World Organisation for Animal Health

TECHNICAL ITEM I

Control and eradication of CBPP in Africa: Challenges and Strategies for a CBPP Free Africa

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Control and eradication of CBPP in Africa: Challenges and Strategies for a CBPP Free Africa

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1. Summary

Contagious bovine pleuropneumonia (CBPP) remains one of the most devastating diseases in Africa, impeding internal and cross-border trade with severe consequences to livestock keepers, especially those in arid and semi-arid areas, whose only livelihood is cattle. The recent increase in climate-driven droughts coupled with insufficiently resourced Veterinary Services are exacerbating the occurrence and spread of the disease. The intention to control CBPP is well-spelt out in numerous disease control and livestock sector growth plans in various documents and strategies at sub-continental, continental and even global levels. However, these intentions need to be translated by Members into actual actions that will result in real progress towards a CBPP-free Africa. Except for a few Members, the CBPP status is endemic, with sporadic outbreaks that are not well tracked, exposing Veterinary Services to often late and insufficient response. In the absence of concerted and coordinated control efforts, livestock keepers have resorted to treating their animals with substandard and unregulated antimicrobials, a key driver of antimicrobial resistance. Challenges to effective control include inadequate surveillance, absence of clear tools, procedures and expertise for accurate diagnosis, inadequate coverage of vaccination programmes that are characterised by poor infrastructure that compromises quality and importantly, inability to effectively control the movement of infected animals. Further, besides major gaps in policy and regulatory frameworks for CBPP control, there is poor coordination between Members. Notwithstanding these challenges, a CBPP free Africa is possible and even within reach as more opportunities have become available including the resurgent interest in the disease as evidenced by the development of strategies by Regional Economic Communities (RECs), the AU-IBAR LiDESA strategic Plan and the GF-TADS framework. In addition to the development of better surveillance capacities, there is need to strengthen and validate diagnostic tests, improve the quality and access to CBPP vaccines. A CBPP-free Africa requires recognition of the role of all stakeholders including private sector participants. This should be accompanied by enactment and implementation of policies that define and support market driven incentives for the sector. Finally, there is need to better quantify and communicate the real cost of CBPP to livelihoods, food security, nutrition and economic well-being of both communities and countries as a prerequisite for resource mobilization from Members and development partners. Embracing these opportunities will accelerate CBPP control and ensure Members do not miss the benefits of achieving effective control and eradication of CBPP for improved animal health and safe trade.

2. Introduction

Contagious bovine pleuro-pneumonia (CBPP) or lung sickness in cattle, is caused by the bacterium *Mycoplasma mycoides* subsp. *Mycoides (Mmm)* and remains a truly an African disease, long eradicated from the rest of the world, with few exceptions. The disease represents a considerable burden for cattle owners in many parts of Africa, from Senegal and the Gambia in the west through Somalia in the east, and as far south as Namibia and Tanzania (1). CBPP is especially devastating when it infects previously unexposed herds, causing mortality rates that approach 100%. In recent years, the occurrence of CBPP is closely following adverse climate events like drought, which apart from weakening animals and making them more susceptible, is also causing increased movement by livestock keepers in search of pastures and water. Effective control of CBPP in Members has remained elusive due to multiple challenges ranging from under-resourced Veterinary Services and inadequate control tools to socio-cultural factors related to animal husbandry and markets.

Efforts towards an Africa free of CBPP continue - with the most notable being establishment of the Global Framework for the progressive control of Transboundary Animal Diseases (GF-TADs for Africa) which targets five TADs, including CBPP. The 11th Regional Steering Committee (RSC) meeting for Africa, held in June 2022, identified the need to develop strategic CBPP control plans with focus on resources, collaboration, and enhanced tools for surveillance, diagnosis, and vaccination (2). Importantly, it was acknowledged that CBPP control strategies need to be adapted to specific regions and situations as Africa presents varying ecosystems, animal production, and husbandry systems.

The World Organisation for Animal Health (WOAH) has established an official procedure for recognising countries or zones as free from CBPP. This recognition is crucial for supporting national livestock economies and facilitating international trade. Countries must follow specific steps outlined in WOAH *Terrestrial Animal Health Code* (*Terrestrial Code*) to achieve this status. Additionally, WOAH endorses official control programs for diseases, which helps countries improve their Veterinary Services, enhance transparency and to strive towards attaining the CBPP free status either for a country or zone.

This technical report summarises the status of CBPP in Africa and highlights major challenges and opportunities that call for Members' attention to expedite advancement towards a CBPP - free Africa. Priority areas of focus and action are identified, and recommendations are presented for consideration. Without attending to these recommendations, Africa risks missing the opportunities for achieving effective control and eradication of CBPP for improved animal health and safe trade.

3. Current Status of CBPP in Africa

At present, CBPP is endemic to 22 Members in Africa, is suspected in several others, although information is not available for some. Only 4 Members in Africa have attained CBPP-free status, with two of these having attained WOAH certification of their CBPP control programs. Considering WOAH guidelines, most Members remain without an official WOAH status (3). CBPP has not been reported in Members at the southern and northern extremities of the continent. CBPP seems to have attained endemic status in pastoralist areas, but clinical cases occur when animals undergo nutritional stress. Movement of CBPP infected animals through trade or in search of pasture introduces the disease in smallholders farms, causing devastating losses to these previously naïve herds. The true status of CBPP on the continent remains unclear due to the absence of consistent surveillance and up-to-date reporting by Members. CBPP exerts direct and indirect economic losses on livestock keepers and the whole livestock sector. Direct losses include mortalities of 30-80 % in severe outbreaks (4), morbidity leading to reduced productivity of milk and meat, high costs of treatment and re-stocking following death or replacement of culled animals. Indirect losses are experienced from restrictions to local and international trade, driving up the cost livestock and livestock products with subsequent knock-on effects on livelihoods, food security and nutrition. The true cost of CBPP to the economic, social, cultural and security of Members has not been quantified but is thought to be devastating, considering the lengths to which livestock keepers are willing to stretch to protect their animals from CBPP.

4. CBPP Control

The most effective CBPP control method is stamping out whole herds as soon as the presence of disease is confirmed. This method was successfully used in Australia, Europe, and the United States in the last century (5). Related to this approach is targeted slaughter of infected animals following a positive test and subsequent restriction of movement to contain disease. These options are effective but difficult to implement in African Members due to under-resourced Veterinary Services, weak infrastructure, socio-economic, and cultural reasons. The test and slaughter method has been used to control CBPP in some pastoralist ecosystems but requires protocols to detect infected animals at meat inspection, disease traceback, and eventually test and slaughter of suspected herds (6). Thus, both stamping out and test and slaughter are only effective if diagnosis is accurate and timely and adequate compensation to livestock owners is available. Where livestock keepers are adequately compensated for losses due to disease control measures, timely reporting and compliance with veterinary regulations is encouraged.

Treatment of sick cattle with antimicrobials is officially not recommended because of the potential formation of sequelae in chronically infected cattle that could later become infectious. Nonetheless, expert opinion remains divided as there is no direct evidence of disease transmission from chronic carriers; Interestingly, but maybe not surprisingly, it is common knowledge that livestock keepers continue to treat CBPP with antimicrobials (tetracycline and tylosin) as the immediate remedial step for new infections (7).

Vaccination with the live attenuated T1/44 vaccine in East and Central Africa and the T1sR vaccine in West Africa accompanied by surveillance and movement control of infected herds has been shown to be the most effective method to control CBPP, especially among Members in Africa. Indeed, there is evidence that consistent mass vaccination programs remarkably reduce the incidence of CBPP as observed in some West African countries at the end of the Pan African Rinderpest Campaign (PARC) programme (8). For vaccination to be effective, herd immunity should reach 80%, a level that can only be attained by bi-annual vaccination as immunity from primary vaccination begins to wane after 6 months (9). A major drawback of the T1 CBPP vaccines is undesirable adverse reactions at the site of injection in a proportion of vaccinated animals (10). These are often severe and require treatment with antimicrobials and prevent livestock keepers from fully embracing the vaccines.

Except for stamping out, all other CBPP control methods require that animals from infected zones are quarantined or restricted from moving until it is officially determined that the outbreak has ceased. However, in most Members, control of movement and quarantine are not practical, especially in pastoralist regions due to trade, socio-cultural practices, potential for civil strife and weak veterinary systems. (11,12),

WOAH procedures for official recognition of disease status provides standards and guidelines to Members who wish to apply for recognition. These standards and guidelines require that an applicant Member demonstrates their knowledge of the veterinary system including legislation support, show evidence of CBPP eradication and absence of infection, and history of vaccine use. CBPP surveillance and diagnosis are also critical and include abattoir surveillance of pneumonic lesions, and response to suspicious cases. An effective surveillance programme should exist that may depend on the prevailing epidemiological circumstances and should be planned and implemented according to the *Terrestrial Code*. This requires the support of a national

or other laboratory able to undertake identification of CBPP infection. Contingency planning and legislating for CBPP are important parts of the process.

In Africa, Botswana, Eswatini, South Africa, and the French territories of Mayotte and Reunion were declared Members free of CBPP. Namibia is recognised as having a CBPP free zone, and along with Zambia, both Members received WOAH endorsement of their official control program for CBPP.

5. Challenges to a CBPP-free Africa

Many efforts have been made to effectively control CBPP in Africa with varying degrees of success. Efforts made in the past include the Joint Project 28 (JP 28) of the 1970s, and the Pan African Control for Epizootics (PACE). Mass vaccination encountered serious problems mainly due to refusal of pastoralists to allow their animals to be vaccinated for fear of post-vaccination reactions. The combined control effort for rinderpest and CBPP conducted during the Pan African Rinderpest Campaigns (PARC) ended in 1999 and rinderpest was eradicated but CBPP still persists despite continuation of a mass vaccination campaigns. The implementation of monitoring systems of the PACE programme for transhumance cattle has not been widely effective due to lack of cooperation by cattle herders.

Ecological and anthological factors influence the epidemiology of CBPP and therefore, control or eradication programs should be area dependent. The quest for a CBPP-free Africa presents significant challenges that must be considered when developing strategies for eradication. These challenges can broadly be classified as follows: poorly resourced state of Veterinary Services and infrastructure; Legislation and policy gaps; challenges in availability and use of control tools (vaccines, therapeutics and diagnostics) and challenges with cross border Member collaboration.

4.1 Challenges in Availability and Use of CBPP Control Tools (Vaccines, Therapeutics and diagnostics)

Inaccessible and difficult to use diagnostic tests

WOAH *Terrestrial Manual for Diagnostic Tests and Vaccines* (13) describes the tests that are available for diagnosis of CBPP. These include isolation and culture of bacteria, immunological tests [Competition-enzyme linked immunosorbent assay (C-ELISA), the complement fixation test (CFT) and latex agglutinations tests (LAT)] to detect antigen, and PCR tests to detect bacterial nucleic acid (14). It is important to distinguish between tests that are valid for individual animals from those relevant for herd level only. Tests that isolate and culture live bacteria are the most appropriate for individual level diagnosis, while those that measure presence of antibodies or nucleic acids are more useful when conducted at herd level and interpreted with accompanying herd history. The serological tests prescribed by WOAH for testing animals for export are the CFT and C-ELISA. Both are regarded as herd screening tests and should not be used for testing individual animals owing to the possibility of those animals being either in an early stage of the disease before detectible antibodies have been produced or in a chronic stage when only a few animals remain positive. CFT is considered more sensitive for acute infections while C-ELISA is more appropriate for chronic or latent tests. Various other tests like Latex agglutination and the isothermal loop -mediated amplification (LAMP) have been developed but are not in mainstream use. Currently, although desirable, there is no CBPP diagnostics test that distinguishes between infected and vaccinated animals (DIVA) test for CBPP.

In African Members, diagnosis is clinical, with confirmatory follow-up in mostly regional and central governmental laboratories. There is only one WOAH Reference Laboratory for CBPP in Africa. The Botswana National Veterinary Laboratory attained this status after the completion of a WOAH laboratory twinning programme in 2010. WOAH aims to foster a more balanced geographical distribution of advanced expertise, allowing more Members to access high-quality diagnostic testing and technical knowledge within their own region, thus facilitating early disease detection or confirmation and rapid control. A recent CBPP twinning project has been completed in Ethiopia in 2023.

Recent efforts led by *Istituto Zooprofilattico Sperimentale*-Teramo (IZS-Terramo) have started to pilot abattoir level diagnosis using pictures of gross lesions subjected to analysis by software followed by potential traceback (Massimo Scacchia, personal communication). In recent years, the commercial C-ELISA has not been available as the producer has cited a low return on investment due to poor demand. Members have often indicated that the cost of the C-ELISA test was prohibitive. Currently a C-ELISA test is available on the market (15), although its performance is yet to be validated. The CFT test can be made in-house by many laboratories, however, reagents require standardisation and validation. Considering how long the C-ELISA has not been on the market, challenges with obtaining reagents and a small number of laboratory technicians that are proficient in CBPP CFT and CFT tests, it is likely that no consistent laboratory confirmation of CBPP is being undertaken

in most Members. Members have expressed the need for retraining laboratory staff in CBPP diagnosis and the need to establish and maintain alternative sources for reagents. Thus, there is excessive dependence on clinical diagnosis of CBPP raising critical questions on capacity of Members to undertake effective CBPP control programs. Opportunities to improve CBPP diagnosis in Members include strengthening participatory diagnosis of CBPP at community level, especially for areas that are not endemic for CBPP, strengthening abattoir surveillance and traceback, establishment of public-private partnerships with industry to ensure availability of diagnostic tests and validation of current C-ELISA and CFT tests.

Unregulated use of antimicrobials for treatment of CBPP

Oxytetracyclines and tylosin, the commonly used antibiotics against CBPP are effective in alleviating symptoms and reducing the number of clinical cases but not in eliminating the disease in an affected herd which retain persistent lesions in some treated animals (16). Antimicrobials have been discouraged for use because of relapse of the disease in treated animals, with the possibility of treated animals developing carrier state (17). Regardless of this official policy, the practice of antibiotic treatment has persisted under field conditions where the disease can be mistaken initially for any other pneumonia. In fact, some veterinarians, community animal health workers and livestock keepers use antimicrobial treatment for differential diagnosis in areas where both East Coast fever and CBPP occur. It is likely that the widespread use and unregulated availability of antimicrobials in Members is contributing to masking the true incidence of CBPP and maintaining latent CBPP within herds. Since there are no guidelines for the type, dosage, and withdrawal times for antimicrobial use for CBPP, the development of resistance in humans and animals to these common antibiotics is inevitable, although this is not adequately documented in Members. Research is providing opportunities for Members to determine whether antimicrobial treatment, when used with other measures like vaccination and movement restriction could be effectively control CBPP. Past studies with new generation macrolides (Tulathromycin and Gamithromycin) under experimental conditions have shown promise in metaphylactic treatment. (18). Mariner and others (19) have shown, through statistical simulation that approaches that include vaccination (with current vaccines and 85% coverage) and treatment have potential to bring CBPP to within the range of elimination within five years. There are on-going research efforts to test whether this is in fact true, and to develop treatment and vaccination protocols for potential field use.

Challenges with quality, efficacy, and delivery of CBPP Vaccines

The current available vaccines are attenuated live vaccines, which induce low levels of protection (20-70%) for short durations (up to one year). Delivery is dependent on a functional cold chain and may in some cases cause severe reactions at the site of injection (Willem's reaction), which need treatment and can even cause death. The quality of CBPP vaccines is often identified as the main reason for inconsistent protection rates for the live attenuated T1/44 CBPP vaccine (20). However, there are no formal mechanisms for identifying QC challenges along the vaccine value chain from production to distribution (through multiple intermediaries) and ultimate use as vaccine producers do not typically conduct post-vaccine release follow-up. This makes it difficult to identify specific areas that should be improved. Thiaucourt and others (21) have demonstrated genomic drift of the *Mmm* T1/44 vaccine strain, indicating that the vaccine at the point of use is markedly different from the original strain that is released by vaccine manufacturers. Nonetheless, how widespread this is, and the effect of this drift on efficacy is not clear. The WOAH recommended vaccine titre at the point of use is10^7 colony forming units (CFU) per animal. However, given QC challenges of most CBPP vaccine producers, some manufacturers do not attain the minimum titres of 10^8 CFU per animal to allow for loses to 10^7 CFU during lyophilization, storage, transportation, and reconstitution (22, 23). Other vaccine related challenges include policies that maintain CBPP vaccines as public good and which limit the robust participation of the private sector, inconsistent vaccination programs resulting in incomplete coverage, packaging vaccines in large doses that result in wastage, use of vaccines that are no longer viable, and challenges in maintaining effective cold chains during vaccine delivery.

Despite these challenges, mass vaccination with vaccines has played an important role in controlling CBPP when conducted consistently and with extensive coverage. The AU-PANVAC continues to undertake certification of CBPP vaccines that are voluntarily submitted by vaccine producers for distribution in Members. However, it is reported that annually, only 13% of CBPP vaccines that are distributed in Members are submitted to AU-PANVAC for certification (24) and Members are encouraged to enact legislation that mandates this quality certification for all CBPP vaccines in their market.

4.2 The Under-resourced State of Veterinary Services and Infrastructure

Veterinary Services are classified into four categories: clinical services (treatment of sick animals and disorders that limit production); preventive services (stopping outbreak of infectious diseases); and regulation of drugs and vaccines and protecting human health by regulating marketed animal products. As expected, the most resourced aspect of Veterinary Services is the human health protection service, which places emphasis on zoonotic diseases. Therefore, CBPP, which is not a zoonotic disease, is given less priority and receives attention and resources only when its occurrence generates significant economic and political interest. Due to declining livestock and animal health budgets in Africa, most Members depend on bilateral and multilateral international donor organisations for funds to finance animal disease control programs. However, this is not sustainable, resulting in poorly resourced Veterinary Services. Thus, due to limited resources, Members continue to experience challenges in identifying and confirming CBPP through surveillance and laboratory capacities, with limited expertise and sufficient tools for veterinarians, veterinary paraprofessionals and technical laboratory staff (25). Most Members do not have WOAH endorsed official control programs for CBPP and where available, vaccination programs are irregular, reactive to outbreaks, or are not undertaken at all due to limited resources.

A major challenge for most Member Veterinary Services is how to effectively undertake restriction of movement during CBPP outbreaks. While policies for movement control are well articulated in most Members, several factors including the transhumance nature of CBPP susceptible areas, absence of animal identification systems, absence of well-resourced quarantine and animal holding zones, security challenges between communities due to cattle rustling and absence of timely confirmatory test have conspired to make this process burdensome.

While there is continuing improvement and increasing coverage of general infrastructure including roads and electricity in Members, this progress has not yet translated into better infrastructure for control of infectious diseases, including CBPP, largely due to limited direct investment in infrastructure like functional regional laboratories, cold chain facilities for vaccine storage. The last three decades have witnessed major advances in communication technologies including digitization, although the application of these for control of infectious diseases including CBPP remains sporadic and limited in scope.

4.3 Governance, Legislation, and Policy Gaps

The governance, organisation, legislation, and policy frameworks for disease control, including CBPP, are diverse in Members. However, the defining determinant for how control of infectious diseases is governed and legislated is whether a disease is classified as a public or private good. In Members, CBPP is a WOAH notifiable disease and is controlled using a mandate in the interest of public good. This sole public mandate is only effective when accompanied by sufficient resources and capacities. Governance challenges for CBPP control include uncertainty over mandate between national government levels and devolved governance units (counties, districts, or provinces) where division of responsibilities to enforce disease control measures is often unclear.

Legislative and policy challenges include absence or inability to enforce sanitary and surveillance measures like slaughtering at home for cultural reasons, unregulated exchange of animals for cultural or trade reasons, unregulated availability and use of antimicrobials, absence of regulations to achieve animal identification and registration, and perceived punitive and non-participatory policies to CBPP control, especially in regions that practice transhumance. Further, the role of private veterinary service providers in CBPP control remains unclear, although they continue to play a key role in CBPP control. When private providers have been involved in CBPP disease control through contractual agreements, results were more beneficial to livestock keepers. (26). Thus, although they continue to make major contributions to CBPP control, the status of private veterinary, veterinary paraprofessionals and community animal health practitioners is often unclear, excluding them from mainstream CBPP control training opportunities.

4.4 Challenges in Regional and Transboundary collaboration for CBPP control

Infectious diseases, including CBPP are transboundary and transcend man-made borders, rather, they persist within distinct ecosystems and are driven by various climatic, epidemiological, and human factors. For this reason, disease control strategies at both the AU-IBAR and Regional Economic Communities (RECs) (EAC, ECOWAS, COMESA, IGAD, SADC) of African Members emphasise the need for regional and transboundary disease control collaborations. Nonetheless, this collaboration is mostly limited to information sharing meetings that are mostly donor funded. Coordinated transboundary efforts are required, especially for control measures such as surveillance, vaccination programs, movement control and participatory community engagement or

CBPP control. Collaboration is even more crucial in remote transborder pastoralist areas, where cattle rustling is common, calling for coordinated security between Members. Successful regional collaboration for CBPP control and indeed any transboundary disease requires harmonised policies, coordinated control programs, and resources for establishment of infrastructure for information handling and sharing. Existing strategies for transboundary disease control both within the RECs and potential coordination by AU-IBAR, WOAH and FAO provide opportunities for Members to advance engagement and begin progressive harmonisation of policies and collaboration for CBPP control. The GF-TADs' format allows Members with similar socio-economic and epidemiological situations to share information, challenges, and best practices, and to discuss regional solutions and approaches to enhancing control (27).

4.5 Limited Financial Resources for CBPP control in Africa

In Members, attention to CBPP is largely dependent on its sporadic occurrence and the extent to which outbreaks attract political attention and national security concerns. Compared to ever-present trade sensitive diseases like foot and mouth disease, the seasonal nature of CBPP and its endemic stability in pastoralist regions has resulted in irregular resource allocation, and in most cases only when major losses are experienced in areas with naïve herds. This has led to inconsistent control measures for CBPP, with poorly documented disease zonation, limited expertise and incompletely equipped laboratories and infrastructure for CBPP control. Thus, in most Members, CBPP control programs have almost always been implemented when supported by significant funding from development partners. The most cited reason for this limited resource allocation by Members is CBPP is not prioritised as economically important. Studies demonstrating economic losses due to CBPP are limited and those available use varying methods, often resulting in inaccurate estimations. Recently, expertise has become available to estimate direct and indirect losses due to animal diseases with models that are able to demonstrate to policy makers the magnitude of economic losses due the burden of specific animal diseases (28). It will be important to develop strategies to clearly articulate these losses to encourage prioritisation of CBPP in the budgets of Members and international development partners.

Following the SARS-Cov-2 pandemic and its devastating economic consequences, funding from international development partners has declined, with efforts focused on a few research initiatives and competitive limited bilateral support for livestock disease control. Dependence on international donor funding by Members will not be sustainable for CBPP control. Despite the public good classification of CBPP, Members will need to consider opportunities to increase the participation of the private sector in appropriate aspects of CBPP control, including vaccine production and distribution, production of CBPP diagnostics, delivery of CBPP vaccines and financial mechanisms like insurance schemes for areas where test and slaughter is implemented.

6. Priority Areas for Effective CBPP Control Towards a CBPP-free Africa

This section presents a summary of measures that should be considered by Members and other stakeholders to advance progressively towards a CBPP-Africa. For some measures like CBPP governance, legislation and policy formulation, relatively modest or in some cases no new resources are needed as Members can use strategies and frameworks with support from WOAH, FAO, AU-IBAR, industry and other development partners and stakeholders. Resource mobilisation for more technical challenges will need to be undertaken.

5.1 Disease Epidemiology, Diagnostics and Quality vaccines

- ***Review and update CBPP risk maps in Members***: A combination of abattoir surveillance, clinical and laboratory diagnosis and community surveys should be employed to update CBPP risk maps in the continent. The use of digital tools should be adopted and frameworks towards periodical updating of risk maps should be considered.
- ***Develop CBPP control plans for review and endorsement by WOAH***: Members are encouraged to develop disease control plans that are specific and responsive to current CBPP risk maps. These plans should demonstrate progressive control of CBPP including periodic evaluation and should be sensitive to regional situations and include participation from all stakeholders.
- ***Strengthen abattoir and participatory community diagnosis and surveillance of CBPP:*** Increase the capacity of community animal health workers and para-veterinary professionals to clinically diagnose CBPP and train abattoirs to identify and report occurrence of CBPP lesions. Consider the use of materials for use in differential diagnosis.
- ***Ensure availability and validation CBPP laboratory diagnostic tests:*** Research organisations, Members, industry and funders should collaborate to ensure the C-Elisa and CFT are available and validated for use in CBPP herd surveillance and laboratory confirmation. Timelines between suspected

clinical diagnosis and laboratory confirmation should be shortened and logistics for collection, transportation and testing should be clarified. This should include an evaluation of market size to ensure sustainability. In addition, WOAH reference laboratories should consider enhancing support and training to increase the diagnostic capacities of Members to achieve a CBPP-free Africa.

- ***Increase availability and coverage of quality CBPP vaccines:*** AU-PANVAC, research organisations, Members, industry and funders should collaborate to improve the quality of current CBPP vaccines including protocols for production, storage and delivery to the last mile. Members should make tenders for vaccine procurement predictable and periodic to enable vaccine producers to keep up with demand.
- ***Train veterinarians, veterinary paraprofessionals, community animal health workers and farmers on prudent use of antimicrobials***: Efforts to train stakeholders in prudent use of antimicrobials should be made. Guidelines for the use of antimicrobials in the treatment of livestock should be developed and shared and could form part of the curriculum for continuing education to retain certification.

5.2 Governance, Legislation and Policy Interventions:

- ***Streamline governance of Veterinary Services:*** Members should review the structure of Veterinary Services and clarify responsibilities for various aspects of CBPP control for distinct levels of government.
- ***Review and update institutional and regulatory frameworks to align with international standards for CBPP control:*** Members should review the status and capacities for CBPP control including evaluation of institutions and regulatory frameworks for relevant procedures like animal identification, traceability of livestock products and quality control of CBPP surveillance and diagnosis procedures. Members should be encouraged to progressively align these with international standards and best practices for CBPP control.
- ***Define the role of the private sector in CBPP control:*** Members should consider their unique circumstances and determine the role and extent of private sector involvement in CBPP control. This might involve formal contractual agreements and public private partnerships that have potential to benefit all stakeholders.
- ***Develop and enforce policies for the use of antimicrobials in livestock:*** Guidelines for the rational use of antimicrobials for animal welfare and treatment of infectious diseases should be developed and enforced. Legislation on importation and use counterfeit antibiotics should be developed and enforced and audits of use of antimicrobials in livestock should be periodically conducted.
- ***Offer legal status of veterinary paraprofessionals and community animal health workers:*** Use existing WOAH PVS system to enable training, certification and continuous learning for veterinary paraprofessionals and community animal health workers. This process would involve development of a curriculum for CBPP clinical diagnosis and reporting and increase capacity to detect, report and prevent CBPP.

5.3 Harmonisation of Policies Across Members for Transboundary CBPP Control

- ***Harmonise regional strategies for CBPP control:*** Members should review WOAH standards and guidelines for CBPP control, recommendations of AU-IBAR and RECs on collaboration for control of transboundary diseases including CBPP. This review should result in regional engagement to harmonise ecosystem approaches to CBPP control. Such harmonisation should include consultation with livestock keepers.
- ***Harmonize and implement policies for CBPP control:*** Policies for CBPP control should be harmonised between Members. For example, procedures for restriction of movement during a CBPP outbreak should be harmonised, the role of industry in CBPP control should be clarified between Members.
- ***Establish sub regional CBPP control taskforces for focus on CBPP:*** Sub regional taskforces for CBPP cross-border control of CBPP should be established with clear terms of reference and mandate for communication and enforcement of CBPP control measures.
- ***Development a framework for timely resource and information sharing*****:** Opportunities and collaborative frameworks to share laboratory reagents, capacities and information should be identified and supported by Members. Recognition of results from a neighbouring Members should be encouraged and where appropriate, laboratories in areas with proximity to common borders could be supported to provide diagnostic services.

- ***Establish and implement WOAH laboratory twinning programmes:*** WOAH reference laboratory or collaborating centres twinning programmes have proven successful for other diseases. Establishment of these programmes for Members with capacity, expertise and quality gaps will and improve and maintain CBPP diagnostic capacity and standards.

5.4 Mobilising Resources Towards a CBPP-free Africa

- Raise the profile of CBPP: Members should generate, document and evidence for the importance of CBPP to social, cultural, economic and livelihoods of livestock keepers in Africa and highlight the benefits of CBPP control in supporting livestock keepers to withstand adversity from climate change and protect human health through rational use of antimicrobials in livestock.
- Develop and disseminate to international development partners communication materials with simplified messages and statistics demonstrating the benefits of controlling CBPP.
- Prioritise CBPP in national budgets: Members should consider dedicating a specific proportion of the Veterinary Services budget for specific CBPP activities.

7. Conclusion

Efforts to successfully control CBPP in Africa have fallen short due to the insidious nature of the disease as well as technical, structural and policy challenges because of under-resourced Veterinary Services. However, there is evidence that these challenges can be surmounted as some Members have demonstrated significant progress to the extent of receiving WOAH CBPP-free status and approval for their CBPP control programmes. Without renewed momentum for CBPP control, Members risk being locked out of the benefits of trade, food security and livelihoods for livestock keepers. The rising frequency of climate-driven droughts will only increase transhumance and exacerbate the spread of CBPP if left unattended. Priority areas for better surveillance, diagnosis and vaccines and their use have been presented. Technical support from WOAH, especially with respect to building capacity of Members to effectively diagnose CBPP is emphasized. These technical interventions will not be successful unless accompanied by improved strategies for effective policies that incorporate industry and promote harmonized implementation of transboundary CBPP control. Members are encouraged to work together with WOAH and other partners to better quantify losses from CBPP to build strong evidence to justify investment in CBPP control from development partners, governments industry.

References

1. Contagious Bovine Pleuropneumonia - WOAH - Africa: https://rr-africa.woah.org/en/projects/gf-tads-for-africa/contagious-bovine-pleuropneumonia/ Accessed on 10th January, 2025

2. 02-bastiaensen-recommendations-of-rsc-10.pdf Downloaded from https://rr-africa.woah.org/en/news/11th-regional-steering-committee-rsc11-meeting-of-gf-tads-for-africa/. Accessed 8th January 2025

3. Contagious bovine pleuropneumonia - WOAH (formerly OIE): https://www.woah.org/en/disease/contagious-bovine-pleuropneumonia/ Accessed on 9th January, 2025

4. Demil, E. (2017). Review on Economic Impact of Contagious Bovine Pleuropneumonia (CBPP).

5. Di Teodoro, G., Marruchella, G., Di Provvido, A., D'Angelo, A. R., Orsini, G., Di Giuseppe, P., Sacchini, F., & Scacchia, M. (2020). Contagious Bovine Pleuropneumonia: A Comprehensive Overview. *Veterinary Pathology*, *57*(4), 476–489. https://doi.org/10.1177/0300985820921818

6. Kairu-Wanyoike, S. W., Kiara, H., Heffernan, C., Kaitibie, S., Gitau, G. K., McKeever, D., & Taylor, N. M. (2014). Control of contagious bovine pleuropneumonia: Knowledge, attitudes, perceptions and practices in Narok district of Kenya. *Preventive Veterinary Medicine*, *115*(3–4), 143–156. https://doi.org/10.1016/j.prevetmed.2014.03.029

7. Alhaji, N. B., Ankeli, P. I., Ikpa, L. T., & Babalobi, O. O. (2020). Contagious Bovine Pleuropneumonia: Challenges and Prospects Regarding Diagnosis and Control Strategies in Africa. *Veterinary Medicine : Research and Reports*, *11*, 71–85. https://doi.org/10.2147/VMRR.S180025

8. *Towards sustainable CBPP control programmes for Africa*. (n.d.). Retrieved January 12, 2025, from https://openknowledge.fao.org/server/api/core/bitstreams/37fae686-f3bb-4cda-a1b8-4d56abae23d1/content/y5510e0t.htm

9. Wesonga, H. O., & Thiaucourt, F. (2000). Experimental studies on the efficacy of T1 sr and T1/44 vaccine strains of Mycoplasma mycoides subspecies mycoides (small colony) against a field isolate causing contagious bovine pleuropneumonia in Kenya—Effect of a revaccination. *Revue d'Elevage et de Médecine Vétérinaire Des Pays Tropicaux*. https://doi.org/10.19182/remvt.9707

10. Teshale, S. (2005). Contagious bovine pleuropneumonia (CBPP) post-vaccinal complication in EthiopiaComplication apres la vaccination contre la peripneumonie contagieuse bovine (PPCB) en Ethiopie. *Bulletin of Animal Health and Production in Africa*, *53*(4), Article 4. https://doi.org/10.4314/bahpa.v53i4.32717

11. Wanyoike, S. W. (1999). Assessment and mapping of contagious bovine pleuropneumonia in Kenya: Past and present. *Unpublished MSc Thesis, Addis Ababa University and Freie Universität*.

12. Windsor, R. S. (2000). The eradication of contagious bovine pleuropneumonia from southwestern Africa. A plan for action. *Annals of the New York Academy of Sciences*, *916*, 326–332. https://doi.org/10.1111/j.1749-6632.2000.tb05309.x

13. Manual of diagnostic tests and vaccines for terrestrial animals 2021 - 6ème □dition: https://www.woah.org/fileadmin/Home/eng/Health_standards/tahm/A_summry.htm Accessed on 4th January 2025

14.Wagh, K. (2024). Contagious Bovine Pleuropneumonia: A Review. *Agricultural Science Digest - A Research Journal*, *Of*. https://doi.org/10.18805/ag.D-5972

15. ID Screen® CBPP Competition - Innovative Diagnostics: https://www.innovative-diagnostics.com/produit/id-screen-cbpp-competition/ accessed on 11th January, 2025.

16. Yaya A, Wesonga H, Thiaucourt F (2004). Use of long acting tetracyclines for CBPP-preliminary results. Report of the third meeting of the FAO/OIE/OAU-IBAR consultative group on CBPP, FAO, Rome. pp. 112-113.

17. Windsor RS, Masiga WN. Investigations into the role of carrier animals in the spread of contagious bovine pleuropneumonia. Research in Veterinary Science. 1977;23(2):224–9.

18. Muuka, G., Otina, B., Wesonga, H., Bowa, B., Gicheru, N., Stuke, K., Poole, E. J., Salt, J., & Colston, A. (2019). Evaluation of new generation macrolides for the treatment and metaphylaxis of contagious bovine pleuropneumonia (CBPP) in cattle experimentally infected with Mycoplasma mycoides subspecies mycoides. *BMC Veterinary Research*, *15*(1), 451. https://doi.org/10.1186/s12917-019-2197-x

19. Mariner, J. C., McDermott, J., Heesterbeek, J. a. P., Thomson, G., & Martin, S. W. (2006). A model of contagious bovine pleuropneumonia transmission dynamics in East Africa. *Preventive Veterinary Medicine*, *73*(1), 55–74. https://doi.org/10.1016/j.prevetmed.2005.09.001

20. Nkando, I., Ndinda, J., Kuria, J., Naessens, J., Mbithi, F., Schnier, C., Gicheru, M., McKeever, D., & Wesonga, H. (2012). Efficacy of two vaccine formulations against contagious bovine pleuropneumonia (CBPP) in Kenyan indigenous cattle. *Research in Veterinary Science*, *93*(2), 568–573. https://doi.org/10.1016/j.rvsc.2011.08.020

21. Thiaucourt, F., Exbrayat, A., Loire, E., Boissière, A., Nwankpa, N., & Manso-Silván, L. (2024). Deep sequencing and variant frequency analysis for the quality control of a live bacterial vaccine against contagious bovine pleuropneumonia, strain T1. *Vaccine*, *42*(8), 1868–1872. https://doi.org/10.1016/j.vaccine.2024.02.031

22. Waite, E. R., & March, J. B. (2002). Capsular polysaccharide conjugate vaccines against contagious bovine pleuropneumonia: Immune responses and protection in mice. *Journal of Comparative Pathology*, *126*(2–3), 171–182. https://doi.org/10.1053/jcpa.2001.0540

23. Rweyemamu, M. M., Litamoi, J., Palya, V., & Sylla, D. (1995). Contagious bovine pleuropneumonia vaccines: The need for improvements. *Revue Scientifique Et Technique (International Office of Epizootics)*, *14*(3), 593–601. https://doi.org/10.20506/rst.14.3.856

24. https://rr-africa.woah.org/app/uploads/2023/06/18-bodjo-panvac-1.pdf Accessed on 6th January 2025

25. PowerPoint Presentation: https://rr-africa.woah.org/app/uploads/2024/07/AU-IBAR-H.-Salih-CBPP-Africa-status-implications-on-Trade-wealth-creation.pdf Accessed 11th January 2025

26. Onono, J. O., Wieland, B., Suleiman, A., & Rushton, J. (2017). Policy analysis for delivery of contagious bovine pleuropneumonia control strategies in sub-Saharan Africa. *OIE Revue Scientifique et Technique*, *36*, 195–205. https://doi.org/10.20506/rst.36.1.2621

27. GF-TADs for Africa - WOAH - Africa: https://rr-africa.woah.org/en/projects/gf-tads-for-africa/ Accessed 6th January, 2025

28. Global Burden of Animal Diseases | Institute of Infection, Veterinary and Ecological Sciences | University of Liverpool: https://www.liverpool.ac.uk/infection-veterinary-and-ecological-sciences/research/groups/gbads/ Accessed 5th January