



**SUMMARY OF COMMENTS AND DISCUSSIONS
FROM THE FAO ELECTRONIC CONFERENCE ON
CONTAGIOUS BOVINE PLEUROPNEUMONIA
(CBPP)**

*Contagious Bovine Pleuropneumonia –
To Eradicate, Control or Live with the Disease*

June – November, 2001

The designations employed and the presentation of the material in this publication do not imply the expression of any opinion whatsoever on the part of the Food and Agriculture Organization of the United Nations concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries.

The designations “developed” and “developing” economies are intended for statistical convenience and do not necessarily express a judgement about the stage reached by a particular country, country territory or area in the development process.

The views expressed herein are those of the authors and do not necessarily represent those of the Food and Agriculture Organization of the United Nations nor of their affiliated organization(s).

All rights reserved. Reproduction and dissemination of material in this information product for educational or other non-commercial purposes are authorized without any prior written permission from the copyright holders provided the source is fully acknowledged. Reproduction of material in this information product for resale or other commercial purposes is prohibited without written permission of the copyright holders. Applications for such permission should be addressed to the Chief, Publishing and Multimedia Service, Information Division, Food and Agriculture Organization of the United Nations, Viale delle Terme di Caracalla, 00100 Rome, Italy, or by e-mail to <copyright@fao.org>.

© FAO 2002

CONTENTS

List of acronyms and terms used

List of acronyms	iv
Introduction to the Electronic Conference	1
Preamble	2
Comments and Discussion	3
1. Control options – radical thoughts	3
2. Efficacy of current CBPP vaccines and research prospects in this area	5
3. Private versus public good in the control of CBPP	7
4. Use of antibiotics in the management of CBPP disease	8
5. Strategies for CBPP control	8
Appendix 1: Recommendations of the First meeting of the FAO/OIE/IAEA/OAU-IBAR Consultative Group on CBPP (October 1998)	10
Appendix 2: Recommendations of the Second meeting of the FAO/OIE/IAEA/OAU-IBAR Consultative Group on CBPP (October 2000)	14
Appendix 3: List of subscribers to the e-conference	22

LIST OF ACRONYMS

CAHW	Community Animal Health Worker
CBPP	Contagious bovine pleuropneumonia
CBPP CG	[FAO/OIE/IAEA/OAU-IBAR] Consultative Group on Contagious Bovine Pleuropneumonia
CFT	Complement fixation test
cELISA	Competitive enzyme-linked immunosorbent assay
EMPRES	Emergency Prevention System for Transboundary Animal and Plant Pests and Diseases
EU	European Union
FAO	Food and Agriculture Organization of the United Nations
HACCP	Hazard Analysis and Critical Control Points
IAEA	International Atomic Energy Agency
ISCOM	Immunostimulating complex
<i>Mmm</i> SC	<i>Mycoplasma mycoides</i> subspecies <i>mycoides</i> small-colony type
NGO	Non-governmental organization
OAU-IBAR	Organization of African Unity - Inter-African Bureau for Animal Resources
OIE	<i>Office internationale des épizooties</i> [International Office of Epizootics]
PACE	Pan-African Control of Epizootics
PCR	Polymerase chain reaction
SADC	Southern African Development Community
TADInfo	Transboundary Animal Disease Information System

INTRODUCTION TO THE ELECTRONIC CONFERENCE

[1] Contagious bovine pleuropneumonia (CBPP) made its initial entry into Africa in 1854, when an infected bull was introduced to Mossel Bay, South Africa, from the Netherlands. Nearly one hundred and fifty years later, the disease is still enzootic in large areas of sub-Saharan Africa. The whole of the West African subregion is infected. Most countries in Central and Eastern Africa are infected. Angola is still infected and the prevalence of the disease in the country is not known because of civil conflict. Currently, the disease is absent in most southern African countries, i.e. Botswana, Lesotho, South Africa, Swaziland and Zimbabwe, and parts of Namibia and Zambia.

[2] In the 1960s and 1970s, sustained research on CBPP in Kenya, Chad and other African countries, coupled with a massive international campaign – code-named Joint Project 16 – resulted in the disappearance of clinical disease from most parts of Africa. However, because of economic decline and poorly financed veterinary services, the disease made a spectacular comeback in the late 1980s and early 1990s. Today, more countries are affected by CBPP than was the case 20 years ago. The near eradication of rinderpest from the continent and the cessation of vaccination have meant that government resources for veterinary services have been drastically reduced, thus creating a potential danger of further decline in the effectiveness of veterinary services. Introduction of cost recovery as part of economic policy change has had, in some cases, a negative effect on the coverage levels for CBPP and other disease vaccination programmes. CBPP qualifies as an ‘international public good disease,’ but in many instances it has become confused ‘with private good disease,’ resulting in loss of control and further spread of the disease. With this scenario in the background, FAO/OIE/IAEA/OAU-IBAR organized a joint consultative group meeting on CBPP in Rome in 2000.

[3] Under the difficult circumstances of multiple outbreaks and unrestricted animal movements, one could ask “What are the control options available to countries?”

[4] The objectives of the electronic conference were therefore to:

- ✍ provide a forum for sharing views on the various options available for CBPP control. These options reflected the particular epidemiological circumstances of the disease in each country, and the economic and infrastructural capacities to effect control;
- ✍ discuss the efficacy of the current vaccines available for control of the disease;
- ✍ consider the legal framework with respect to control options, especially for animal movements;
- ✍ examine modalities for the rational involvement of non-governmental organizations (NGOs) and Community Animal Health Workers (CAHWs) in the control of CBPP;
- ✍ evaluate the uses of antibiotics as curative or prophylactic measures, alone or in combination, in the face of an outbreak; and
- ✍ assist in the finalization of a draft paper on *Strategies for CBPP control in Africa*.

[5] This FAO electronic conference (e-conference) was planned as a forerunner to an FAO consultative meeting to be held in Rome in the future. Consultative group meetings have often afforded the opportunity for experts to express varied opinions on issues of technical significance to FAO’s mandate. Using this approach, it was hoped that stimulating discussions on the pressing issue of CBPP control could be generated.

PREAMBLE

[6] The first meeting of the FAO/OIE/IAEA/OAU-IBAR Consultative Group on Contagious Bovine Pleuropneumonia (CBPP CG) was held in June 1998 in response to the situation in Africa, where CBPP was spreading uncontrollably. This meeting focused on the wealth of new data accumulating on the causative organism of CBPP, *Mycoplasma mycoides* subspecies *mycoides* small-colony type (*MmmSC*). Disease status, current knowledge and research directions were summarized under the headings of Epidemiology; Causative agent; Vaccines and vaccination; Research needs; and Surveillance and control strategies. A summary of the recommendations made by the experts appears in Appendix 1.

[7] The second meeting of the FAO/OIE/IAEA/OAU-IBAR Consultative Group on Contagious Bovine Pleuropneumonia, held in October 2000, updated the situation in Africa and, while mindful of research advances, concentrated on the veterinary aspects of the disease, with a view towards control and the plausibility of eradication. Problems in the field, in the delivery of veterinary services, and cost recovery were discussed under the topics Status in Africa; Disease and diagnosis; Surveillance; Vaccines; and Control strategies for Africa. Working groups considered Research priorities; Control strategies for West Africa; Control strategies for East Africa; and Progressive control in SADC countries. A summary of the recommendations of the working groups is given here in Appendix 2.

[8] The FAO e-conference reported here was intended to stimulate debate on key issues in preparation for the third FAO/OIE/IAEA/OAU-IBAR Consultative Group meeting. It was decided to base the conference on e-mail communication among the participants to the 2nd Consultative Group meeting on CBPP (October, 2000). Others participated in the conference through the Internet or by direct contact with the moderator. There were 47 subscribers in all, and they are listed here as Appendix 3. Excellent contributions were received from (in alphabetical order): William Amanfu; Yves Cheneau; J. Domenech; Guy Freeland; Martyn Jeggo; Joseph Litamoi; Jeff Mariner; Tony Musoke/David Mwangi; Roger Paskin; Theresa Ponela; Alain Provost; Peter Roeder; Mark Rweyemamu; Francois Thiaucourt; Gavin Thomson; Paa Kobina Turkson; and Roger Windsor. The summary of comments and discussions presented herein includes portions of text as offered by the contributors, while many of the points discussed in earlier Consultative Group meetings are incorporated as appropriate.

COMMENTS AND DISCUSSION

“What do we do with CBPP? We cannot afford to sit down as a profession and watch while cattle saved from another devastating disease, rinderpest, are decimated by CBPP. If then, what have we gained?”

1. CONTROL OPTIONS – RADICAL THOUGHTS

[9] “... I find little that is new in all the very interesting debate.” Yes, many of the points discussed during this e-conference have been discussed before, but has anything been done since? The fact remains that we already have the means to [start to] deal with CBPP, imperfect though they may be, but we do not have the resources, and probably are unlikely to get them in the near future. Even if we had the ideal vaccine and diagnostic test, does it mean that all governments would automatically commit millions of dollars to CBPP eradication? Research funding for CBPP is unlikely to increase in the near future. Government funding for CBPP control or eradication will, in most countries, simply not be forthcoming. At the very least, this means no improved vaccines and no better diagnostic tests in the next decade or more.

[10] With the realization that sustained control efforts would not be possible, the report of the first CBPP CG meeting suggested the zoning of target regions into varying epidemiologically demarcated action zones (see Appendix 1). Could zonation still work? Could areas within regions embark on the OIE pathway towards CBPP eradication and eventually be granted freedom from disease status, regardless of political borders? Would this increase their trading options and wealth and motivate other areas to do the same?

[11] The second CBPP CG meeting concluded (even with the promise of better vaccines and diagnostic tests), that it was possible in the near future only to envisage enhancing the existing systems of CBPP control to suppress the incidence of disease in the endemic maintenance zones and strengthen the protection of free areas (see Appendix 2). Could HACCP for production systems in areas or regions help in the identification of appropriate actions for the maintenance of free areas and for CBPP eradication schemes? Would this lead to progressively more effective control, and reduce the extent of endemic maintenance areas and the risk of CBPP movement to peripheral areas?

[12] The current CBPP problem is not so much that of technology, but rather one of under-funded or partially dismantled veterinary services, or both. The total infrastructure of veterinary services, culture, etc., need to be changed. When viewed in its entirety, the eradication of CBPP from Africa seems to be an insurmountable task, but does it seem equally daunting if regions and sub-regions were to be considered? This calls for the formulation of regionally coordinated disease control strategies. We have to decide what to do now, with the present tools. “So let’s roll up our sleeves and start being realistic,” was the call from one of the contributors, who offered some practical ideas on the types of controls that were possible now (see table).

Possible actions	Disease Situation			
	Control not seen as important	Endemic Control important, strong government commitment	Resources insufficient or control not important	Epidemic Control important
Stamping out	No	Only if disease incidence reduced to sufficiently low levels	No	Yes – slaughter entire affected herds, with compensation
Mass official vaccination	No	Yes – sustained whole-population vaccination with careful surveillance to monitor progress towards 'end-point'	No	Perhaps – to create a temporary 'immune curtain' where considered practicable
Private vaccination	Yes – private Vets, NGOs, CAHWS, etc.	Could be allowed at the beginning of strategy, could also harness help from NGOs, CAHWS, etc.	Yes	Probably not
Private antibiotic use	Yes – private vets, NGOs, CAHWS, etc.	Probably not	Yes	
Movement control	No	Yes	Maybe	Yes
Public awareness	Yes	Yes	Yes	Yes

[13] The establishment of the true prevalence rates of CBPP in infected countries is a crucial prerequisite to mounting a successful disease control programme, and a precursor to national efforts. Current diagnostic assays are suitable for the critical area of conducting prevalence studies. In fact, it is now easier than before to estimate the prevalence of CBPP, using serology and pen-side antibody detection tests. The only way to know the actual prevalence is the demonstration of the causative organism in the host. Effective epidemiology requires accurate data. Currently the best means for such investigations remains the rational use of abattoir and slaughter slab inspection. Clinico-pathological surveillance of CBPP is relevant in Africa, but good record keeping and reporting systems would be required. This assumes a reliable network of field officers to collect specimens and ensure that they reach a functional CBPP diagnostic laboratory to be analysed, interpreted and reported. Rapid laboratory or pen-side tests for the detection of *MmmSC* would therefore be most useful. Such data would allow cost benefit analyses on a range of control and eradication options. How many functional CBPP laboratories are there, could they be identified, and would their National authorities allow their use for regional purposes?

[14] The lack of adequate veterinary and extension services, transport and the absence of laboratory facilities in many African countries make this task difficult to achieve. Thus, the project coordination unit of the Pan-African Control of Epizootics (PACE) is urged to instigate and fund the establishment of sustainable field and laboratory surveillance methods for CBPP, perhaps through a Pan-African Laboratory Network (PAL). Key laboratories require adequate mycoplasma culture facilities, could use at least the currently available serological tests, including the complement fixation test (CFT), competitive enzyme-linked immunosorbent assay (cELISA), and polymerase chain reaction (PCR)-based tests. PAL would offer many advantages in troubleshooting, training, exchange of reagents and the collection of epidemiological data in a sustainable and cost-effective manner. Newer molecular tools, such as insertion sequence (IS) and amplified fragment length polymorphism (AFLP) fingerprinting, that allow the differentiation of strains of *MmmSC* have been developed and these could be used for traceback studies; but they require isolated *MmmSC*. Molecular epidemiology could enhance the understanding of the movement of *MmmSC* within the ruminant population in a region or a country, and reveal covert cattle movements.

[15] Need was seen for research to be carried out with the aim of determining incentives and disincentives for people reporting disease, and then exploiting those factors that tend to increase

incentives. This is necessary because priorities and willingness to cooperate change with time and therefore these may need to be revised as appropriate.

[16] If we are looking at Africa as a whole, and if not, then at least regions of Africa that encompass more than one African member state, as the target for disease control, then we should not simply paint in the whole country as infected but strive to delineate the areas within each country that are infected and thereby arrive at a more detailed map of infected areas within the regions. Application of the Transboundary Animal Disease Information System (TADInfo), or any computer-based geographical information system (GIS), could be used to great advantage in CBPP control. At least a more detailed epidemiological database would help plan a focused approach, with strategies tailored to match the prevalence in order to quickly react towards eradication of the disease from recently or lightly affected areas or isolated pockets, and then perhaps move on to areas where the disease is endemic.

[17] "I believe that one should go ahead and do something to combat CBPP without waiting for sound prevalence studies to be implemented." Simply, where CBPP prevails and there is no control programme, the prevalence of the disease is likely to be high. Therefore, appropriate control measures should be implemented in a wide area without the precise knowledge of prevalence. It is evident that strict cattle movement control is not feasible in most of the African continent at present. A more realistic option remains mass vaccination with high coverage using good quality certified vaccines. This requires a high level of positive political will, because sustained and coordinated efforts over several years would be required for progressive control by vaccination, leading to eventual eradication by the interruption of the transmission cycle. Efforts from community-based animal health workers (CAHWs), and private sector contractors that can cater for nomadic populations, may be required.

[18] The prevalence may vary, but before we embark on campaigns to determine prevalence or vaccinate, or indeed any other intervention, activities require careful pre-planning. In central Africa, mistakes may have been made in the sensitization process, stakeholders and pastoralists were not informed adequately about the possible side effects of the vaccine, e.g. reactions at vaccination site and a percentage loss, and this has led to much loss in confidence. All efforts must also be made to ensure that the reporting system includes the customer. Thus, field services need to be restored and must include clinico-pathological surveillance systems and pharmacovigilance systems. This would result in proper field evaluation of vaccines and antibiotics. There is no reason why control measures could not be taken now, and whilst prevalence and other studies are being conducted.

[19] Together with data on prevalence, hopefully CBPP can gain its proper standing and attention as a genuine OIE List A disease.

2. EFFICACY OF CURRENT CBPP VACCINES AND RESEARCH PROSPECTS

[20] Current vaccines can be effective if properly deployed, by using the correct dosage and ensuring efficient delivery of the vaccines. Recent trials show that they are protective, although they also show that T₁ 44 was better than T₁ SR. Failures need to be investigated. Boosting the responses with co-administration of immunomodulators may warrant further research. Repeated vaccination with T₁ 44 would be sufficient for decreasing disease in a national herd. This is not happening at the moment in most countries, and this explains why the vaccines are being condemned. It is essential that six-monthly vaccination is carried out when a vaccine confers immunity for six months and thereafter immunity wanes over the next six months, but mathematical modelling will show that failure to do so may be worse than the epidemic itself. Not only does this delay the epidemic, but also it does not significantly reduce the number of cattle infected in the epidemic, i.e. to the owner and the field worker it may seem a waste of time. Perhaps this is another reason for the apparent lack of effectiveness of recent vaccination programmes.

[21] Many countries have succeeded in controlling and even eradicating CBPP in the past using relatively simple tools and often without any understanding of the immunology of the disease at all. The key factors in these situations were movement control and effective compensation after stamping-out policies, i.e. political will and the right legislative framework. It still took 50 years in some cases.

[22] For these reasons, we could do with a better vaccine, but control measures must commence immediately, reviewed regularly in the light of current understanding, and modified accordingly. “We do not have to wait until all the basic immunological events occurring in affected cattle are clearly understood.”

[23] “Getting more potent new vaccines is certainly not far-fetched.” The track record for new CBPP vaccine development is poor and attempts to do so, ranging from the modification to streptomycin resistance of the T₁ 44 vaccine to the recent immunostimulating complex (ISCOM) preparation, have left much to be desired; some might call them failures. This represents many years of public-funded research, and seems to suggest that empirical vaccine preparation without prior knowledge of the protective antigenic components of *Mmm*SC is fraught with risk.

[24] The more we move forward with CBPP control, the more it is essential to unravel the basic immunology of this disease. Africa has already been waiting for many years for more information on CBPP immunology. In fact, very little research has been done on CBPP since the 1960s, although it has picked up in the last five years. The perception is that a relatively small investment is needed now to produce new generation vaccines, and the work would not take too long to complete. A vaccine destined for the protection of an individual animal may need to be quite different from one that is capable of protecting the national herd. We need to know more about the cellular and humoral responses in the establishment of immunity. Only when we understand these will it be possible to develop appropriate vaccines and diagnostic assays that will be meaningful in the context of control and eradication strategies. It is often said that we do not have far to go before we will be able to understand the basis of protective immunity in CBPP. The completion of this work is an essential precursor to further work being undertaken on vaccines or diagnostic assays. More funds have been allocated for study into the protective cellular immunology of CBPP as part of the larger, EU-funded project, granted to the World Reference Centre in Montpellier, France, and we are promised that new vaccines will be available shortly.

[25] The establishment of improved diagnostic reagents will also rely heavily on the results of immunological studies and genome analyses, especially if carriers are to be identified. Again, a test capable of accurate diagnosis of an individual animal will have to perform very differently to a test that is adequate for the assessment of herd immunity. New tools would have to be developed to detect chronic carriers, and smarter, more reliable tools would be required to switch from the present herd-based diagnosis to individual diagnoses. Realistically, more and better directed funding from international and national research organizations is required.

[26] Coordination may be crucial to the timely success of research efforts, and the FAO/IAEA Coordination Research Programme (CRP) on the *Diagnosis and Control of Contagious Bovine Pleuropneumonia (CBPP) in Africa* provides a forum for dialogue between the stakeholders. It is a link between the various activities of PACE and regional FAO CBPP programmes.

3. PRIVATE VERSUS PUBLIC GOOD IN THE CONTROL OF CBPP

[27] Is CBPP a major problem for farmers, i.e. the production of meat, or to the country, i.e. transboundary trade? There must be no doubt that CBPP is a major concern for many pastoralists throughout east, west and central Africa. Hence there can be no question of whether it is a private or public good, because clearly it is both. Therefore the argument here is how much, and for what services, is it appropriate for the financial burden to be borne by producers, and how much should be the governments' contribution.

[28] To some, CBPP had become a private good in all regions where CBPP was enzootic and where the state was not able, or willing, to implement any control strategy. Very often in this situation owners coped with the disease with antibiotic treatments. Private-sector service delivery can have little effect other than palliative, and damping down the worst effects against a background of continued and relentless spread throughout the few still-unaffected populations.

[29] Others disagreed that CBPP is an international public good, which can only, and indeed must, be controlled or eliminated through the large, long and totally committed investment of public funds in massive national and regional control programmes. The reasons for this were that:

- ✂ anything less than 100% commitment – political, social and economic – would result in failure;
- ✂ really efficient vaccines, giving the wide levels of protection required without side-effects, will probably never be available; and
- ✂ enthusiasm during a long campaign will wane and complacency will set in as incidence of disease decreases.

[30] Therefore, at least until there is more homogeneity of perception and fear for the consequences of CBPP – and that these perpetually outweigh the perceived costs and penalties of any mass control programme – control of this disease should largely be treated as a private responsibility, and our research, development and extension activities should focus on tools and systems that enhance an individual's choice and opportunity (through a veterinarian or animal health worker) to effectively diagnose, treat, vaccinate or otherwise protect their own stock from the depredations of CBPP.

[31] "... Public good services must be resuscitated if anything effective is to be done" was a strong comment that should be upheld, because the political lead, legal and strategic framework would probably come from the public sector. Another said,

"Are we satisfied with this [current CBPP] situation and do we wish all African countries to become infected and reach the enzootic stage of the disease? This is what would certainly happen if we decide to classify CBPP as a private matter and leave to the owner alone the task to cope with it. Deciding that Africa will remain CBPP infected for good (the consequence if CBPP is considered a private matter) necessarily means that Africa will also be kept out from international animal trade for ever as all the other continents will be CBPP free. Is it what is to be wished?"

[32] Even so, opportunities for synergy between private and public sectors in the control of CBPP are plentiful, but these must be carefully planned to ensure continued mutual advantage. This was the consensus: palliative interventions and therapies were private good; vaccination may be a private good (if it guaranteed protection of the recipient animal), or a public good (national herd immunity); surveillance and epidemiology were public good. Effective coordination of research and to maintain disease-free areas, support for the development of better tools, information systems, and establishment of an enabling environment were public good.

4. USE OF ANTIBIOTICS IN THE MANAGEMENT OF CBPP DISEASE

[33] There is a strong perception that the use of antibiotics at least predisposes infected animals or may cause infected animals to become carriers of CBPP, echoed by the comment “Private antibiotic use – THIS SHOULD NOT BE ALLOWED UNTIL THE RESULT OF THE TRIAL IS KNOWN.” There is little information on the effect of treatment on the generation of carriers, and, in fact, on the role of carriers in the spread of the disease.

[34] It is unfortunate that only a small number of attempts have been made so far to evaluate, in the field, the spectrum of antibiotics that have proven efficacy against *MmmSC in vitro*. Moreover, such attempts were poorly funded and hence poorly designed. It was proposed that considerable effort be placed on seeking funding to address these issues before advocating the wide use of antibiotics.

[35] “If the veterinarians do not use an antibiotic, the farmer will get it and use it ...” is the reality in the field. Often a cocktail of antibiotics is used when CBPP is involved. These may be any combination of the following: oxytetracycline; penicillin/streptomycin combinations; and tylosin. Some of the reasons why the use of antibiotics is not recommended for CBPP are:

- ✍ There is too much tissue damage in CBPP, so an effective dose of antibiotic cannot be reached at the site of infection and is not lethal for *MmmSC*.
- ✍ Tetracyclines are bacteriostatic not bacteriocidal, and the host kills and eliminates the mycoplasmas. Erythromycin is said to be bacteriocidal but there is no proof.
- ✍ Pathology of Botswana CBPP was different to that in east Africa. – sequestra were liquid, generally without capsules, and this was thought to be caused by antibiotics. However, comments from other participants suggested that the liquefied lesions observed in Botswana might be a stage in the progressive development of sequestra. Similar lesions were observed in experimental vaccine studies in the Cameroon.

[36] Antibiotics are used freely in the field and, from hearsay; it is thought to help some clinically-ill animals. That chemotherapy helps one or millions of cattle may not be the point here, but rather do the antibiotic therapies currently in use provide bacteriological sterility from *MmmSC*? This is what is required if eradication of the disease, i.e. freedom from disease and freedom from infection, is the desired outcome. Nevertheless, in endemic settings, in the absence of the realistic availability of other effective interventions, farmers should treat and it should be officially permitted.

[37] Treatment may be the only tool within reach that might actually be able to eradicate CBPP in the current technical and socio-economic climate. Research on treatment to ascertain which antibiotics may be useful and the field situations that warrant their use, validation of regimes, and documentation of any adverse effects, should be a high priority. Of the research options, money invested in determining the true efficacy and risks of treatment would probably be of the most direct benefit to farmers, given the reality of what is going on in the field.

5. STRATEGIES FOR CBPP CONTROL

[38] “So why has CBPP re-emerged in recent times, with devastating consequences?” Where did it all go wrong? In the light of recent circumstances, it is not difficult to ascertain the reasons why there is a marked deterioration of the disease status of CBPP in Africa, and the most significant of these is insufficient funding of national veterinary services. The lack of close surveillance almost certainly means that the extent of the disease in Africa is not fully realized. There is a decrease in the number of foci in Namibia, but increasing incursions of disease into Zambia from Angola. Solutions such as animal (cattle) movement control are usually not practicable in many parts of the continent. In some cases, such as Botswana, the disease is truly ‘transboundary,’ but where free trade – legal or illegal – and sharing of stock between relatives across boundaries exist, the label is less adequate. The idea of animal movements that are out of

control also fades when there are no systems to control animal movement in the first place. Transhumance, drought and culture often complicate this situation further

[39] The steady deterioration in the competence and motivation of veterinary staff is compounded by inadequacy in the funding of veterinary services.

[40] The lack of movement control certainly contributes to the spread of disease, but conflicting views on movement control were offered. Depending on the disease situation, it was proposed that movement control could be relaxed in favour of private vaccination and private antibiotic treatment when the disease was endemic and control not important. However, in every other disease situation, movement control was necessary. Stronger views were also offered where movement control was thought to be essential in all disease situations, and a system of permits and passports for its regulation was suggested, but who would police it? Movement of cattle was kept under control in Botswana by the construction of fences and checkpoint control, but perhaps more importantly, a high profile campaign was mounted to educate and convince the cattle owners of the importance of CBPP control.

[41] The discussions of the second CBPP CG meeting (see Appendix 2) noted that total eradication should be the eventual goal, and that veterinary services and contagious disease control should be accorded a higher priority by governments. Lack of data and policy advice were a hindrance to strategic planning. The conclusions were arranged in terms of regions, but reported country by country. However, the desirable actions for CBPP control roughly followed areas with a particular disease status. These were their recommendations:

- (a) Where the disease was endemic, the suppression of disease incidence was the best that could be achieved, and it is assumed that this could be done with vaccination and antibiotic therapy. Clinico-pathological monitoring may be useful. For the present, CBPP control could only be limited to holding actions aimed at reducing the risk of further spread into new areas.
- (b) Areas that were not affected but were bordered by infected areas should receive free vaccination, with sero-surveillance performed outside the areas.
- (c) Free zones should never receive vaccination, but be serologically monitored regularly. All efforts should be made to strengthen the protection of free areas.

[42] Any plan for CBPP control must be systematic and viewed in terms of regions and not political borders. It must be so because the measures taken by any country have a direct bearing on the disease status of neighbouring countries, and more so now. Regional recognition of CBPP status must prompt concerted efforts to (1) coordinate the management of resources, (2) accurately describe the extent of CBPP by the enhancement of field and laboratory surveillance, (3) actively sensitize the population and promote dissemination of relevant information. These data should be used for accurate zonation of the region(s) to an extent where the three points above could be tailored to fit the needs of the zones. Some of the principles of HACCP could result in relevant and economical adjustments of these processes, which could change in time.

[43] The consequence of CBPP disease is devastating, but efforts must be made to quantify the extent of the damages. Thus, proper socio-economic evaluation of the impact of CBPP and cost-benefit analyses of various control measures could be made to convince stakeholders of the need for action. This matter should be brought to the attention of national Ministries of Agriculture at the highest level in appropriate regional forums and at national level through PACE national activities. Political will must be built for the necessary legislative back-up to be provided.

APPENDIX 1

EXTRACT FROM THE REPORT OF THE

FIRST MEETING OF THE FAO/OIE/IAEA/OAU-IBAR CONSULTATIVE GROUP ON CONTAGIOUS BOVINE PLEUROPNEUMONIA

Rome, Italy

5–7 October, 1998

RECOMMENDATIONS

1. Strategy development of an integrated and coordinated regional control programme

1.1 FAO and its partners should formalize the consultative group (CG) in order to ensure its continuation as a body that will provide guidance on CBPP control and research. Standing members of the CG would include FAO, OIE, OAU–IBAR, FAO/IAEA, the newly recognized World Reference Laboratory for CBPP, and other appropriate collaborating centres and individual specialists. The Secretariat will be hosted by FAO.

1.2 The CG should prepare, in consultation with concerned countries, a strategic plan for the improved control of CBPP. A fully comprehensive programme for the progressive control of CBPP throughout the world, with special focus on Africa is to be implemented. The ultimate goal is eradication following the OIE pathway in accordance with the International Animal Health Code.

1.3 It was recognized that the FAO/EMPRES group possesses the required skills to advise on standardized surveillance systems at continental and national levels, and to establish guidelines for these. It was recommended that these guidelines should be implemented through regional networks, such as those already existing in OAU–IBAR and SADC. In conjunction with data from socio-economic studies, the baseline data generated would be used for the economic analysis and disease modelling of optional control strategies.

1.4 It was recognized that there is a shortage of funds for CBPP control at the regional and, in most cases, national levels and that most future initiatives will require donor assistance for funds and resources. It was therefore recommended that the newly established CG should invite donors to participate in CG meetings as observers.

2. Surveillance, modelling and economics

2.1 FAO and partners should prepare appropriate standards, supported by clear documentation, and training materials, for: abattoir surveillance; serological surveillance; and clinical disease search.

2.2 FAO/IAEA, in collaboration with their partners, should prepare appropriate standards, supported by clear documentation, and training materials, for laboratory diagnosis.

2.3 National CBPP committees, through their epidemiology network, will generate baseline data for economic assessment of the disease to determine its true costs and impact. Furthermore, disease modelling is recommended to investigate the efficacy of ongoing control programmes and to develop other cost-effective control options.

2.4 Detailed field and laboratory studies should be made to further elaborate the epidemiology of CBPP. In particular:

- ✍ The risk of transmission from recovered cases/lungers – breakdown to transmission.
- ✍ The effectiveness of chemotherapy and its effect on development of carrier state.
- ✍ The possible reversion to virulence of live vaccines.
- ✍ The persistence of infectiousness after recovery from disease and sub-clinical infection.

2.5 The development of robust sampling and transport methods for antigen and antibody detection systems should be undertaken.

2.6 The development of new molecular typing systems should be actively encouraged and their results continually related to accurate field surveillance data in order to establish reliable and meaningful molecular epidemiology.

3. In-country capacity building to support the strategy

3.1 Public Veterinary Services should have a strong central authority supported by clear, implementable legislation, with adequate human and financial resources.

3.2 A national CBPP committee should be established in each country concerned. It should comprise among its members a veterinarian with recognized expertise in CBPP, having the responsibility of liaising with the CG and the appropriate regional organizations (e.g. OAU/IBAR, SADC, etc.).

3.3 The public sector should be encouraged to examine the feasibility of sub-contracting vaccination against CBPP to the private sector, including NGOs and veterinarian-supervised community-based animal health workers (CAHWs). In addition, it is proposed that governments could subsidize the supply of vaccine in order to increase vaccination coverage.

3.4 National Authorities should endeavour to deploy as necessary trained workers for CBPP diagnosis, surveillance, research and control.

3.5 Efforts should be made to establish CBPP research laboratories on a regional basis. The allocation of the laboratories should be determined following an evaluation exercise of the present facilities in Africa. Adequate finance, equipment and materials should be provided to the laboratories for efficient functioning. In addition, an enabling environment should be provided to retain scientists and support staff.

3.6 It is proposed that when budgets for CBPP control are being established a defined proportion (5 to 10%) be allocated for research purpose.

3.7 As far as possible, research on CBPP should be carried out in African institutions.

3.8 Veterinary curricula should emphasise CBPP, and continuing education should be encouraged to up-date field veterinarians with the latest knowledge in diagnosis, epidemiology and control. Additionally, there should be access through the CG Secretariat to a complete collection of archival and recent published reports and studies pertaining to the control of CBPP.

3.8 Information and communication systems should be put in place to monitor the efficiency of the adopted strategy. This will enhance general awareness and sensitize politicians, administrators and breeders on the importance of CBPP control/eradication.

4. Vaccine production, research and quality assurance

4.1 This meeting noted that the use of KH₃J in CBPP vaccination was no longer recommended by OIE.

4.2 The use of bivalent rinderpest–CBPP (Bisec) vaccine is no longer advisable.

4.3 On account of field observations, which have cast some doubt on the immunogenicity of T₁ SR, the use of this strain in CBPP vaccines should await the results of conclusive cattle

efficacy trials. For the time being, T₁ 44 remains the recommended seed strain. A reference seed lot, which has been jointly produced and tested by the Pan-African Veterinary Vaccine Centre (PANVAC) and EMVT, can be obtained from PANVAC.

4.4 Specific *in vitro* tests for definitive vaccine seed strain identification are needed.

4.5 The OIE manual section on vaccine culture inoculation needs to be revised to avoid the risk of inadvertent cloning of vaccine seed culture. One way may be to inoculate the whole contents of a vaccine seed vial directly into 100 ml of medium. After incubation, this can then be used to inoculate vaccine bulk cultures.

4.6 Noting PANVAC's results of 957 titrations on 319 CBPP vaccine batches from 10 different producers, the meeting considered that the mycoplasma content for the 100-dose pack is only marginally above the OIE minimum requirement. Consequently, it is recommended that vaccine manufacturers should strive to limit the prescription of the number of doses per vial, as currently constituted, to only 50.

4.7 It was also noted that there is a need for vaccine packs of 10 and 20 doses, especially for use in small-scale holdings and pastoral areas.

4.8 Means of increasing mycoplasma final titre should be investigated, e.g. through the fermentation process. Such products should be fully quality controlled, including testing in cattle, before they are adopted for routine use.

4.9 Procedures to improve the thermostability of vaccines should be defined, e.g. optimized freeze-drying cycles using appropriate excipients or stabilizers.

4.10 Research aimed at the development of vaccines of defined antigenic or genetic character using conventional and/or recombinant DNA technology should be encouraged. Such vaccines would be expected to be less reactogenic than the current T₁ 44 and to be able to confer regularly an immunity that lasts longer than one year.

4.11 There is a need for a wider use of experiments in cattle, in Africa, for evaluation of various aspects of vaccines, including determining the immunizing dose, route of administration, onset and duration of immunity, and evaluation of various formulations.

4.12 Research on the application of the ISCOM technology, which now offers an opportunity to study antigen delivery systems, adjuvant formulations, definition of antigenic determinants and a re-examination of the killed vaccine alternative, should continue to be supported.

5. Standardization and improvement of diagnostic procedures

5.1 National Laboratories should strive to obtain recognition of proficiency using standardized assays (Standard Operating Procedures), well-defined controls, and compliance with external quality assurance schemes and national or international veterinary laboratory accreditation schemes.

5.2 The ability to both detect the causative agent (or part of it) or antibody to it at the cow-side is considered important at the herd level for CBPP control and eradication programmes. A number of assays are under evaluation and support should be given for their further evaluation and validation.

5.3 It is essential that national laboratories have an ability to isolate and identify the causative agent of CBPP. Standardized procedures for the culture and identification (including descriptions of the broth and reference sera) should be prepared and distributed. National laboratories in infected countries should ensure that the necessary reagents and skills are available to ensure that this can be carried out.

5.4 Whilst PCR is an invaluable tool both for initial confirmation of a diagnosis and for more long-term molecular epidemiology studies, it is difficult to standardize and quality assure. It is

recommended that, as a minimum, the African CBPP Reference Laboratories should have a capability to carry out PCR for CBPP.

5.5 Competitive ELISA (cELISA) could prove a useful method for rapid antigen detection at the laboratory level and studies should be undertaken to develop and validate such an approach.

5.6 Whilst CFT is the OIE prescribed test it gives rise to false positives, is difficult to quality assure and rather costly. Initial studies on a competitive ELISA (cELISA) show great promise and the validation work on the cELISA and its comparison to the CFT should be completed as a matter of priority. If this assay shows equal or greater sensitivity and specificity to the CFT it should be adopted by the OIE as a Prescribed Test and an internationally standardized kit should be made available to infected countries in Africa.

5.7 It is likely that even with the cELISA some false positives will occur. It is recommended that the immunoblot assay (IBT) be used as a confirmatory test and in the validation of the cELISA, positive sera should be re-tested using this assay.

5.8 Antibody assays that clearly identify vaccinated animals and, separately, infected animals will be vital for surveillance studies. Current assays (CFT, cELISA) do not achieve this and every effort should be made to ensure that such assays are developed as a matter of priority. Equally, an assay that correlates with immunity (cell-mediated) is vital for vaccination purposes use and should be developed.

5.9 The designation by FAO and OIE of a CBPP World Reference Laboratory and the identification of Regional Reference Laboratories is considered essential.

6. Investigations into the pathogenesis and immunology of CBPP

It was recognized that there were at least two major areas that require further investigations, namely (1) how initiation of the infective process takes place; and (2) how to explain the clinical course of the disease. This requires a better understanding of:

- ✍ the cellular and humoral immune responses to *MmmSC* and components of *MmmSC*;
- ✍ the mechanisms of the pathogenic process, especially the early interactions between the organism and the host;
- ✍ the role of toxins and extracellular components in pathogenicity and the importance of autoimmunity in the disease process; and
- ✍ the relevant protective responses to *MmmSC* antigens with a view towards the development of more effective vaccination strategies.

Therefore:

6.1 Investigations by a multidisciplinary team need to be conducted to (1) map the immune response including the expression of cytokines and lymphokines, etc; (2) check the response of the host to separated fractions of the causative agent, e.g. carbohydrates, surface proteins; and (3) re-examine the mechanisms of Willems inflammatory reaction.

6.2 The CG secretariat should request the International Livestock Research Institute (ILRI) to incorporate research on CBPP pathogenesis and immunology in their programme (technical advisory committee to CGIAR to be contacted for immediate attention).

APPENDIX 2

EXTRACT FROM THE REPORT OF THE

SECOND MEETING OF THE FAO/OIE/IAEA/OAU-IBAR CONSULTATIVE GROUP ON CONTAGIOUS BOVINE PLEUROPNEUMONIA

Rome, Italy

24–26 October 2000

WORKING GROUP RECOMMENDATIONS

A. RESEARCH PRIORITIES FOR CBPP

1. Introduction

Although tools exist for the eradication of CBPP, the current political and socio-economic context in many African countries makes it improbable that eradication can be achieved in the near to medium term.

Therefore, there is a need to improve control tools in three main areas:

- ✍ technology;
- ✍ epidemiology; and
- ✍ socio-economics and institutional considerations.

It will be essential that the research actors coordinate their efforts to ensure synergy and avoid any duplication.

Research must have both a short-term and a long-term perspective, with longer-term research initiated or continued today.

2. Control technology

2.1 Vaccines

Recognizing that there is a need for long-lasting protection for the individual animal,

In the short term:

- ✍ Improvement of current T₁ vaccines (doses effect, longevity of immunity, thermostability)

In the medium term:

- ✍ new routes of administration;
- ✍ new generation of vaccines; and
- ✍ new adjuvants.

2.2 Diagnostic tools

- ✍ Pen side tests.
- ✍ Individual tests that can detect newly infected and chronic carriers.

- ✍ Evaluation of tests that can detect post-vaccinal response (for monitoring, evaluation and management of vaccination campaigns).
- ✍ The knowledge of the immune mechanisms and of the pathogenicity and protection against the disease is indispensable.
- ✍ Results can be expected to be continuous and progressive, and to be applied to diagnostic tools, vaccine development, and tools to measure their efficiency.

3. Epidemiology

- ✍ Better understanding of the modes of transmission, including the role of chronic carriers and modelling the disease dynamics.
- ✍ Effect of chemotherapy on the epidemiology and control of the disease.
- ✍ Development of performance indicators for the evaluation of the national and regional epidemiological surveillance systems.

4. Socio-economic and institutional analyses

To ensure that research leads to appropriate and sustainable control options with optimal impact:

- ✍ Evaluate the economic impact of the disease, including production losses, control costs, and trade opportunities.
- ✍ Develop decision-aid tools based on cost-benefit analysis at farm, national and regional levels and evaluate the socio-economic incentives and disincentives to effective and sustainable control of CBPP.
- ✍ Identify appropriate delivery pathways and policies to ensure effective and sustainable use and impact of CBPP control, including a viable surveillance and monitoring system if eradication is achieved.

5. Final remarks

The group recommends that specific efforts be made:

- ✍ For training, exchange of researchers and effective transfer of technology to developing country laboratories.
- ✍ To use national CBPP activities carried out under PACE as often as possible for applied research, in close collaboration amongst the national, regional and international scientists working on diagnostic tests, vaccines, epidemiology, socio-economics and evaluation.
- ✍ To build strong links between research and national and regional development projects.
- ✍ To increase the number of strains sent to the WRL and to develop their exchange between the research groups, with the aim of validating diagnostics tools, and monitoring antigenic and genetic drifts.

B. CBPP CONTROL STRATEGIES FOR WEST AND CENTRAL AFRICA

The overall conclusion of the group was:

It is possible in the near future only to envisage enhancing the existing systems of CBPP control to suppress the incidence of disease in the endemic maintenance zone and strengthen the protection of free areas. In the longer term, it is desirable to work towards achieving progressively more effective control, thereby reducing the extent of the endemic maintenance area and the risk of CBPP movement to peripheral areas. Total eradication should be the eventual goal. This will require veterinary services and contagious disease control to be accorded a higher priority by governments than it is at present, and the exploration of fundraising mechanisms, which will undoubtedly differ from country to country. This matter should be brought to the attention of national Ministries of Agriculture at the highest level in appropriate regional forums and at national level through PACE national activities.

1. Summary of disease status in the subregion with consideration of zones

In west and central Africa, there are two main CBPP infection foci. These are the Inner Delta area of Niger and the Lake Chad area. With the exception of Senegal and Gambia in West Africa and Gabon and Congo Brazzaville in central Africa, all other countries are currently infected. The subregion may thus be divided as follows:

- (a) Throughout the Sahelian countries, the disease is endemically maintained.
- (b) The southern parts of the coastal countries are endemically infected through constant re-infection by trade and transhumance.
- (c) Countries not declaring CBPP are Senegal, Gambia, Congo Brazzaville and Gabon.

2. Define control and surveillance strategy, including verification and protection of freedom

(a) *For countries not currently reporting CBPP*

The strategy is to prevent introduction of infection. The current position is compulsory vaccination paid by the farmer and government. The coverage is less than 50 per cent.

The proposed procedure is to:

- ✍ Initiate moves to epidemio-surveillance.
- ✍ Vaccinate only the buffer zone (50 km at borders with Mauritania, Mali and Guinea-Bissau).
- ✍ Set up an emergency preparedness group to deal with outbreak situations through stamping out and compensation.

This applies to Senegal and could be a model for the other countries.

(b) *Endemic Sahelian countries*

The current position is to reduce the incidence of the disease by compulsory mass vaccination.

The strategy for the foreseeable future is to maintain control by mass vaccination to progressively reduce the incidence to as low a level as can be achieved, after which ancillary actions, such as stamping-out of outbreaks, become feasible tactics. The proposed steps are:

- ✍ To establish the point prevalence of the disease.
- ✍ To control cattle movement.
- ✍ Enforce existing legislation.
- ✍ Vaccination must be compulsory, generalized, coordinated and repeated at least over five years.
- ✍ Commitment is required on the part of veterinary services (public and private) to act massively in these endemic areas.

(c) *Coastal areas*

The strategy is to protect these countries from infections brought in from the endemic Sahelian countries. The proposed steps are:

- ✍ Control movement, especially of transhumance.
- ✍ Vaccinate transhumant cattle.
- ✍ Strengthen epidemio-surveillance.

3. Practical funding strategy

The governments should be encouraged to accord animal health an appropriate level of priority, allocating more funds to disease prevention and control. The money generated by charges for animal health services should be retained for veterinary activities, in particular national disease control programmes. Continual donor assistance will be sought.

4. Public-private good differentiation and community participation

In Sahelian countries, CBPP control may be seen as a public good, whereas in the coastal countries CBPP control could be generally considered a private good. The government services should be encouraged to share some activities, such as vaccination.

Communities should be encouraged to be involved in disease reporting and control by creation of improved awareness.

5. Technologies

Two vaccines exist (T₁ 44 and T₁ SR), and governments should be left to choose whichever they find appropriate.

Full use should be made of existing diagnostic technologies to improve detection of disease and reporting.

Maximum use should be made of the PARC serum banks to carry out serological studies to provide baseline data on the prevalence and distribution of CBPP.

The role of chemoprophylaxis as an aid to reduction of risk in trade cattle should be re-evaluated.

C. PROGRESSIVE CONTROL IN SADC COUNTRIES

1. Background

This area is unique within the OAU/IBAR/SADC countries because it has an invaluable trade link to Europe and other countries outside the region that it is essential to protect. Many rural and urban livelihoods are dependent on this trade. It is therefore critical that every effort is made to protect and secure this trade.

It is also recognized that the problems in this region and the rest of Africa with regard to CBPP are inter-related and inter-dependent. It is essential that an immediate and strong dialogue be established between SADC and PACE to ensure a collaborative and coordinated approach to the control and eventual eradication of CBPP.

Within this area, there are areas or zones that will require vaccination. This should be undertaken with T₁ 44. It is essential that, whenever vaccination is undertaken, it must be done with properly managed vaccine and with properly trained staff. Without this, there is an unacceptable risk of adverse reactions to the vaccine.

Within the region, there are three identifiable zones:

Free countries

Currently uninfected, mainly free but with high risk of infection along border areas with Angola. These countries are Namibia and Zambia.

Infected countries: Tanzania and Angola.

1. Free Countries

The no-vaccination policy must be retained in these countries. Meat inspection and regular surveillance must continue to ensure that any disease would be rapidly detected and in effect, therefore, surveillance would meet the requirements as laid down in the OIE CBPP Pathway.

In these countries, freedom from infection is the same as freedom from disease.

2. Currently uninfected, mainly free but with infection and high risk on border areas with Angola

For both countries, the aim is to reduce any infection in border areas and to extend the uninfected areas into and finally throughout Angola. The two countries that fall into this category are very different and require very different strategies to achieve the above.

It is essential to engage the Government of Angola in discussions with the Namibia and Botswana in agreeing to a coordinated approach aimed at reducing and removing the risk posed by endemic disease in Angola. All three countries (Namibia, Zambia and Botswana) are at constant threat from the presence of endemic disease in Angola.

It is recognized that at present there is a “window of opportunity” for dialogue and action in Angola. There is a clear role for the introduction of NGOs to assist the vaccination and control process and public-private sector cooperation. The example of the highly successful “Operation Lifeline Sudan” project could be employed in this area.

✍ Namibia

In the north of Namibia, in the zone abutting the border, adequate vaccination with T₁ 44 should continue to ensure control of the disease and that this vaccination availability should extend into Angola and be free of charge to those in this area.

Below this northern zone, there must be sero-surveillance monitoring with effective response to any serologically positive animals. It should be noted that this zone in effect extends into Botswana along the Caprivi Strip.

✍ Zambia

The area of high risk is in the western border area with Angola. About 25% of the cattle in the country are found here. There is considerable trade pressure for livestock to move to other areas of the country. Although there is an abattoir in this region, live animals continue to move eastwards. Furthermore, whenever an infected animal is detected in this area, animals tend to be rapidly moved to other areas of Zambia, posing a very high risk of spreading the disease.

It is essential to appreciate that the border is ill defined and that transhumance is driven not by husbandry needs but by the presence of civil strife.

Vaccination on both sides of the border is essential and every encouragement must be made to extend this vaccination area into as large a part of Angola as possible. Given the disadvantage that all this poses to livestock owners in this region it is considered that an incentive must be developed to ensure that adequate vaccination and control is maintained. This could revolve around price interventions, or agricultural subsidies.

We need to understand exactly what the problem is in this area and develop innovative strategies. It is proposed that FAO support a socio-economic study to be undertaken as a starting point in this direction.

It is recognized that laboratory support in this region is poor, but essential. It is recommended that IAEA support be sought to strengthen diagnosis and sero-surveillance capabilities at the regional laboratory in Mongu.

3. *Infected Areas (Tanzania and Angola)*

✍ Tanzania

The situation in Tanzania is considered a disaster, with a third of the cattle at very high risk (4 million head of cattle) and 50% of the country infected. It is essential to obtain a political appreciation of this situation within Tanzania and by the donor community. The veterinary services are now very weak due to structural adjustment programmes and could not currently undertake an extensive control programme based on mass vaccination. It has been estimated that blanket vaccination would cost around US Dollars 10 million and in the present climate of donor reluctance to fund projects of this magnitude such support is unlikely to be forthcoming. It is therefore essential to develop alternative strategies.

It is recommended to urgently conduct a socio-epidemiological study to define the extent of the problem AND to develop solutions that can operate within the available resource envelope. These solutions should include strategies to deal with the risks to Zambia, Malawi and Mozambique.

It is probable that solutions developed will include private vaccination that will need to be monitored, and thus it will be necessary to develop tools for this.

D. DISCUSSIONS AND RECOMMENDATIONS OF THE WORKING GROUP FOR EASTERN AFRICA

Summary of disease status in the subregion

The current situation with regard to CBPP in eastern Africa is unclear. It is, however, known that CBPP is widespread within the region, but, for many reasons, concrete information is simply not available. There is no regular flow of management information in most of the countries to underpin strategic decision-making.

What is known is the following:

- ✍ Ethiopia – large endemic areas in the southwestern and northeastern parts of the country; new foci developing in the highland areas.
- ✍ Kenya – endemic in the eastern parts, stretching southward to the coast; also patches of disease in the northwest and in the southern areas bordering Tanzania.
- ✍ Tanzania – large parts of the country are now endemically infected, particularly in the north, the west and southwest. Malawi and Zambia are under threat from the infected areas of Tanzania.
- ✍ Eritrea, Somalia, Sudan – very little or nothing is known about the CBPP situation in these countries.

Elucidation of the extent of CBPP in these countries is essential as a pre-requisite to the planning of CBPP control strategies.

There also seems to be little stakeholder awareness and commitment with respect to CBPP control; and this holds against a background of ever-weakening national veterinary services.

The conclusion is that the problem of CBPP control is largely a problem of structures and policies, not of technology.

Eco-epidemiological zoning

The importance is recognized of trans-border ecosystems, particularly with respect to Kenya-Tanzania and Kenya-Somalia. There is also the sharing of ecosystems around the junction of Kenya, Uganda, Sudan and Ethiopia. While it is possible at this stage to roughly define the boundaries of these ecosystems within Kenya, Tanzania, Uganda and Ethiopia, it is not possible to do so in Sudan and Somalia. An understanding of the size and extent of these systems would be essential to understanding CBPP epidemiology in the subregion and the planning of appropriate strategies for control.

Differentiation of infected from presumed free Eco-epidemiological zones

While it is possible, at least in some countries of the region, to define where the presence of CBPP is clearly known, it is difficult to define with certainty the zones from which it is absent. It is known that large parts of central Kenya and central Ethiopia may be free of the disease. More surveillance work is needed to clearly define the borders of the infected and presumed free areas.

Control strategy

Given the lack of data (and particularly of a regular flow of data for management purposes), control strategies cannot be planned in detail at this point. Ethiopia and Kenya are currently getting to grips with the problem and work is being done to elaborate in-country control strategies. However, this cannot be done in isolation, particularly given the presence of cross-border ecosystems.

Overall management and coordination (both within countries and within the subregion) is a priority and is clearly the responsibility of governments. However, the current situation is one in which many veterinary services are either without a clear chain of command or are becoming progressively weaker due to lack of resources. The subregion's veterinary services therefore have to be appropriately structured, with the strengthening and restoration of a functional chain of command. These services also ought to receive adequate resources. The importance of veterinary services needs to be widely recognized at a policy level, with a clear commitment of political support. Only once this has been achieved can surveillance systems for the creation of a flow of management information be put in place.

The outcome of the abovementioned activities would provide a rational basis for disease management decision-making and the elaboration of a clear subregional strategy for the progressive control and ultimate eradication of CBPP.

At national level, veterinary services will need to use epidemiological and economic facts in order to present economically convincing arguments to policy-makers regarding CBPP control. This would necessitate a re-orientation of veterinary professionals to work in multidisciplinary teams involving economists and others.

There is clearly a need for policy research leading to improved policy advice in this area. Governments, donors and international financial institutions will need to be made aware of the importance of properly structured veterinary services and the public good aspects of transboundary animal diseases such as CBPP.

Organizations such as FAO and OAU-IBAR can play a pivotal role in providing good policy advice. Strengthening of the role of veterinary services is seen as an essential first step in eastern Africa. It is proposed that, through the PACE project, OAU-IBAR and FAO should play a leading role in facilitating stakeholder consultations aimed at formulating a coherent and harmonized regional approach to CBPP control.

The beginnings of such a strategy would be:

- ✍ Creation/strengthening of effective national surveillance systems.
- ✍ Creation/strengthening of national veterinary epidemiology units.
- ✍ Creation of a regional forum for epidemiologists for both regular meetings and regular electronic communication.
- ✍ The elaboration of a sound strategy for progressive control based on the identification of ecozones and disease behaviour and prevalence within these ecozones.
- ✍ The identification of areas in the sub-region where pilot work could be carried out to develop surveillance, monitoring and control methodologies. Various partners would be expected to be involved from both the public and private sectors.
- ✍ There would need to be a wide and uninhibited sharing of results of these pilot studies throughout the sub-region, which would include official and private veterinarians. Chief Veterinary Officers, veterinary epidemiologists, economists, administrators and politicians should be involved in such regional consultations, such as the regular border harmonization meetings between Ethiopia and Kenya.

For the present, the work of CBPP control can be limited only to holding actions aimed at reducing the risk of further spread into new areas.

A number of factors constraining control efforts remain, including resource limitations, and apparent lack of transparency with regard to disease and risk communication and poor infrastructure and lack of access to remote areas.

A major impediment, which could upset any strategy devised, is civil conflict and inaccessibility to CBPP endemic ecozones. Innovative methods (using NGOs and involving local communities) would be needed to face this important constraint.

Funding strategy

Large areas of the sub-region are endemically infected, and many of these areas are subject to civil strife. This raises serious difficulties from the point of view of funding. First because there is as yet no clearly defined regional strategy to fund. Second, the sheer size of the problem puts it beyond the resources of national governments. It is therefore not realistic to consider only government-funded and implemented mass vaccination campaigns. International donor fund supplements will be needed and the assistance of international organizations, e.g. OAU-IBAR, FAO and IAEA, in the design and harmonization of regional control strategies is essential.

In areas where there are possibilities for control, mechanisms whereby both funding and implementation would be the outcomes of a public sector-private sector partnership should be explored. Overall coordination would still remain a government responsibility.

Public-private good differentiation

Differentiating public from private good essentially defines the level of government involvement. An eradication process is clearly a government responsibility, but could only be followed in areas where CBPP prevalence was low enough to justify it. High-prevalence areas would, for the time being, continue to remain more in the realm of private-public cooperation; however, the prevention of further spread is clearly a government responsibility. Governments in the subregion would have to fund and implement such work.

Community participation

The harnessing of community capacity in CBPP surveillance and control is clearly needed if progressive CBPP control is to be achieved. Community participation would be particularly necessary in Somalia and southern Sudan where civil unrest still presents a problem in terms of access to infected herds. In this respect, the engagement of NGOs (such as PARC-VAC and Operation Lifeline Sudan) is important, and the participatory methods used in rinderpest control should be adapted for CBPP control.

Technologies

The use of pilot trials would explore the use of the various technologies available. While it is believed that the problems besetting CBPP control relate to policies, institutions and funding more than to technology, it is true that existing technologies (surveillance, diagnostic and control) need to be correctly applied, and that their application may differ under different circumstances. Appropriately trained and motivated laboratory and field personnel are therefore crucial for successful implementation of a control strategy.

Summary of recommendations with regard to eastern Africa:

1. Government veterinary services should be encouraged to define their requirements for early detection of and rapid response to epizootic disease outbreaks.
2. Governments, through their veterinary services and with the support of OAU-IBAR, PACE and FAO, should be encouraged to develop technical and operational strategies for the progressive control and eradication of CBPP.
3. OAU-IBAR and PACE, with the support of FAO, should explore innovative approaches for dealing with the question of CBPP in strife-torn areas.

APPENDIX 3

LIST OF SUBSCRIBERS TO THE E-CONFERENCE

Name	Country or Organization
M.H. Jeggo	FAO/IAEA Joint Division, Vienna
R. Geiger	Austria
A. Wondwosen	Ethiopia
J.K. Litamoi	Ethiopia
G. van't Klooster	Ethiopia
E. Redmond	FAO, Rome
Y. Cheneau	FAO, Rome
M. Rweyemamu	FAO, Rome
P. Roeder	FAO, Rome
D. Ward	FAO, Rome
W. Amanfu	FAO, Rome
L. Pite	FAO, Rome
D. Nyakahuma	FAO, Rome
J. Mariner	FAO, Rome
V. Martin	FAO, Rome
F. Thiaucourt	France
J. Domenech	France
L. Diedeu	France
G. Hendrikx	France
A. Provost	France
M. Agyen-Frimpong	Ghana
P.K. Turkson	Ghana
A. Musoke	Kenya
D. Mwangi	Kenya
W. Masiga	Kenya
P. Bonnet	Kenya
G. Laval	Kenya
A. Catley	Kenya
T. Leyland	Kenya
G. Thomson	Kenya
R. Bessin	Kenya
R. Connor	Kenya (Later unsubscribed)
B. Rey	Kenya
H. Wesonga	Kenya
M. Kané	Mali
A. Benkirane	Morocco
O.J.B. Huebschle	Namibia
J. Frey	Switzerland
T. Ponela	Tanzania
P. Njau	Tanzania
G. Freeland	U.K.
R. Windsor	U.K.
J. March	U.K.
R.A.J. Nicholas	U.K.
J.B. Bashiruddin	U.K.
A. Morrow	U.K.
P. Mangani	Zambia