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Mycoplasmas Isolated from the Respiratory Tract of Cattle and Goats in Tanzania

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Kusiluka LJM, Ojeniyi B, Friis NF, Kazwala RR, Kokotovic B: Mycoplasmas isolated from the respiratory tract of cattle and goats in Tanzania. Acta vet. scand. 2000, 41, 299-309. – A microbiological study of the mycoplasma flora in the respiratory tracts of cattle and goats in selected regions of Tanzania is described. In the examination of cattle, mycoplasmas were isolated from 60 (17.8%) of the 338 examined lung samples, 8 (47.1%) of the 17 lymph nodes, 4 (13.3%) of the 30 pleural fluid samples and 4 (3.9%) of the 103 nasal swabs examined. All the isolates were identified as *Mycoplasma mycoides* subsp. *mycoides,* Small Colony type except for one isolate from pleural fluid which was identified as *Mycoplasma arginini. M. mycoides* subsp. *mycoides,* Small Colony type was isolated from samples originating from Dodoma, Iringa, Mbeya, Morogoro and Shinyanga regions where outbreaks of contagious bovine pleuropneumonia had been reported. In the examination of goats, mycoplasmas were isolated from 54 (34.0%) of the 159 examined lung samples, 41 (18.1%) of the 226 nasal swabs and 4 (40.0%) of the 10 pleural fluid samples. The species demonstrated were *Mycoplasma capricolum* subsp. *capripneumoniae, M. mycoides* subsp. *mycoides,* Small Colony type *Mycoplasma ovipneumoniae* and *M.Capricolum* subsp. *arginini.* The isolation of *M. capripneumoniae* in the Coast and Morogoro regions confirmed the presence of contagious caprine pleuropneumonia in the regions.

pleuropneumonia.

Introduction

Mycoplasmas are associated with a variety of disease syndromes in livestock including pneumonia, mastitis, polyarthritis, polyserositis, keratoconjunctivitis and reproductive disorders (*Stalheim* 1990). Contagious bovine pleuropneumonia (CBPP) caused by *Mycoplasma mycoides* subsp. *mycoides,* Small Colony (SC) type (*M. mycoides* SC) is the most serious respiratory mycoplasmosis of cattle in Africa, Asia, Middle East and south-western Europe (*Provost et al.* 1987). Besides *M. mycoides* SC several other pathogenic species exist in cattle such as *M. bovis* which causes mastitis, pneumonia, arthritis and reproductive disorders (*Pfützner & Sachse* 1996). *M. dispar, Ureaplasma diversum* and *M. bovigenitalium* are also involved in the calf pneumonia complex (*Thomas et al.* 1982, *Ross* 1993). *M. bovigenitalium, M. canadense, M. alkalescens* and *M. californicum* cause mastitis (*Ross* 1993) and *M. bovigenitalium* and *U. diversum* are also involved in bovine genital and reproductive diseases (*Ernø* 1974). *M. bovoculi* is associated with infectious bovine keratoconjunctivitis (*Friis & Pedersen* 1979).

Contagious caprine pleuropneumonia (CCPP) caused by *M. capricolum* subsp. *capripneumoniae* (*M. capripneumoniae*) is one of the

most contagious and highly fatal mycoplasma diseases of goats. The disease is prevalent in Africa, the Mediterranean and Asia (*Bölske* 1995, *Thiaucourt & Bölske* 1996). *M. mycoides* subsp. *mycoides,* large colony (LC) type (*M. mycoides* LC) and *M. mycoides* subsp. *capri (M. capri)* cause pleuropneumonia which may be indistinguishable from CCPP (*Lefèvre et al.* 1987, *Jones* 1989) and, together with *M. capricolum* subsp. *capricolum (M. capricolum), M. agalactiae* and *M. putrefaciens* are involved in the mastitis, arthritis, keratitis, pneumonia and septicaemia (MAKePS) syndrome in goats (*Thiaucourt & Bölske* 1996). *M. conjunctivae* causes caprine and ovine keratoconjunctivitis while *M. ovipneumoniae* is associated with pneumonia in small ruminants (*DaMassa et al.* 1992). *M. arginini* is frequently isolated from lungs of goats but its role in respiratory disease is unclear (*Jones* 1989).

M. mycoides SC, *M. mycoides* LC, *M. capri, M. capricolum, M. capripneumoniae* and *Mycoplasma* sp. bovine group 7 have been grouped together under the so-called *'Mycoplasma mycoides* cluster' because of their biochemical, antigenic and phylogenetic similarities (*Bölske* 1995). They cause diseases that have a global socio-economic impact (*Rweyemamu & Benkirane* 1996). *M. putrefaciens* is closely related to the *M. mycoides* cluster (*Weisburg et al.* 1989).

CBPP has been endemic in north-eastern Uganda and northern Kenya for many years and cattle movements in the 1990s spread the disease to the southern parts of these countries, Rwanda and Zaire (*Rweyemamu & Benkirane* 1996). CBPP was eradicated from Tanzania in 1964 (*Lwebandiza* 1969) but it was reintroduced into the north-eastern part of the country from Kenya in 1990 (*Bölske et al.* 1995) and into north-western Tanzania from southern Uganda in 1991 (R*weyemamu & Benkirane* 1996). Since then, CBPP has spread to many parts of the country and presently, it is the most devastating disease of cattle threatening more than 9.5 million heads of cattle in 17 regions of the country (*Melewas* 1999).

CCPP was confirmed by isolation of *M. capripneumoniae* (formerly *Mycoplasma* strain F38) in Kenya in 1976, and since then it has remained endemic in the country (*MacOwan & Minette* 1976, *Rurangirwa et al.* 1991). In Uganda, CCPP was confirmed in 1993 (*Bölske et al.* 1994). The disease has been suspected to be present in Tanzania since the early 1980s (*Nyange & Mbise* 1983, *Msami* 1991) but it was only confirmed by isolation of *M. capripneumoniae* in 1998 (*Msami et al.* 1998a). Like CBPP, CCPP is rapidly spreading; now encompassing the major goat-rearing regions of the country (Dr. Ponela-Mlelwa, personal communication). Limited studies have been conducted concerning CBPP, CCPP and other respiratory mycoplasmoses of cattle and goats in Tanzania. Therefore, this study was designed to elucidate the mycoplasma flora in the respiratory tracts of cattle and goats in selected regions of the country with special emphasis on the *M. mycoides* cluster.

Materials and methods

Source of samples

This study was carried out in Tanzania from October 1998 to November 1999. It was based on examination of the respiratory tract specimens (lungs, lymph nodes, pleural fluid, fibrin and nasal swabs) from cattle and goats from 11 different regions of the country, namely: Arusha, Dodoma, Dar es Salaam, Iringa, Kagera, Mbeya, Morogoro, Mtwara, Coast, Shinyanga and Tanga. Except for the Coast region, outbreaks of CBPP have been reported in the regions, but data on laboratory confirmation of the disease was scanty. CCPP had only been confirmed in Arusha, Dar es Salaam Kilimanjaro and Tanga regions. Samples from the lower respiratory tract were obtained from slaughter-

Table 1. Mycoplasmas isolated from specimens of the respiratory tract of cattle in Tanzania.

	Number (%) infected							
							Nasal swabs	
		Lung lesions		Lymph nodes	Pleural fluid	Fibrin	Clinical respiratory distress	
Mycoplasma spp.	CBPP like	Other types	No lesions				Present	Absent
M. mycoides SC	60 (49.6)	-	-	8 (47.1)	3 (10.0)	2 (66.7)	4 (11.1)	-
M. arginini	-	-	-	-	1 (3.3)	-	-	-
Total no. (%) infected	60 (49.6)	-	-	8 (47.1)	4 (13.3)	2 (66.7)	4 (11.1)	-
Total no. examined	121	133	84	17	30	3	36	67

Figures for samples with no microbial growth and those which showed bacterial or fungal growth are not indicated in the table.

houses and some of them were collected from animals which died naturally from disease or had been sacrificed. Lungs without pneumonic lesions were also examined for comparison. After collection, the specimens were kept in a cool box during transport to the laboratory at Sokoine University of Agriculture, Morogoro or stored at –20 °C until transported to the laboratory. Some specimens submitted to the Animal Disease Research Institute (ADRI), Dar es Salaam as part of the National CBPP/CCPP Surveillance Programme and whose records of origin were available were also included in the study. Similarly, samples submitted to the Faculty of Veterinary Medicine, Sokoine University of Agriculture for routine diagnostic work were screened. Depending on their gross pathological appearance, lungs were categorised as CBPP/CCPP like lesions, other types of pneumonias and non-pneumonic cases.

Nasal swabs were collected from cattle and goat herds and some of them were collected at local animal markets. Animals from which nasal swabs were collected were categorised as suffering from respiratory tract disease when they showed nasal discharge and/or distressed respiration and as normal when they did not show these signs. Immediately after collection the swabs were immersed in mycoplasma transport medium and kept in a cool box during transport to the laboratory or stored at –20 °C if transport to the laboratory was delayed.

In cattle, a total of 338 lungs comprising 121 with CBPP like lesions, 133 with other pneumonic lesions and 84 without pneumonic lesions were examined (Table 1). Of the lungs with CBPP like lesions, 18 had sequestra. Seventeen lymph nodes comprising 11 mediastinal and 6 bronchial were examined, as were 30 and 3 samples of pleural fluid and fibrin, respectively. A total of 103 nasal swabs comprising 36 and 67 from animals with and without clinical respiratory distress, respectively, were also screened for mycoplasmas.

In goats, 159 lungs were examined, 98 of which had CCPP like lesions (including one with a sequestrum), 47 other pneumonic lesions and 14 were non-pneumonic cases (Table 2). Ten pleural fluid samples comprising 6 from cases with CCPP like lesions and 4 from cases with other types of pneumonic lesions were screened for mycoplasmas. In addition, a total of 226 nasal swabs comprising 108 collected from animals with clinical respiratory distress and 118 from animals exhibiting no clinical respiratory distress were examined.

Table 2. Mycoplasmas isolated from specimens of the respiratory tract of goats in Tanzania.

	Number (%) infected					
					Nasal swabs	
		Lung lesions		Pleural fluid	Clinical respiratory distress	
Mycoplasma spp.	CCPP like	Other types	No lesions		Present	Absent
M. capripneumoniae	10 (10.2)	-	-	1 (10.0)	-	-
M. mycoides subsp. mycoides	5 (5.1)	-	-	1 (10.0)	1 (0.9)	-
M. ovipneumoniae	30 (30.6)	3 (6.4)	-	1 (10.0)	21 (19.4)	18 (15.3)
M. arginini	5 (5.1)	1 (2.1)	-	1 (10.0)	1 (0.9)	-
Total no. (%) infected	50 (51.0)	4 (8.5)	-	4 (40.0)	23 (21.3)	18 (15.3)
Total no. examined	98	47	14	10	108	118

Figures for samples with no microbial growth and those which showed bacterial or fungal growth are not indicated in the table.

Isolation media

Three types of media selected on the basis of growth requirements of known bovine and caprine mycoplasmas were used for isolation purposes. A modified Hayflick's medium containing 15% horse- and swine serum, and enriched with arginine and urea, herein abbreviated as HAU, was used for isolation of glucose-, arginine- and urea-metabolising mycoplasmas (*Friis* 1975). A medium designated as NHS-20, originally developed for isolation of *M. hyopneumoniae* and containing 20% horse- and swine serum was used mainly for isolation of *M. dispar* (*Kobisch & Friis* 1996). Another Hayflick-based medium, containing 25% horse- and swine serum and enriched with sodium pyruvate, herein abbreviated as H25P, was used for isolation of *M. capripneumoniae* from CCPP-suspected samples (*Bölske et al.* 1996). For primary propagation, all media were supplemented with D-cycloserine (Fluka Biochemika, Buchs) in addition to bacitracin and methicillin in NHS-20 and ampicillin in HAU and H25P. Differentiation between arginine- and urea-positive cultures was achieved by subculturing in a modified Hayflick's medium enriched with arginine but no urea, and additionally a NHS-20 medium enriched with urea, $MgSO_4$ and lincomycin (Fluka Biochemika, Buchs). The solid medium was prepared from final liquid medium by adding autoclaved agar, L28 (Oxoid, Hampshire, England) to 0.8%-0.9%.

Cultural procedures

Ten-fold serial dilutions to 10^{-6} of homogenised lung and lymph node tissue suspensions, pleural fluid and nasal swabs were prepared in all 3 liquid standard media and incubated at 37 °C. Broth cultures were examined daily for colour change of phenol red for 2 weeks. Appearance of slight floccular material and weak turbidity in the broth medium were also used as indicators of growth. Positive cultures were subcultured onto solid medium for the examination of colony morphology. Cultures without evidence of growth after 4 days of incubation were also plated in an attempt to isolate mycoplasmas which do not produce noticeable colour change in broth. The plates were incubated at 37 °C in a humidified atmosphere with a candle source of CO_2. They were examined for mycoplasma

colonies every second day and discarded if negative after 14 days of incubation.

Identification of isolates

Isolates of mycoplasmas were cloned by the single colony technique (*Stalheim* 1990) prior to biochemical characterisation. Biochemical tests including sodium polyanethol sulphonate and digitonin sensitivity, glucose, arginine and urea metabolism, and film and spots production were used for preliminary characterisation (*Ernø* 1974, *Friis* 1975, *Stalheim* 1990). Isolates of the classical mycoplasma types were then identified by the disc growth inhibition test using rabbit hyperimmune sera against the type strains for known bovine and caprine mycoplasmas as previously described (*Working Group of the FAO/WHO Programme on Comparative Mycoplasmology* 1976). Epi-immunofluorescence on colonies was used as a supplementary test for some isolates for confirmation of the disc growth inhibition test results (*Gardella et al.* 1983). Isolates showing strong positive reactions in the disc growth inhibition test with PG1 and Y-Goat antisera were further examined for their ability to digest casein and to survive at +45°C, in attempt to separate the small (SC) and large (LC) variants of the *Mycoplasma mycoides* subspecies *mycoides* (*Cottew & Yeats* 1978). The *M. mycoides* subsp. *mycoides* isolates from goats and some from cattle were also sent to Dr. Göran Bölske, National Veterinary Institute, Uppsala for further examination by the serum digestion test and molecular methods.

Results

Disc growth inhibition test

In the disc growth inhibition test of the *M. mycoides* cluster, weak interspecies cross-reactions were noted. The cross-reactions were notably strong between the SC- and LC variants of *M. mycoides* subsp. *mycoides,* rendering them inseparable by this test. The 2 variants were tentatively distinguished by their colony size, sensitivity to +45°C, ability to digest casein and liquefy inspissated serum. The type strains PG1 (*M. mycoides* SC) and Y-Goat (*M. mycoides* LC) showed unequivocal results which conformed with published literature (*Ernø* 1983). However, variable results were obtained with the field strains rendering it difficult to assign them to their respective biotypes. However, because typical CBPP lesions are caused only by the SC variants of *M. mycoides* subsp. *mycoides,* the isolates from cattle with CBPP lesions were considered to be of the SC type. The *M. mycoides* subsp. *mycoides* isolates from goats were confirmed to be of the SC type by molecular methods.

Mycoplasmas of cattle

The prevalence and species of mycoplasmas isolated from cattle in Tanzania are presented in Table 1. Mycoplasmas were demonstrated in 60 (17.8%) of the 338 lungs examined, all of which had CBPP like lesions, including 7 sequestra. Of the 17 lymph nodes screened, 8 (47.1%) of them, comprising 5 mediastinal and 3 bronchial nodes were mycoplasma-positive. Mycoplasmas were also isolated in 4 (13.3%) of the 30 pleural fluid samples, 4 (3.9%) of the 103 nasal swabs and 2 fibrin samples. Bacterial and fungi were encountered in some of the specimens while others did not show any microbial growth.

M. mycoides SC was isolated from the lungs, lymph nodes, pleural fluid and fibrin samples, all originating from cases with typical CBPP pathology (Table 1). The 4 mycoplasma-positive nasal swabs also yielded *M. mycoides* SC and they were among 11 swabs collected from animals in a herd in which CBPP was confirmed by isolation of *M. mycoides* SC from the lung and pleural fluid of a sacrificed animal. *M. arginini* was identified in only 1 sample of pleu-

ral fluid. Mixed *M. mycoides* SC and bacterial flora were detected in 31 (51.7%) of the 60 mycoplasma-positive lungs. Bacterial growth was also demonstrated in 7 (87.5%) of the 8 mycoplasma-positive lymph nodes, and in 1 nasal swab and 1 fibrin sample.

M. mycoides SC was isolated from specimens originating from Dodoma, Iringa, Mbeya, Morogoro and Shinyanga regions where outbreaks of CBPP had been reported, but none from specimens originating from Arusha, Dar es Salaam, Kagera, Mtwara and Tanga where the disease had also been reported. The pleural fluid sample that yielded *M. arginini* originated from Kagera region.

Mycoplasmas of goats

The prevalence and species of mycoplasmas isolated from goats in Tanzania are presented in Table 2. Mycoplasmas were isolated in 54 (34.0%) of the 159 lung specimens, 41 (18.1%) of the 226 nasal swabs and 4 (40%) of the 10 pleural fluid samples. Some specimens appeared to be sterile while others revealed bacterial and fungal growth.

M. capripneumoniae was identified in 10 (18.5%) of the 54 mycoplasma-positive lungs, all of them with typical CCPP lesions, while *M. mycoides* SC was identified in 5 (9.3%) of the 54 infected lungs, all with CCPP like lesions (one of the lungs contained a sequestrum). *M. ovipneumoniae* and *M. arginini* were isolated in 33 (61.1%) and 6 (11.1%) of the infected lungs, respectively. *M. capripneumoniae, M. mycoides* SC and *M. ovipneumoniae* were concurrently isolated from one sample of pleural fluid from a goat with CCPP like lesions. *M. ovipneumoniae, M. mycoides* SC and *M. arginini* were demonstrated in 39 (95.1%), 1 (2.4%) and 1 (2.4%) of mycoplasma-infected nasal swabs, respectively. Five (9.3%) of the 54 infected lungs contained mixed *M. capripneumoniae* and *M. ovipneumoniae* infections. Combinations of *M. mycoides* SC and *M. arginini,* and *M. mycoides* SC and *M. ovipneumoniae* were observed in 1 lung each while a mixed infection of *M. ovipneumoniae* and *M. arginini* was recorded in 1 nasal swab. Mixed mycoplasma and bacterial flora were also common.

M. capripneumoniae was isolated from goats in the Coast and Morogoro regions while *M. mycoides* SC was encountered in specimens originating from the Coast, Dodoma and Morogoro regions. *M. ovipneumoniae* was encountered in samples originating from the Coast, Dar es Salaam, Dodoma, Iringa and Morogoro regions.

Discussion

This study has demonstrated that mycoplasma infections are prevalent in cattle and goats in the study areas. The predominant mycoplasma in cattle was *M. mycoides* SC, the aetiological agent for CBPP. This indicates that CBPP is still the major respiratory mycoplasmosis of cattle in the country as also reported by others (*Bölske et al.* 1995, *Msami et al.* 1998b). It is noteworthy that several bovine mycoplasmas such as *M. bovis, M. dispar, M. bovirhinis, M. bovigenitalium* and *Ureaplasma* spp. were not found although they are common in the respiratory tract of cattle in Europe, America and Asia (*Shimizu* 1982, *Thomas et al.* 1982, *Ter Laak et al.* 1992). This finding indicates that these mycoplasmas have probably not yet been introduced and/or established in the Tanzanian cattle population. Like in other African countries, information on bovine respiratory mycoplasmas in indigenous cattle apart from *M. mycoides* SC is lacking although they have been demonstrated in imported *Bos taurus* breeds (*Taoudi et al.* 1985). Differences in the management systems may also account for this observation because it has been observed that intensification of management favours establishment of mycoplasmas in the respiratory tract (*Friis & Krogh* 1983, *Tanskanen* 1987).

The Tanzania Zebu cattle examined in this study were from the traditional extensive management system as opposed to the intensive systems in Europe and America.

The isolation of *M. mycoides* SC from the nasal swabs of cattle and goats signifies the role of such animals as carriers for the infection (*Lefèvre et al.* 1987, *Regalla & Lefèvre* 1996), as is the isolation of *M. mycoides* SC from sequestra (*Provost et al.* 1987, *Masiga & Domenech* 1995). Carrier animals are epidemiologically important because they can disseminate the disease over large areas without being noticed. The isolation of *M. mycoides* SC from a sequestrum in a treated goat has not been reported before. The small number of specimens from Arusha, Dar es Salaam, Kagera, Mtwara and Tanga regions, most of which had no CBPP lesion, was probably the reason for failure to isolate *M. mycoides* SC from these samples.

The isolation of *M. capripneumoniae* from goats in the Coast and Morogoro regions confirms that the 2 regions are also CCPP-affected areas and raises the number of infected regions to 6 after Arusha, Dar es Salaam, Kilimanjaro and Tanga regions in which the disease was confirmed in 1998 (*Msami et al.* 1998a). A detailed description of the CCPP outbreak is dealt with elsewhere (*Kusiluka et al. 2000*). It was noteworthy, however, that the isolation rate for *M. capripneumoniae* in lungs with typical CCPP lesions was low despite using the medium specially recommended for the purpose (*Bölske et al.* 1996). The more fastidious *M. capripneumoniae* may have been overgrown by the readily growing *M. ovipneumoniae* and bacteria leading to difficulties in its isolation (*Thiaucourt et al.* 1996). Although bacteria were not characterised during the present work, other workers have demonstrated that some pathogenic bacteria such as *Pasteurella* spp. are often found together with mycoplamas in pneumonic bovine and caprine lungs (*Bitsch et al.* 1976, *Jones & Wood* 1988). On the other hand, the low isolation rate may be attributed to the widespread treatment of the CCPP-suspected goats with antibiotics such as tetracycline and tylosin as indicated from field reports.

M. ovipneumoniae was the most prevalent mycoplasma in the lungs and nasal swabs of goats. This is a ubiquitous mycoplasma of small ruminants worldwide (*Lefèvre et al.* 1987, *Jones* 1989) and together with *M. arginini* it had been previously isolated from goat lungs in Tanzania (*Msami* 1991).

Serological cross-reactions among members of the *M. mycoides* cluster in the disc growth inhibition test have been reported (*Bölske* 1995) and were also observed in this study. The cross-reactions were particularly strong between *M. mycoides* subsp. *mycoides* isolates from typical CBPP lesions in cattle and from cases of pleuropneumonia in goats, rendering it difficult to classify them as SC or LC types. However, because the SC variants occur primarily in cattle where they are associated with typical CBPP lesions (*Freundt* 1983), isolates from CBPP lesions were considered to be of the SC type. The SC variants of *M. mycoides* subsp. *mycoides* have also been isolated from goats with pneumonia and sheep with mastitis (*Brandao* 1995) but their pathogenicity in these hosts under natural conditions has not been well investigated. However, *Machado et al.* (1998) induced fibrinous pleuropneumonia in 2 sheep and mastitis in one goat following experimental infection with SC isolates from small ruminants.

M. mycoides LC is an established cause of pleuropneumonia and is frequently isolated from goats (*Bölske et al.* 1989, *DaMassa et al.* 1992, *Rodriguez et al.* 1995, *Gutierrez et al.* 1999). In the present study, the field isolates from goats did not produce convincing results in the casein- and serum digestion tests or survival at +45°C as would be expected of the LC types. *Ernø* (1983) also did not demonstrate a clear

proteolytic activity in SC isolates from goats suggesting that these tests may sometimes fail to separate the 2 biotypes. Thus, definitive identification can only be achieved by molecular biology methods. Noteworthy, goats from which *M. mycoides* SC were isolated grazed in the same pastures with cattle and were housed less than 100 metres from cattle barns, and yet no single CBPP case has been recorded in cattle for more than one year since the outbreak of pleuropneumonia in goats. This probably suggests that the mycoplasmas have not been transmitted to or are not pathogenic for cattle. Despite its limitations, the disc growth inhibition test is the recommended and most widely used conventional method for preliminary identification of mycoplasmas and it is a method easily available in small laboratories which lack facilities for molecular identification of mycoplasmas (*Freundt* 1974, *Subcommitee on the Taxonomy of Mollicutes 1979*).

In conclusion, this study has demonstrated that mycoplasmas including members of the *M. mycoides* cluster are prevalent in the respiratory tracts of cattle and goats in the regions of Tanzania covered under the study. The fact that *M. mycoides* SC was isolated from areas where CBPP had been reported and the absence of other pathogenic mycoplasmas in the bovine respiratory tract indicate that CBPP is the major respiratory mycoplasmosis of cattle in Tanzania as it has been reported in 17 out the 20 regions. The confirmation of CCPP in the Coast and Morogoro regions signifies a serious threat to the goat population in these regions. Therefore, it is suggested that efforts to control CBPP and CCPP in Tanzania should be intensified in order to minimise economic losses within the country and to prevent spread of these diseases to neighbouring countries in southern Africa such as Malawi, Mozambique and Zambia which are probably still free from the diseases. Adoption of a more vigilant disease surveillance system, restriction and control of animal movements, well co-ordinated vaccination campaigns and educational programmes for stock owners enabled the eradication of CBPP from Tanzania in 1964. These manoeuvres are still valid today and they can be applied to control and eventually eradicate these diseases from the cattle and goat populations.

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Sammendrag

Isolation af mykoplasmer fra respirationsvejene hos kvæg og geder i Tanzania.

En mikrobiologisk undersøgelse af mykoplasmer floraen i respirationsvejene hos kvæg og geder i udvalgte regioner af Tanzania er blevet udført. Ved undersøgelsen af kvæg blev mykoplasmer isoleret fra 60 (17,8%) ud af 338 undersøgte lunger, fra 8

(47,1%) af 17 lymfeknuder, fra 4 (13,3%) af 30 prøver fra pleurahule eksudat og fra 4 (3,9%) af 103 næsehulesvabere. Alle isolater blev identificeret som *Mycoplasma mycoides* subsp. *mycoides,* Small Colony type på nær eet isolat identificeret som *Mycoplasma arginini* hidrørende fra pleurahulen. *M. mycoides* subsp. *mycoides,* Small Colony type, blev isoleret fra prøver hidrørende fra Dodoma, Iringa, Mbeya, Morogoro og Shinyanga regionerne, hvorfra udbrud af kontagiøs bovin pleuropneumoni er blevet rapporteret. Ved undersøgelsen af geder blev mykoplasmer isoleret fra 54 (34,0%) af 159 undersøgte lunger, fra 41 (18,1%) af 226 næsehulesvabere og fra 4 (40,0%) af 10 prøver pleurahule eksudat. De påviste arter er *M. capripneumoniae, M. mycoides* subsp. *mycoides,* Small Colony type *M. ovipneumoniae* og *M. arginini.* Isolationen af *M. capripneumoniae* in Coast og Morogoro regionerne bekræfter tilstedeværelsen af kontagiøs caprin pleuropneumoni i regionerne.

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