Ministry of Agriculture and Rural Development
Department of Animal Health

National strategy for the control of
Contagious Bovine Pleuropneumonia

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National strategy for the control of CBPP (Ethiopia)

Draft document

I. Summary

Contagious Bovine PleuroPneumonia was found to be one of the major constraints to livestock production in many of the surveyed areas. The highest occurrence of the disease was in the lowland areas of the country. 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 neighboring countries. CBPP control strategies cannot be done in isolation, particularly given the presence of cross-border ecosystems. A coherent and harmonized regional approach to CBPP, that is a sound strategy for progressive control based on the identification of ecozones and disease behavior and prevalence within these ecozones is indispensable. There is a sharing of ecosystems around the junction of Ethiopia, Kenya, Uganda, Somalia and the Sudan. International donor fund supplements will be needed and the assistance of international organizations in the design and harmonization of regional control strategies is essential.

II. Introduction

Contagious Bovine PleuroPneumonia (CBPP) is a mycoplasmal respiratory disease of cattle, bison, yak and water buffalo caused by *Mycoplasma mycoides* sub-species *mycoides* small colony type (bovine biotype) characterized by fibrinous pneumonia and pleuritis and is one of the list "A" diseases registered by the Office International des Epizootics (OIE, 1996). Because of its insidious nature and high mortality rate, CBPP is one of the most serious diseases of cattle in the tropics and can cause great economic loss if allowed to spread unchecked (Hunter, 1994). The financial implications of these losses are of great significance to both cattle owners and to the nation. Control of CBPP is therefore important as a way to salvage the losses and increase the incomes of cattle owners. Contagious Bovine PleuroPneumonia is the second national priority livestock disease in Ethiopia. The meeting of Ministers responsible for animal resources of the Organization of the African Unity held in 1998 in Mbabane (Swaziland) and in 2002 in Addis Ababa (Ethiopia) recognized the CBPP as one of the main constraints to livestock development in Africa and recommended a Pan-African program to control this disease. The OIE and the World Bank in association with Food and Agricultural Organization (FAO) and Consultative Group for International Agricultural Research (CGIAR) retained CBPP among priority diseases to be taken into account in the Challenge Programme on "the reduction of the poverty by the abolition of the barriers of the market due to animal diseases". Three regional workshops, organized and funded by Pan African program for the Control of Epizootics (PACE) on CBPP control, were held in November 2001 in Addis Ababa, Ethiopia, in February 2003 in Accra, Ghana and in February 2004 in Conakry, Guinea. The first was to initiate countrywide surveillances to elucidate the extent of the disease in each CBPP affected PACE member country as a prerequisite to the planning of its control strategies, the second on the formulation of a regionally coordinated disease control strategies and the third on validity of strategy to control CBPP in PACE countries. A National surveillance of the disease was carried out in Ethiopia to generate basic and generalized information that would help formulate feasible control strategies.

III. Objectives

The objectives of the control strategy are:

- ❖ to contribute to the increase of cattle production and productivity through the control and ultimate eradication of CBPP
- ❖ to improve export opportunities of live animals and thereby increase the country's foreign exchange earnings through establishment of CBPP-free areas

IV. Control and surveillance of CBPP in Ethiopia

Ethiopia is currently getting to grips with CBPP. The disease is currently widespread in the country. Large endemic areas are found in the south, west, north, northeastern and northwestern parts of the country; new foci developing in the highland areas. The control endeavor of CBPP by vaccination has a history of about 35 years (since 1970) in Ethiopia. prevalence of Contagious Bovine Pleuro-Pneumonia has not declined due to irregularity of vaccination, low rate of vaccinated animals and their unrestricted movements. After rinderpest, the Pan African program for the Control of Epizootics (PACE) has envisaged control of CBPP. PACE Ethiopia has identified CBPP as the most important disease to address. So far, there was no systematic countrywide approach on CBPP control/eradication like the one implemented for rinderpest in Ethiopia. The overall vaccination coverage declined during the last 10 years especially since the cessation of rinderpest vaccination.

Disease outbreak reports from 1991 to 2004 indicate that several epizootics have been recorded from different regions of the country (Table 1 and 2). The highest record was in 1998 when 187 outbreaks with 5652 cases and 1071 deaths were reported (MoARD, 2005). The trend of CBPP morbidity derived from passive reports at national level is shown in Fig. 1. The decreasing trend of morbidity may be due to the long years of intensive vaccinations during the PARC era and also the coordinated annual CBPP vaccinations in various Regional States of the country in the last few years. Due to the insidious nature of the disease ("iceberg phenomenon") such official data do not necessarily convey the extent of the problem in Ethiopia. Recent studies conducted in the various parts of the country revealed that CBPP is posing a major jeopardy to cattle in many parts of the country thereby causing considerable economic losses through morbidity and mortality and warranting for serious attention (Mekonen, 2004; Issa, 2004;

Takele, 1998). In Ethiopia, prior to serological investigations conducted in 1995 and 1996, CBPP serological surveys were conducted in Harerghe by Domenech and Lefevre (1974) and in Borana by Houdre (1978) and positive results obtained by CFT were 1.78 % (730 sera) and 0 % (829 sera) respectively. These surveys were to assess the efficiency of JP-15 vaccination campaigns undertaken in 1960's and 1970's. Serological investigations were also carried out by researchers from National Veterinary Institute (NVI) from 1995 to 1997, in which CBPP endemic, epidemic and free zones were investigated (Laval, 2000). The sero-diagnostic test used, area and sources are as indicated in (Table 3). The sero-prevalence rate varied from 14 % (n=49) in the Illubabor zone suspected to be free of CBPP (Desta, 1998) to 96 % (n=80) in the epidemic zone of Western Gojam (Laekemariam and Roger, 1997) with a CFT titer 1:10. In CBPP endemic and epidemic areas of Awi and Western Gojam zones, Gashaw (1998) collected a large sample of 2140. The average sero-prevalence was 17.3 % and with a CFT titer 1:20. Sero-prevalence in the areas considered as free of the disease varied from 10 % to 54 % (Laval, 2000). Dejene (1997) has also reported prevalence of 46 %, 32 % and 29 % from Konso, Derashe and north Omo respectively.

Table 1 CBPP Outbreak Reports by year (1992-2004) at National level

Year	No. Outbreaks	Cases	Death	Slaughter	PAR	Morb.Rate (%)	Mort. Rate (%)	CFR (%)
1992	1	4	1	0	1500	0.27	0.07	25.00
1993	3	484	127	8	72,655	0.67	0.17	26.24
1994	5	115	46	0	20800	0.55	0.22	40.00
1995	48	429	160	7	161645	0.27	0.10	37.30
1996	96	505	183	5	83484	0.60	0.22	36.24
1997	43	753	131	16	93895	0.80	0.14	17.40
1998	187	5652	1071	77	844833	0.67	0.13	18.95
1999	94	4025	596	740	534938	0.75	0.11	14.81
2000	56	1918	274	600	210,375	0.91	0.13	14.29
2001	26	1590	250	20	312,516	0.51	0.08	15.72

2002	32	1326	421	34	267381	0.50	0.16	31.75
2003	29	31165	366	129	330290	0.10	0.10	1.17
2004	28	447	118	15	417132	0.12	0.03	26.4
Total	**648**	**48413**	**3744**	**1651**	**3351444**	**0.14**	**0.11**	**7.7**

Source: MoARD, Animal Health Department, Epidemiology Section 2005. PAR: Population at risk. CFR: Case Fatality Rate

Table 2. Number of CBPP outbreaks in different regions (2000-2004)

Ser. No	Regions	Number of outbreaks					Total	Average
		2000	2001	2002	2003	2004		
1	Afar	13	3	10	1		27	5.4
2	Amhara	30	18	4	5	10	67	13.4
3	B. Gumuz	4	1	2	2	2	11	2.2
4	Gambella	0	0	2	0		2	0.4
5	Oromia	37	0	23	7	4	71	14.2
6	Somali	2	0	0	0	5	7	1.4
7	SNNP	12	4	14	13	7	50	10
8	Tigray	6	1	2	0		9	1.8
Total		**104**	**27**	**57**	**28**	**28**	**244**	

Source: Federal Veterinary Epidemiology Unit

The regional workshop on CBPP control, which was held in November 2001 in Ethiopia, initiated a countrywide surveillance to elucidate the extent of the disease in the country as a prerequisite to the planning of its control strategies. The purpose was formulation of a regionally coordinated disease control strategies and also to obtain the experiences of other east African countries in controlling CBPP. The establishment of the true prevalence rates of CBPP in infected countries is a crucial prerequisite to mounting a successful disease control program, and a precursor to national efforts. Accordingly, a **national CBPP survey plan** was prepared to know a clear picture of the disease and to understand clearly the basic immunological events occurring in affected cattle of the country. Random selection of 57

representative *districts* was done for the survey. The design was based on two strata - infected and free zones, with assumed prevalence and random probability sampling. Districts in regions were listed and random selection made for sampling. In districts lists of PAs/villages were made and target villages selected randomly. Sample size was determined using a calculation formula (EpiInfo 2000) for 95% confidence level. The surveillance commenced in May 2002 after a National workshop held in March 2002. The actual activities of the survey are **questionnaire survey**, **serological survey**, active CBPP outbreak investigation (**clinical disease search**) and **abattoir investigation**. The target groups were farmers, professionals, animal traders and abattoir inspectors. This surveillance was a prelude (an inception or a reconnaissance phase) to the development of actual control programs. In this surveillance 19230 sera samples were collected and serologically tested with ELISA technique at the National Animal Health Research Center (NAHRC). Data analysis for Questionnaire survey of all the 57 sampled districts was conducted. Preparation of strategy development (a strategic plan) of an integrated and coordinated national control program with **appropriate and sustainable control options of optimal impact** that is technical and operational strategies for the progressive control and an eventual eradication of CBPP is indispensable.

Fig. 1. CBPP morbidity (%) report and trend at national level (1992-2004)

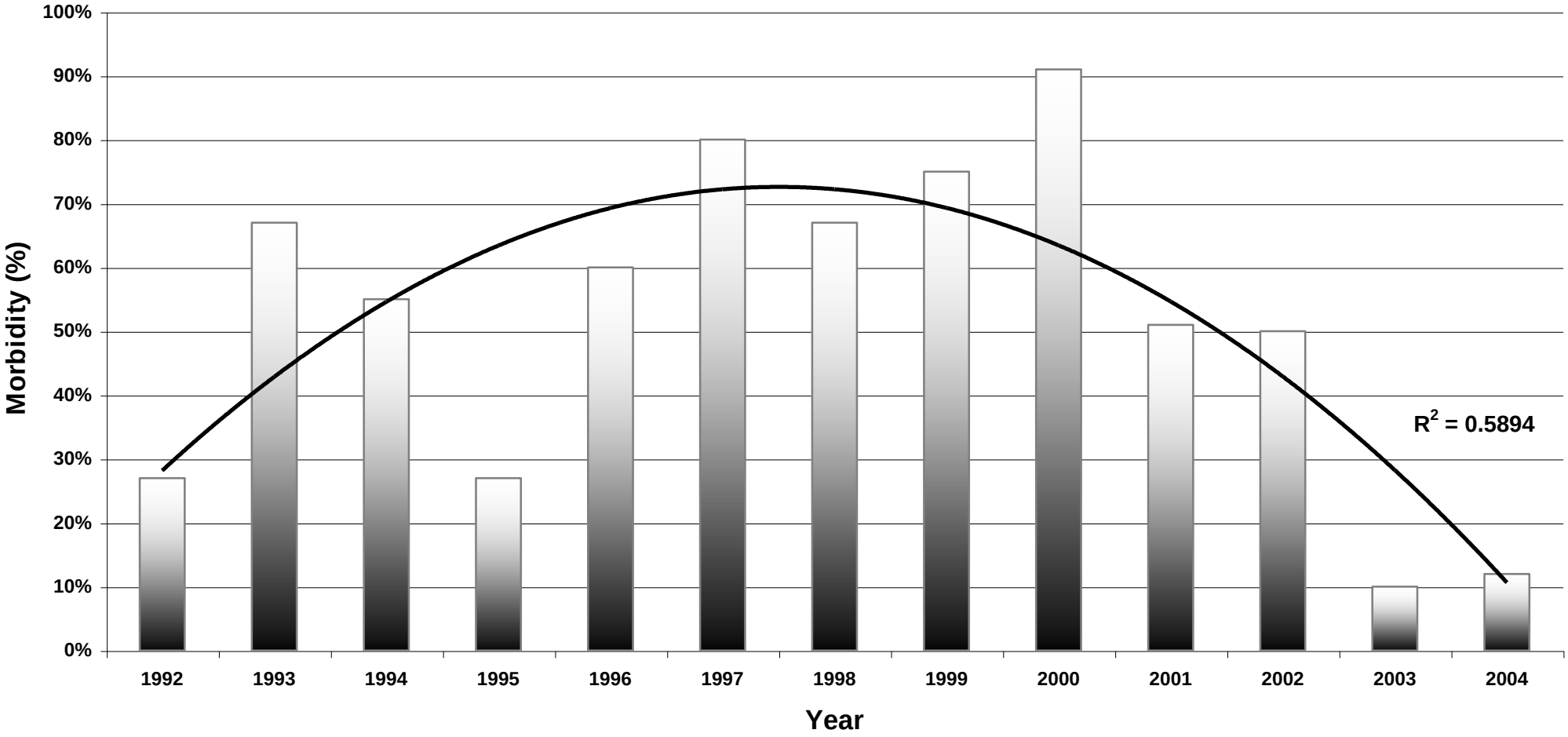

Table 3. Sero-prevalence of CBPP in various zones of Ethiopia from 1995 to 2004

Source	Date of sample collection	Zone	Epidemiological status	Sample size	CBPP prevalence (%)
Ahmed I. (2004)	Oct. 2003-Jan 2004	Borena	enzootic	1033	12
	Nov. 1996-May 1997	Guji	enzootic	1014	6.8
Desta B. (1997)		Western Welega	enzootic	651	48
	Nov. 1995-May 1996	Eastern Welega	epizootic	56	20
		Illubabor	Free	49	14
Dejene W. (1996)	March-April 1997	Konso	enzootic	70	46
		Derashe	enzootic	59	32
		North Omo	epizootic	374	29
Gashaw T. (1998)	Oct. 2003-Jan 2004	W. Gojam & Awi	enzootic	2140	17.3
Gedlu M. (2004)		Shinile	epizootic	653	11.6
		Jijiga	epizootic	140	4.3
Laikemariam and	1996 and 1997	Western Wellega	epizootic	360	75
Roger (1997)		Western Gojam	enzootic	80	96
		Southern Gonder	epizootic	40	85
		Northern Wello	epizootic	60	75
		Northern Shewa	free	100	54
		Southern Tigray	epizootic	20	59
		North Omo	epizootic	240	29
		Borana	enzootic	370	74

PACE has amongst its major objectives the improvement of surveillance for the control of epizootic diseases. After rinderpest, CBPP has been identified as the most important disease to address within the PACE program. CBPP control/eradication is technically far more difficult than is the case with rinderpest

V. Summary results of the national surveillance

The national CBPP surveillance was conducted both in dry and wet seasons of 2002-2003. Activities included sera collection and questionnaires on observations of CBPP by farmers/pastoralists, professionals and abattoir personnel. Questionnaire on farmers' observation (617) on the disease was conducted both in dry (249) and wet (368) seasons (Table 3). During this national surveillance a total of 19230 sera were collected from 7 regional states, (38 zones, 54 districts and 1026 villages). The average sero-prevalence was 5.63%, the highest in Gambella (19.72%) followed by Benshangul Gumuz (12.08%) and the lowest in Somali Regional State (0.99) of Ethiopia (Table 7). The type and rank by population size of livestock species raised by communities in surveillance areas of the different regions is shown in Table 4.

Table 4. Type of livestock species raised by communities in different regions (rank by population size)

Region	First	Second	Third	Fourth	Fifth	Frequency (number)
Afar	Cattle	Camel	Goat	Sheep	Equine	11
Afar	Cattle	Camel	Goat	Sheep		5
Afar	Goat	Cattle	Sheep	Camel	Equine	5
Afar	Cattle	Goat	Camel	Sheep	Equine	4
Amhara	Cattle	Sheep	Goat	Equine		29
Amhara	Cattle	Goat	Sheep	Equine		27
Amhara	Cattle	Sheep	Equine	Goat		21
B. Gumuz	Cattle	Goat	Equine	Sheep		12
B. Gumuz	Goat	Cattle	Sheep	Equine		8
B. Gumuz	Cattle	Goat	Sheep	Equine		3
Gambella	Cattle	Goat	Sheep			15
Gambella	Cattle	Sheep	Goat			9
Oromia	Cattle	Sheep	Goat	Equine		43
Oromia	Cattle	Sheep	Equine	Goat		33
Oromia	Cattle	Goat	Equine	Sheep		26
SNNP	Cattle	Sheep	Goat	Equine		33

SNNP	Cattle	Goat	Sheep	Equine		28
SNNP	Cattle	Sheep	Equine	Goat		21
Somali	Cattle	Sheep	Goat	Camel	Equine	10
Somali	Cattle	Goat	Sheep	Camel		6
Somali	Cattle	Sheep	Goat	Camel		4
Somali	Sheep	Goat	Cattle	Camel		4
Tigray	Cattle	Equine	Goat	Sheep	Camel	8
Tigray	Cattle	Goat	Sheep	Equine	Camel	8
Tigray	Cattle	Equine	Camel	Goat	Sheep	6
Tigray	Cattle	Goat	Equine	Sheep		4
Tigray	Cattle	Sheep	Goat	Equine		4

The husbandry system of areas studied in all regions were generally classified as Semi-sedentary, Pastoral and totally sedentary (Table 5).

Table 5. Husbandry system of areas studied

Region Freq **%** Row pct Col. pct	**Semi-sedentary**	**Pastoral**	**Totally sedentary**	**Total**
Afar	**11** **1.80** **31.43** **8.27**	**24** **3.93** **68.57** **40.68**	**0** **0.00** **0.00** **0.00**	**35** **5.73**
Amhara	**19** **3.11** **13.48** **14.29**	**0** **0.00** **0.00** **0.00**	**122** **19.97** **86.12** **29.12**	**141** **23.08**
B. Gumuz	**9** **1.47** **37.50** **6.77**	**0** **0.00** **0.00** **0.00**	**15** **2.45** **62.50** **3.58**	**24** **3.93**
Gambella	**23** **3.76** **95.83** **17.29**	**0** **0.00** **0.00** **0.00**	**1** **0.15** **4.17** **0.24**	**24** **3.93**
Oromia	**38** **6.22** **19.69** **28.57**	**0** **0.00** **0.00** **0.00**	**155** **25.37** **80.31** **36.99**	**193** **31.58**
SNNP	**2** **0.33** **1.85** **1.50**	**12** **1.96** **11.11** **20.34**	**94** **15.38** **87.04** **22.43**	**108** **17.68**
Somali	**15**	**23**	**0**	**38**

	2.45 **39.47** **11.28**	**3.76** **60.53** **38.98**	**0.00** **0.00** **0.00**	**6.22**
Tigray	**16** **2.6233.33** **12.03**	**0** **0.00** **0.00** **0.00**	**32** **5.24** **66.67** **7.64**	**48** **7.86**
Total	**133** **21.77**	**59** **9.66**	**419** **68.58**	**611** **100,00**

Frequency missing = 3

Freq = The number (frequency) of sampling sites in the different husbandry systems of each region
% = Percentage out of all regions of sampling sites in each husbandry system
Row pct = (Row percentage) - percentage of sampling sites in the different husbandry systems of each region
Col pct = (Column percentage) - Column-wise percentage out of all regions of sampling sites in each husbandry system

The association between husbandry system and test result is highly significant ($p<0.0001$) at regional level. The husbandry system in the different study areas related to test results is shown in Table 6. Maps of test results of the national CBPP surveillance, sampled districts and Pie chart showing test results are shown in Fig. 2, 3 and 4 respectively

Table 6. Husbandry system vs sera test result at Regional level

Hustandry system **Frequency** **%** **Row pct** **Col pct**	**Negative**	**Positive**	**Total**
Mainly sedentary	3627 20.39 90.90 21.45	363 2.04 9.10 41.20	3990 22.43
Nomadic	1609 9.04 92.47 9.52	131 0.74 7.53 14.87	1740 9.78
Totally sedentary	11673 65.62 95.79 69.03	387 2.18 3.21 43.93	12060 67.79
Total	16909 95.05	881 4.95	17790 100.00

The prevalence rate of CBPP was highest in Oromia followed by SNNP and Gambella Regional States (Table 7). Mean villages prevalence rates of CBPP between different Regions were significantly different (p<0001). In the national surveillance sex and age group (adult, young and calf) were found to have no statistical significance on CBPP occurrence.

Table 7. Serological test results of CBPP in different Regions

Region	No of Zones	No of districts	Total sample	Negative	Positive	Prevalence (%)
AFAR	3	3	1080	1001	79	7.31
AMHARA	9	12	4320	4264	56	1.29
B. GUMUZ	2	2	720	633	87	12.08
GAMBELA	1	2	720	578	142	19.72
OROMIA	11	20	7140	6730	410	5.74
SNNP	8	8	2700	2553	147	5.44
SOMALI	2	3	1110	1099	11	0.99
TIGRAY	2	4	1440	1352	88	6.11
Total	**38**	**54**	**19230**	**18210**	**1020**	**5.63**

VI. Control strategies

In order to tackle CBPP at the national level, strategies have been identified which divide the country into epidemiological zones as the basis for a phased eradication program. Current knowledge on the epidemiological situation of the disease in Ethiopia roughly allows distinguishing three zones, endemic zone, epizootic zone and disease free zone but exposed to the risk of the disease. The control strategy is based on the protection of the free zones and the reduction of the disease incidence within the maintenance endemic zones. Establishment of a sanitary cordon to distinguish the disease free zone and the infected zone is indispensable. Control measures would be a compromise between the ideal methods and those that are practically possible, involving a degree of risks. The

details of the most appropriate control options for the control of the disease in Ethiopia are discussed below.

i. Vaccination

One of the major interventions in controlling CBPP is **mass prophylactic vaccination** and that was the method practised in Ethiopia until the PARC era. CBPP vaccination has a history of about 30 years in the country. With the adoption of a strategy towards rinderpest eradication, the blanket vaccinations (combined Rinderpest and CBPP vaccine) in the highlands ceased since 1992/93. Since then CBPP control in Ethiopia is based on targeted and ring vaccination in the face of outbreaks. The irregularity and low rate of vaccination seem to be the cause for the insufficient decrease in the incidence of the disease and circumscribe its dissemination. For mass vaccination endeavours, improved logistic and operational supports for veterinary field activities are absolutely necessary.

1. CBPP endemic zone

What is known so far about Ethiopia (Table 8) is that large endemic areas are found in the south (Borena, south Omo, Konso, Derashe, Amaro), west (West wollega - Manasibu, Boji, Nedjo and Laloasabi; Benshangul Gumuz - Bambasi, Asosa, Kamashi), northeastern (Afar) and northwestern (Awwi, West Gojjam). **The control strategies in endemic zone are**:

- All cattle in endemic areas will be vaccinated at least once every year for five years followed by evaluation. Identification of animals will also be carried out. In the longer term when the incidence of CBPP drops to a low level, zoo-sanitary measures will be carried out at livestock markets, checkpoints and stock routes.
- Disease surveillance and reporting (passive and active)
- Screening of cattle leaving for other zones for breeding, fattening, draft power or any other purpose.
- There will be strict cattle movement control from these areas to clean areas and cattle slaughtered only in mandated slaughterhouses after getting marked.
- Status of CBPP evaluated in collaboration with neighboring countries

The campaign should be carefully planned and organized together with farmers and pastoralists.

A workshop was held in Guinea, Conakry (Feb. 25-27 2004) on validity of strategy to control CBPP in PACE countries. The requirement set in the workshop for controlling the disease were that countries be endowed with operational veterinary services, epidemiological surveillance system including surveys at abattoirs, adequate laboratory diagnosis capacities and a policy aimed at monitoring effectively cattle movement. **Accordingly the recommendations forwarded for countries where the disease is regularly declared (endemic zone) like Ethiopia is to reduce the incidence and prevalence by:**

- annual vaccination targeting 80% for five years
- enter the OIE pathway
- Impact assessment of disease and
- Slaughtering clinically sick animals in areas of outbreak

Table 8. CBPP Endemic Zone of Ethiopia

Ser. no	Regional States	Zones	Districts	Cattle population
1.	Afar	5	29	800000
2.	Amhara	2	16	1985881
3.	B. Gumuz	2	11	79391
4.	Oromia	2	16	2314522
5.	SNNPR	4	12	2639030
Subtotal		**15**	**84**	**7818824**

Source: Cattle population in districts: CSA, 2003

2. CBPP epidemic zone

This zone includes areas between the free and epidemic zones, in some parts encroaching upon the central highland peripheries. The major areas of this zone are low and midland Arsi, North Omo, Maki, Eastern Shoa (Fentale district), North Wollo, South Wollo, Southern Tigray, Southern Gonder, West Wollega (Gimbi and Nolekaba districts), part of Gambella and Somali Regions (Table 9). In this zone, control activities will be geared towards reverting the area to a low risk or clean zone. **The specific interventions in this zone will be:**

- Disease surveillance and reporting (passive and active)
- Surveillance and reporting in fields and at slaughterhouses with trace-back policy
- Outbreaks will be thoroughly investigated with trace-back quarantine and mass screening using regional and the central referral laboratories.
- Vaccinations will be carried out at outbreak foci as well as ring to a minimum of 10 km. Radius.
- Mass screening and vaccination will be repeated at yearly intervals until the area becomes free of the disease.
- When the disease prevalence comes to low level, zoo-sanitary measures will take place at livestock markets, check points and stock routes.

Table 9. CBPP Epidemic Zone of Ethiopia

Ser. no	**Regional States**	Zones	Districts	Cattle population
1.	Amhara	2	23	2908550
2.	Gambella	1	1	50000
3.	Harari	1	2	28082
4.	Oromia	3	24	2989400
5.	SNNPR	1	18	1239622
6.	SNRS	1	6	1818880
7.	Tigray	1	6	570768
Subtotal		**10**	**80**	**9605342**

Source: Cattle population in districts: CSA, 2003

Total cattle population (epidemic and endemic zones) 17,424,166

3. CBPP free zone

Disease free zones are areas where CBPP is absent but rarely and irregularly introduced from the epidemic and endemic areas. The basic strategy for disease free areas is that no vaccination will be carried out except in face of outbreaks. The major part of this zone includes the central highlands and areas bounding the epidemic zones. **The primary activities in this zone is prevention of CBPP introduction which includes:**

- Establishment of clinical and serological surveillance as well as surveillance at abattoirs and reporting is indispensable.

- Cattle from CBPP districts will be allowed in only after screened by 2 CFT tests 21 days apart. Otherwise no animal is allowed either for rearing or for slaughter from any of the other zones.
- In the event of outbreak, the index herd and in-contact herds will be screened and the livestock owner advised to slaughter the positives or compensated. screening will be repeated every 10 weeks until no more positives are detected.
- To ascertain the disease status random surveys will be conducted.
- After considerable years of control endeavors, zoo-sanitary measures will be carried out at livestock markets, checkpoints and stock routes.

Cattle movement restriction and quarantine laws will be enforced. An emergency preparedness plan and solid reporting system will be instituted to immediately investigate and take necessary measures in the disease free zone. Funds, equipment and manpower should be available at all times to contain emergency outbreaks in an early stage.

ii. Movement restriction

Cattle movement is of critical importance to the CBPP situation in Ethiopia. The persistence of the disease may well be connected with the complexity of cattle production and movement in the country. Though mass vaccination with a safe effective vaccine is an essential part of control measures in infected areas, for a lasting success vaccination must be backed up by stock movement control measures. This policy issue must be backed by the existing legislation and further commitment is required to enforce it consistently. Enforcement of the existing *cattle movement restriction and quarantine regulations* is indispensable in CBPP control endeavors. Moreover, for movement control there should be improvement of animal identification scheme (experience of Guinea), updating stock routes, and defining entry requirements of animals into disease free zone.

iii. Stamp out

The principle of test and slaughter as a CBPP control strategy has so far remained far from being implemented in Ethiopia. However this should not be regarded as something unachievable. Slaughter of infected, chronic and latent carrier animals is necessary once a high level of control is achieved. Although it seems theoretical when one looks into

nomadism and transhumance, these approaches have been practiced in countries of East Africa (1960-1970), Central African Republic, Cameron and Nigeria (1970-1980) and Guinea Conakry (1992-1993) (Masiga & Domenech 1995). When animal movement control is enforced and the incidence of the disease in the endemic zones reduced to the lowest level possible, stamp out practice can set in gradually and smoothly.

iv. Surveillance

Strong surveillance networks should be established at National level. When the control activity is started a continuous disease surveillance (to follow the OIE pathway) should be designed by establishment of a system of reporting any signs of disease activity, an active programme of examination of statistically selected samples from host populations and meat inspection reports from abattoirs.

v. Community based animal health activities

It is advisable to carry out community based animal health activities, to implement disease control programs in the pastoralists area.

vi. Awareness, emergency and contingency plans

In disease free areas under threat from movements of cattle from infected zones, **disease awareness, surveillance system, emergency preparedness and contingency plans** must be developed. Cattle population to be vaccinated over 5 years in the endemic and epidemic zones of the country are shown in Tables 10 and 11 respectively.

Table 10. Cattle population to be vaccinated over 5 years in the endemic Zone of Ethiopia (80%)

Ser. no	Regional States	Zones	Districts	Cattle population	No. of cattle to be vaccinated over 5 years
1.	Afar	5	29	800000	3200000
2.	Amhara	2	16	1985881	7943524
3.	Benshangul Gumuz	2	11	79391	317564
4.	Oromia	2	16	2314522	9258088
5.	SNNPR	4	12	2639030	10556120
Subtotal		**15**	**84**	**7818824**	**31275296**

In epidemic zones vaccinations will be carried out at outbreak foci as well as ring to a minimum of 10 km. radius at yearly intervals for 5 years until the area becomes free of the disease. The number of cattle to be vaccinated in the epidemic zone of each Region is calculated as: average number of outbreaks x $\prod r^2$ (where r is 10 km radius and Π is 3.14) x cattle density per sq. km of that specific region x 5 minus Cattle less than 1 year age Per 10 sq. km (Table 12).

Table 11 Cattle population to be vaccinated at outbreak sites over 5 years in the epidemic Zone of Ethiopia

Ser. no	Regional States	Zones	Districts	Cattle population	No. of cattle to be vaccinated over 5 years
1.	Amhara	2	23	2908550	147159
2.	Gambella	1	1	50000	1495
3.	Harari	1	2	28082	31828
4.	Oromia	3	24	2989400	115844
5.	SNNPR	1	18	1239622	123923
6.	SNRS	1	6	1818880	13028
7.	Tigray	1	6	570768	74799
Subtotal		**10**	**80**	**9605342**	**508076**

Source: Cattle population in districts: CSA, 2003

Table. 12. Area and cattle density in the epidemic Zone of Ethiopia

Region	Area (km2)	Cattle density per km2	Cattle <1 y age In each Region	Cattle <1 y age Per 10 sq.km
Amhara	150174	70	1600000	107
Gambella	25274	5	38000	15
Harari	400	85	8000	200
Oromia	353007	52	3000000	85
SNNP	112343	79	1200000	107
Somali	315100	12	1022000	32
Tigray	50079	53	450000	90
Total	**1006377**		**7318000**	

Source: Cattle population in regions: CSA, 2003

VII. Budget requirement

Cattle (beef and live animal) off take is assumed to correspond to annual population increase, that is 7%. For vaccination program a total of _____ETB is required. In endemic zone mass vaccination will be carried out yearly for five years consecutively, while in epizootic zones vaccinations will be carried out at outbreak foci as well as ring to a minimum of 10 km. Radius; the details of which are presented in tables 13 and 14.

Table 13. Budget required (Birr) for vaccination campaigns over 5 years in the endemic Zone of Ethiopia

Region	CBPP vaccine (dose)	Cost of vaccine	Butane & saline water cost	Staff allowance	Operation & maintenance	Camp guard & transport animal rent	Workshop
Afar	3200000	640000					
Amhara	7943524	1588705					
Benshangul G.	317564	63513					
Oromia	9258088	1851618					
SNNPR	10556120	2111224					
Total	**31275296**	**6255060**					

Table 14. Budget required (Birr) for vaccination at outbreak areas over 5 years in the epidemic Zone of Ethiopia

Region	CBPP vaccine (dose)	Cost of vaccine	Butane & saline water cost	Staff allowance	Operation & maintenance	Transport animal rent	Workshop
Amhara Gambella Harari Oromia SNNPR SNRS Tigray							

Assumptions

1. Willingness and ability of the numerous stakeholders to work together effectively
2. CBPP remains one of the major constraints faced by farmers and their cattle
3. The release of sufficient funds to undertake the integrated control activities
4. Government Veterinary Services will fully undertake the overall implementation, supervision, monitoring and disease surveillance activities
5. The perception of the communities to the problem of CBPP and their level of participation are sufficient for the CBPP control activities to be undertaken

Risks

1.Political stability and internal security are preconditions for the success of the implementation of the project

2. Important Government inputs are the allocation of human resources and recurrent expenditures (salaries and allowances of all Government staff, and a progressively increasing contribution towards operational costs)

3. Deviation from the present central economic policy of the participating regions will put the project at risk

Flexibility

Fieldwork related to data collection, vaccination and sero-surveillance allows a reasonable degree of flexibility, in time (it could be undertaken faster or slower) in scope (more could be done than less), in methodology (survey techniques; CBPP control techniques) and in implementation mechanisms (use of Government agencies and/or private sector involvement through communities).

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