Epidémiol. santé anim., 1997, 31-32

THE RESURGENCE OF CONTAGIOUS BOVINE PLEUROPNEUMONIA (CBPP) IN BOTSWANA IN 1995 : EPIDEMIOLOGICAL CONSIDERATIONS AND INTERVENTIONS

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On rapporte ici l'épidémiologie de la résurgence de la pleuropneumonie contagieuse bovine au Botswana en 1995, après une éclipse de plus de 50 années. Le principal agent de dissémination dans les conditions du Botswana a été identifié comme étant lié aux mouvements illégaux du bétail. Les mesures d'éradication adoptées comprennent le zonage et la fermeture des régions affectées, l'extermination totale du bétail et une surveillance intensive.

INTRODUCTION

Botswana has been free from contagious bovine pleuropneumonia (CBPP) since the disease was eradicated in 1939. In February 1995 CBPP occurred in the Xaudumo Valley, Ngamiland District, at the extreme north-western part of Botswana. Xaudumo Valley is adjacent to the Kavango District of Namibia where CBPP is known to occur (Schneider, *at al.*, 1994). This paper presents the epidemiology of CBPP under Botswana conditions and the measures taken to eradicate it.

MATERIALS AND METHODS

The immediate intervention to contain the disease from spreading further was to divide the affected area into red, yellow and green zones, representing the infected, possibly infected or suspicious, and non-infected or clean zones, respectively. These zones were separated by fences to restrict cattle movement. All clinically sick cattle in the red zone were destroyed, while apparently healthy ones were vaccinated with CBPP T_1 - SR /IEMVT strain 49 vaccine produced locally by the Botswana Vaccine Institute (BVI).

Clinical cases were later observed outside the red zone, an indication that the disease was spreading despite the measures being taken. Thus, vaccination was stopped immediately and a decision made to eradicate the disease by total depopulation. Seromonitoring started in October 1995, and by May 1996 blood samples had been collected from 78,917 cattle belonging to 2142 kraals (family herds). Sampling was not randomized rather every animal was sampled (i.e., census sample). Sera were tested for *Mycoplasma mycoides subsp. mycoides* (small colony) (*MmmSC*) complement fixing antibodies using the Complement Fixation Test (CFT) (Campbell and Turner 1953) at the National Veterinary Laboratory (NVL) in Gaborone. Results were reported as either positive or negative.

All statistical analyses were performed using BMDP statistical software (Dixon, 1990). Specifically the BMDP2D programme was used for detailed data description, and BMDP4F to perform trend analysis (Pearson Chi-square) on the proportions of CBPP seropositive herds with respect to month of testing. BMDP3D (t-test) was used to test the difference in herd size between the positive and negative herds.

RESULTS

Table I gives the temporal distribution of the number of herds testing seropositive for *Mycoplasma mycoides subsp. mycoides* (small colony) infection by month. The mean herd size for all the herds tested (2142) was 36.78 ± 36.37 (median = 23) cattle per herd; while the positive herds (n_1 = 126) and negative herds (n_2 = 2016) had mean herd sizes of 74.77 ± 44.26 (median = 78.50) and 34.40 ± 34.46 (median = 21.00) cattle per herd respectively. The within herd CBPP seroprevalence was 0.39% (median = 1.96%); while the within herd seroprevalence for the 126 positive herds was 4.89% (median = 2.55%). However, the herd level seroprevalence (i.e., 126/2142) was 5.88%. Herd size difference between the two groups (positive and negative herds) was highly significant at α = 0.05 (t-test = 12.50; p = <0001), while trend analysis (Pearson Chi-square) showed a highly significant linear increase in the proportion of herds testing positive by month (X^2 = 152.34; p = <0001) with peaks in March 1996 (24.63%) and May 1996 (23.17%).

DISCUSSION

The highly significant (X^2 = 152.34; p = <0001) monthly linear increase in the proportion of herds infected with *MmmSC* is an indication of rapid spread of the disease, possibly due to illegal movement of cattle across different disease control zones. The sharp drop to 1.88% seropositivity in April 1996 is because testing was temporarily stopped during this month and should be considered an outlier. However, the level of *MmmSC* seropositivity within herd (0.39%), within positive herd population (4.89%) and among herds (5.88%) in this study is far lower than had been perceived given the nature and speed of spread of the infection by month (see table 1). This may be explained in terms of sensitivity and specificity of the CFT under Botswana conditions, and the

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stage of infection (acute, subacute and chronic) at which the test was applied. It has been reported that chronic cases which have developed encapsulated sequestra (Schneider, *at al.*, 1994), as well as those in the incubation period (Hudson, 1972) might be missed by the CFT. The highly significant (t-test = 12.50; p = <0001) difference between the positive (mean = 74.77 ± 44.26) and negative (mean = 34.40 ± 34.46) mean herd sizes underlines the importance of management in the transmission of *MmmSC* infection among cattle populations. More specifically, it indicates that larger herd size holdings are more likely to be at higher risk of *MmmSC* infection than those of comparatively smaller sizes. This is because of increased management demands to control movement of larger herds under communal tenure system where cattle may stray far afield with increased risk of exposure from adjacent sources of infection. How large or small a herd size should be in order to be considered to be at a higher or lower risk of infection is not exactly known and therefore, this statement should be evaluated in the context of these data.

The message these results convey is that CBPP is a disease of movement. Therefore, for a country like Botswana, which has been free from the disease for over fifty years, the best option for dealing with CBPP is eradication by total depopulation of cattle from 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 manpower resources of the country in question as well as the potentially devastating social consequences of depopulation. Following careful evaluation, the Government of Botswana made the decision to depopulate Ngamiland District of all cattle (318000 or 20.30% of cattle population of Botswana) in order to eradicate CBPP from the country.

Table I

Temporal distribution by month of *Mycoplasma mycoides subsp. Mycoides* (small colony) seropositive kraals (herds), CFT results, October 1995 - May 1996

Month tested	Number of kraals tested	Number of kraals positive	Percent positive
October	111	0.00	0.00
November	164	3.00	1.83
December	467	16.00	3.43
January	290	12.00	4.14
February	311	17.00	5.47
March	134	33.00	24.63
April	373	7.00	1.88
May	164	38.00	23.17

Pearson Chi-square, X^2 = 152.34 (df = 7; p = <0001)

ACKNOWLEDGEMENTS

We are grateful to the Director of Animal Health and Production, Republic of Botswana for permission to publish this paper. Dr. Saeed Akhtar under the FAO Consultancy (TCP/BOT/4552 E) helped in the analyses of these data. We thank him most sincerely. Our thanks also go to the field officers and staff of the National Veterinary Laboratory, Gaborone, for their efforts in data collection and processing.

REFERENCES

Campbell A.D. and Turner A.W., 1953. Studies on Contagious Pleuropneumonia of Cattle, IV - An improved Complement Fixation Test. Australian Veterinary Journal, 29, 154 - 163.

Dixon W.J., 1990. BMDP Statistical Software. University of California Press, Berkeley.

Hudson J.R., 1971. Contagious bovine pleuropneumonia. Food and Agriculture Organization Agricultural Studies, No. 86, Rome: Food and Agriculture Organization of the United Nations, pp. 62 - 81.

Schneider H.P., van der Lugt J.J.; and Hubschle O.J.B., 1994. Contagious bovine pleuropneumonia. In: Coetzer J.A.W., Thomson G.R., and Tustin R.C. (ed), Infectious Diseases of Livestock, Vol. II. Cape Town: Oxford University Press, pp. 1485 - 1494.