have also been observed in duly vaccinated herds. The immunosuppressive effects of CBPP itself (1), trypanosomosis (7) and dermatophilosis (3) have been blamed for such outbreaks. No significant cattle development (e.g. settlement of nomadic graziers) can be successfully accomplished until CBPP is eradicated from Africa (2).

In 1986, Nigeria introduced a Structural Adjustment Programme with World Bank loans, which resulted in 1,000% devaluation of local currency. As a consequence vaccine production, vaccination programmes and all services became so expensive that budgetary provisions fell short of requirements. Diagnostic services, which are essential for identifying chronic carriers by serological tests, became virtually paralysed. Compulsory slaughter and compensation could not be practised for want of funds.

For PARC to succeed in Africa, obstacles such as shortages of vaccines, vaccination equipment, funds for mass vaccination, payment of compensation for slaughter of chronic carriers and diagnostic services will have to be overcome.

CONCLUSION

If CBPP is to be controlled and eradicated from Africa, adequate funds will have to be provided for vaccines, vaccination, diagnostic services and payment of compensation for compulsory slaughter, etc.
ACKNOWLEDGEMENTS

The author is grateful to the Director of the Centre national d'études vétérinaires et alimentaires/Laboratoire d'études sur la rage et la pathologie des animaux sauvages (CNEVA/LERPAS) in Malzéville (France), the Director General of the OIE and the Vice-Chancellor of Maiduguri University for encouragement and financial support.

RECRUDESCENCE DE LA PÉRIPNEUMONIE CONTAGIEUSE BOVINE AU NIGERIA.
D.R. Nawathe.


Les inspections pratiquées entre janvier 1988 et juin 1991 à l'abattoir de Maiduguri, ville principale du Bornou (Nigeria), ont montré que sur 122 567 bovins abattus, 6 008 (4,9 %) étaient atteints de pneumonie et 777 (0,6 %) présentaient des lésions macroscopiques évocant la péripneumonie contagieuse bovine. Seuls 22 foyers sporadiques ont été rapportés pendant la même période dans le bassin du Bornou. Une discussion est consacrée aux raisons probables de la détérioration de la situation concernant cette maladie au Nigeria.


REAPARICIÓN DE LA PLEURONEUMONÍA CONTAGIOSA BOVINA EN NIGERIA. – D.R. Nawathe.


Entre enero de 1988 y junio de 1991, los exámenes postmortem realizados en el matadero de Maiduguri, capital del Estado de Borno (Nigeria) revelaron que, de 122.567 bovinos sacrificados, 6.008 (4,9%) padecían de neumonía y 777 (0,6%) tenían lesiones que sugerían la presencia de PNCB. Durante el mismo periodo, se notificaron únicamente 22 focos esporádicos dentro de la cuenca de Borno. El artículo trata de las razones probables del deterioro de la situación de la PNCB en Nigeria.

PALABRAS CLAVE: África Enfermedades de los bovinos Mycoplasma mycoides - Nigeria Pleuroneumonía - Prevalencia de enfermedades.
REFERENCES


