INDICATIONS FOR THE IMPLEMENTATION OF STAMPING-OUT MEASURES FOR ANIMAL DISEASE CONTROL IN AFRICA

K.V. Masupu
Department of Animal Health And Production, P/Bag 0032 Gaborone, Botswana.

Original: English

Summary: The report deals with the three approaches to the problem of fighting animal diseases: prevention, control and eradication. It discusses prophylactic measures, especially those described in the OIE International Animal Health Code. Factors to be taken into consideration when deciding to implement a stamping-out policy are outlined.

A questionnaire was sent to all OIE Member Countries in the region to gather data on their livestock populations, recent animal disease outbreaks, contingency plans which are in place in the event of an epizootic outbreak and the question of costs and compensation for farmers. A synthesis of the information received is presented, with an emphasis on the use of stamping-out.

Finally, the difficulties facing Veterinary Services with respect to the implementation of control measures are summarised. The appendix of this report describes the contagious bovine pleuropneumonia surveillance and control measures implemented in Botswana from February 1995 to December 1998.

1. INTRODUCTION

Prevention, control and eradication are three categories of actions used in relation to disease prophylactic activities. Prevention refers to measures taken to exclude diseases, or their causative agent from a healthy population, while control refers to actions taken to reduce the frequency of an existing disease to levels that can be locally tolerated. Eradication, on the other hand, refers to complete elimination of an existing disease or its causative agent from an affected population or area within a given time.

For the disease to be eradicated it must lend itself to easy case detection, surveillance and termination of transmission within the concerned population. These actions or lack thereof are motivated by concern for the welfare of both animal and human populations (1, 4).

It is important to understand the ways in which diseases influence animal welfare, limit animal productivity and affect directly and indirectly humans so that the benefits of adopting a particular disease prevention, control or eradication strategy may be properly evaluated (2).

2. DEFINITION AND INDICATION OF STAMPING-OUT-MEASURES

Eradication may be achieved through elimination of the agent from the environment or changing population resistance to infection or disease. The agent may be eliminated from the environment by killing the agent or killing the affected population through the implementation of stamping-out measures.

The OIE International Animal Health Code gives the following definition for 'stamping-out policy':

'Stamping-out policy' means carrying out under the authority of the Veterinary Administration, on confirmation of a disease, the killing of the animals which are affected and those suspected of being affected in the herd and, where appropriate, those in other herds which have been exposed to infection by direct animal to animal contact, or by indirect contact of a kind likely to cause the transmission of the causal pathogen.
All susceptible animals, vaccinated or unvaccinated on an infected premises should be killed and their carcasses destroyed by burning or burial, or by any other method which will eliminate the spread of infection through the carcasses or products of the animals killed.

This policy should be accompanied by the cleansing and disinfection procedures defined in the Code.

The term 'modified stamping-out policy' should be used in communications to the OIE whenever the above animal health measures are not implemented in full and details of the modifications should be given. (3)

Similar approaches are used to prevent and control animal diseases but a wide variation exists in adopting an eradication strategy, especially with respect to the implementation of stamping-out measures. An investigation into factors that are considered in adopting or not adopting the implementation of stamping-out measures has been undertaken through a questionnaire sent to the OIE Member Countries in Africa.

3. CONTRIBUTIONS RECEIVED FROM OIE MEMBER COUNTRIES

The questionnaire, aimed at gathering information on the criteria used when considering the implementation of stamping-out measures, was designed and distributed to all 43 OIE Member Countries in Africa.

Nineteen Member Countries responded, representing the 40 to 50 percent rates generally observed in such surveys. The countries having responded were: Algeria, Angola, Botswana, Burkina Faso, Central African Republic, Chad, Comoros, Côte d'Ivoire, Democratic Republic of the Congo, Ghana, Guinea, Morocco, Namibia, Senegal, Sudan, Swaziland, Tunisia, Zambia and Zimbabwe.

In the 19 Member Countries having responded to the questionnaire, the average size of the animal population was as follows: cattle: 19 million; small ruminants: 8.3 million; equines: 233 000; pigs: 226 000; poultry: 29 million; other: 275 000 (mainly camels from 8 Member Countries and ostriches in the remaining Member Countries).

Eleven of the twenty respondents did not indicate the proportion contributed by livestock to their gross domestic product (GDP). The remaining nine stated that livestock contribution to their GDP was dominated by cattle ranging from 1 million USD in Sudan to 17 billion USD in Namibia. The average percentage of livestock contribution to GDP amongst the nine Member Countries was 4.1% ranging between 0 to 20%. Percentage contribution to export earnings ranged from 0 to 40% with an average of 7%.

Fifteen of the responding members confirmed having experienced an epizootic (contagious bovine pleuropneumonia, foot and mouth disease, Newcastle disease or African swine fever) in their livestock population in the last few years (0-5 years), while three had remained free from a major disease outbreak during the same period. One country did not indicate its status during the reporting period. All members stated having had an exotic disease in their country but most did not have any written contingency plan as to how to deal with an outbreak of such a disease.

Response to diseases outbreaks varied according to livestock contribution to both GDP and export earnings. One-third of the countries (Botswana, Guinea, Namibia, Zambia and Zimbabwe) having experienced an outbreak of disease responded by implementing stamping-out measures to eradicate the disease. The cost of the operations ranged from 21 000 to 250 000 USD (see Appendix concerning Botswana's particular case).

About half of the cost was due to compensation accorded to livestock owners. Compensation was dispensed concurrently with quarantine and vaccination in four of the implementing countries. Livestock owners were compensated by national governments amounts ranging from zero in two of the Member Countries, to the average market value in the remaining countries (Botswana, Zambia and Zimbabwe).

The most common method of carcass disposal was by burning, burial or a combination of the two, and sometimes salvage.

In all the five countries where an epizootic was controlled by implementation of a stamping out policy, the disease was brought under control within a reasonable length of time.

Common constraints in implementing a stamping-out policy to control outbreaks of livestock diseases in Africa are characterised by inadequate resources to implement policies (eight countries), followed equally by lack of political
support and lack of financial compensation (four countries), resistance by livestock owners and effects on trade and agricultural systems (three countries), carcass disposal (two countries) and lastly animal welfare concerns and lack of staff inducement (one country). In some countries, concerns over the potential loss of genetic material when stamping-out policy is implemented has been a strong point that has sometimes influenced decisions not to adopt this policy.

4. CONCLUSION

Cattle is the predominant farmed species in the nineteen responding countries. Contribution of livestock to GDP and export earnings in individual countries is varied but of significant importance in some of them. Countries therefore react differently to disease outbreaks as the effect of such an outbreak is likely to vary from insignificant to drastic. Few Member Countries (33%) opted to eradicate disease outbreaks through the implementation of stamping out policy measures. The common constraint cited for failure to implement these measures is inadequate financial resources.

REFERENCES


CONTAGIOUS BOVINE PLEUROPNEUMONIA SURVEILLANCE AND CONTROL MEASURES IMPLEMENTED IN BOTSWANA FROM FEBRUARY 1995 TO DECEMBER 1998

Since contagious bovine pleuropneumonia (CBPP) was eradicated from Botswana, in 1939, the country remained free from the disease until February 1995 when it occurred in the Xaudumo Valley, Ngamiland district, in the extreme north-western part of Botswana. Xaudumo Valley is adjacent to the Kavango district of Namibia where CBPP is known to occur (4).

This paper presents the epidemiological situation relating to CBPP in Botswana and the measures taken to eradicate the disease.

1. IMPLEMENTATION OF CONTROL MEASURES

The immediate intervention to contain the disease and prevent it from spreading further involved dividing the affected area into infected, possibly infected or suspected of being infected, and non-infected or clear zones. These zones were separated by fences and pickets were placed at strategic points to restrict cattle movement (Photo 1). All clinically sick cattle in the infected zone were destroyed, while apparently healthy animals were identified and vaccinated with T1-SR CBPP vaccine produced locally by the Botswana Vaccine Institute (BVI).

During the epizootic, CBPP surveillance was conducted within the outbreak area and adjacent districts. Between October 1995 and May 1996 blood samples were collected from 78,917 cattle belonging to 2,142 kraals (family herds) in the Ngamiland district. Sampling was not randomized but every animal was sampled and bled (i.e., census sample). Sera were tested for Mycoplasma mycoides subsp. mycoides (small colonies) (MmmSC) complement fixing antibodies (1) at the National Veterinary Laboratory (NVL) in Gaborone.

Clinical cases were later observed outside the infected zone, an indication that the disease was spreading despite the measures being taken. Thus, in order to protect the adjacent CBPP-free cattle population and the welfare of their owners, vaccination was immediately stopped and the decision made to eradicate the disease by implementation of stamping-out measures. Evaluation of other control methods yielded very costly and uncertain outcomes.

On Good Friday of 1996, a meeting of livestock owners was addressed by His Excellency the President, who announces the adoption of an eradication strategy by stamping-out. Logistics were listed and sourced and a co-ordinator appointed.

Heavy plant machinery was used to dig trenches about 2 meter deep for burial of carcasses. Compensation was paid within 10 days of slaughter and staff were compensated for overtime worked. Relief measures were put in place in the form of labour intensive public works, issuing of food rations, delivery of water. During the eradication process, political leaders and civil servants addressed many meetings. This kept livestock owners content and supportive of the programme.

All statistical analyses of serological results were performed using BMDP statistical software (2). Specifically, the BMDP2D program was used for detailed data description and BMDP4F to perform trend analysis (Pearson Chi-square) of the proportions of CBPP-seropositive herds with respect to the month of testing. BMDP3D was used to test the difference in herd sizes between the positive and negative herds.

Three hundred and twenty thousand cattle were destroyed during the CBPP stamping-out measures (Photo 2). The unaudited costs to date stand at P 360 million (100 million USD). These do not include the cost of staff overtime, increased per diems, the increased incidence of other diseases and the risk of diseases introduction elsewhere in the country as a result of staff re-deployment, or the social cost to staff separated from their families for extended periods.

Currently, CBPP serosurveillance is being undertaken in a statistically selected sample in high-risk zones of Chobe and Okavango and in all abattoirs. Ngamiland has been restocked with 70,000 cattle, which are being strictly monitored through a stock card system and movement from the north of the district is restricted.
2. RESULTS

Table 1 gives the temporal distribution of the number of herds testing seropositive for MmmSC infection by month.

The median herd size for all the 2,142 herds tested was 23 cattle, whereas the median herd size of positive and negative herds was 78.5 and 21 cattle respectively. The global within-herd CBPP seroprevalence was 0.39% while the within-herd seroprevalence for the 126 positive herds was 4.89%. However, the prevalence of serologically positive herds (i.e., 126/2,142) was 5.88%. The difference in herd size between the two groups (positive and negative herds) was highly significant, while trend analysis showed a highly significant linear monthly increase in the proportion of herds testing positive ($\chi^2 = 152.34; p < 0.0001$). The sharp drop to 1.88% seropositivity in April 1996 was due to sampling being temporarily stopped during the month and should be considered an aberration.

Disease surveillance is currently being continued in CBPP high-risk zones of Chobe and Okavango. Purposive non-randomised sampling is undertaken due to the small transhumant population. To date, there have been two false alarms; in each case intensive follow-up testing yielded CBPP-negative results.

3. DISCUSSION

The highly significant linear monthly increase in the proportion of herds with antibodies is an indication of the rapid spread of the disease, possibly due to illegal movement of cattle across the different disease control zones. However, the level of within-herd seropositivity (0.39% overall and 4.89% in positive herds) and the level of infected herds (5.88%) found in this study was far lower than had been expected given the nature and speed of spread of the infection by month (Table 1). This may be due to the sensitivity and specificity of the complement fixation test under Botswana conditions, and the stage of infection at which the test was applied. It has been reported that chronic cases that have developed encapsulated sequestra (4) and those in the incubation period (3) might be missed by CFT. The highly significant difference between the mean herd size of positive and negative herds underlines the importance of management in the transmission of MmmSC infection among cattle populations. More specifically, it indicates that large herds are at greater risk of MmmSC infection than those of comparatively smaller size. The exact relationship between herd size and risk of infection is not known and this statement should therefore, be evaluated in the context of these data.

<table>
<thead>
<tr>
<th>Month</th>
<th>Number of herds tested</th>
<th>Number of herds positive</th>
<th>Percent positive</th>
</tr>
</thead>
<tbody>
<tr>
<td>October</td>
<td>111</td>
<td>0</td>
<td>0.00</td>
</tr>
<tr>
<td>November</td>
<td>164</td>
<td>3</td>
<td>1.83</td>
</tr>
<tr>
<td>December</td>
<td>467</td>
<td>16</td>
<td>3.43</td>
</tr>
<tr>
<td>January</td>
<td>290</td>
<td>12</td>
<td>4.14</td>
</tr>
<tr>
<td>February</td>
<td>311</td>
<td>17</td>
<td>5.47</td>
</tr>
<tr>
<td>March</td>
<td>134</td>
<td>33</td>
<td>24.63</td>
</tr>
<tr>
<td>April</td>
<td>373</td>
<td>7</td>
<td>1.88</td>
</tr>
</tbody>
</table>

4. CONCLUSIONS

The message these results convey is that CBPP is a disease of movement. Therefore, for a country like Botswana, which had been free from the disease for over fifty years, the best option for dealing with CBPP is eradication by total depopulation of cattle in the infected area, accompanied by intensive surveillance to guard against any future resurgence. Implementation of such a control strategy must, however, also take into account the financial and human resources of the country in question as well as the potentially devastating socio-political consequences of stamping-out measures.

Following careful evaluation, the Government of Botswana made the decision to apply stamping-out measures to all cattle in the Ngamiland district in order to eradicate CBPP from the country. The implementation of the above was successful and the country remains free from the disease.
Photo 1: Fence separating two contagious bovine pleuropneumonia control zones in Botswana.
The most important points to be monitored are where the fence crosses rivers.

Clôture séparant deux zones de contrôle de la péripneumonie contagieuse bovine au Botswana.
Les points les plus importants à surveiller sont ceux du franchissement des rivières par la clôture.

Photo 2: Slaughter of cattle within the framework of contagious bovine pleuropneumonia disease control

Abattage des bovins dans le cadre de la prophylaxie sanitaire de la péripneumonie contagieuse bovine au Botswana
Acknowledgements

The author is grateful to the OIE Regional Commission for Africa and the Director of Animal Health and Production, Republic of Botswana, for having provided the opportunity to present this paper. He also thanks Drs Agrey Majok and Saeed Akhtar, of the FAO Consultancy (TCP/BOT/4552 E), who helped in analysing the data, and the field officers and staff of the National Veterinary Laboratory, Gaborone, for their efforts in successful CBPP eradication.

REFERENCES


