Rev. sci. tech. Off. int. Epiz., 2005, **24** (3), 921-932

The use of community-based animal health workers to strengthen disease surveillance systems in Tanzania

R. Allport [(1)], R. Mosha [(1)], M. Bahari [(2)], E. Swai [(3)] & A. Catley [(4)]

(1) VETAID, P.O. Box 15249, Arusha, Tanzania
(2) Pan African Programme for the Control of Epizootics, P.O. Box 9152, Dar es Salaam, Tanzania
(3) Veterinary Investigation Centre, P.O. Box 1068, Arusha, Tanzania
(4) African Union/Interafrican Bureau for Animal Resources, P.O. Box 30786, 00100 Nairobi, Kenya and Feinstein International Famine Centre, 126 Curtis Street, Medford, MA 02155, United States of America

Submitted for publication: 3 November 2004
Accepted for publication: 20 May 2005

Summary

An 18 month trial was conducted in three districts of Arusha region, northern Tanzania, to assess the use of community-based animal health workers (CAHWs) in an official disease surveillance system. Disease reports provided by CAHWs were assessed using six indicators for effective disease surveillance, i.e. sensitivity, specificity, timeliness, representativeness, simplicity and acceptability. To assess sustainability issues and determine the incentives required by CAHWs to report disease, three different incentive models were tested in the trial. None of the incentive models involved direct payments to CAHWs. Before involving CAHWs in disease surveillance in the three trial districts, disease case reports as a proportion of cattle population were 0.13%, 0.20% and 0.12%. During the trial, disease case reports as a proportion of cattle population increased to 5.0%, 5.6% and 6.3%. The CAHWs also improved the spatial and temporal coverage of the disease surveillance system and provided timely reports. During the trial, national-level disease reporting in Tanzania increased by 17% owing to the sensitisation and support activities of the Pan African Programme for the Control of Epizootics in Tanzania. In Arusha region, disease reporting increased by 118%, and 49% of this improvement was attributable to increased reporting in the three trial districts. Reporting from these districts far exceeded that from any other district in Tanzania. Veterinarians confirmed the CAHWs' clinical diagnosis in 88% of the 170 clinical cases examined.

The increase in disease reporting resulting from CAHW activities was sufficient to enable the national epidemiology unit to achieve its target in relation to World Organisation for Animal Health (OIE) guidelines. The authors conclude that the use of CAHWs should be promoted in the national strategy for disease reporting. Additionally, CAHWs must be brought under the control of the Tanzanian veterinary authorities, a process that will include appropriate legislative reform.

Keywords

Community-based animal health worker – Disease surveillance – Sustainability – Tanzania.

Introduction

According to the World Organisation for Animal Health (OIE) *Terrestrial Animal Health Code* (15), animal disease surveillance data is of fundamental importance for countries wishing to engage in international livestock trade. Surveillance systems can also contribute to the identification of disease priorities at national and sub-national levels and lead to the prompt recognition of emerging disease problems (9). Although quantitative performance indicators are suggested by the OIE for some animal diseases of major international importance, such as rinderpest (11), the OIE has yet to recommend quantitative science-based indicators for disease surveillance systems in general. The performance indicators for rinderpest, published by the OIE in 2003 (11), draw on seven main surveillance indicators suggested by the Centres for Disease Control in the United States of America: sensitivity, specificity, representativeness, timeliness, simplicity, flexibility and acceptability (19). It should be noted that in the context of a general surveillance system the definitions of sensitivity and specificity differ from those used when these terms are applied to diagnostic tests.

In many developing countries, establishing and maintaining nationwide animal disease surveillance systems is a major challenge. Important constraints include the need to access remote and often large areas characterised by poor infrastructure and communications and the need to conduct adequate surveillance with limited financial resources. For example, Tanzania has the second largest livestock population in Africa but only one mainline telephone per 283 people, one mobile phone per 1,200 people, 1 km of paved road per 255 km^2 of land, and less than 0.8% of the population are internet users (5). The logistical and resource problems affecting surveillance systems in countries such as Tanzania are compounded by the limited incentives for veterinary workers to cover rural areas.

One useful approach for improving both primary-level delivery of veterinary services and disease surveillance in rural areas of developing countries is to use community-based animal health workers (CAHWs) (4, 16, 17). CAHWs are selected by their communities and trained in the prevention or treatment of a limited range of animal health problems; these workers can act as the interface between livestock keepers and official disease surveillance systems (9). Programmes using CAHW-type surveillance systems have been introduced in Somalia (2), Sudan (7) and Ethiopia (1). CAHWs can be trained to complete basic monitoring forms and report outbreaks of important diseases to the nearest veterinarian or veterinary assistant. Unlike other types of veterinary worker, CAHWs travel long distances on foot or by rudimentary, but appropriate, forms of transport. Ideally, CAHWs should be supervised by veterinarians or veterinary assistants, as such supervision is central to the licensing and quality control of CAHWs (4). Key aspects of well-designed CAHW systems are the recognition of indigenous knowledge of animal health and husbandry (13) and providing training that builds on existing knowledge (6).

In 1997, VETAID, a British non-governmental organisation, established a CAHW project in northern Tanzania. This project covered the semi-arid district of Simanjiro and worked with Maasai pastoralist communities to train and support CAHWs in the treatment and prevention of common diseases and in the reporting of disease outbreaks. An assessment of the project in May 2001 demonstrated how CAHWs had reduced the impact of livestock diseases, with consequent improvements in milk availability, income and food security (14).

In 2002, the National Epidemiology Unit of Tanzania, Arusha Veterinary Investigation Centre (VIC) and District Veterinary Officers (DVOs) worked with VETAID to test the use of CAHWs for disease surveillance; this included assessing the effectiveness of different incentives for CAHWs to report disease in pastoralist districts. Incentives were considered to be an important aspect of the reporting system because the CAHWs were private operators, and many other CAHW projects have proved difficult to sustain once external donor support is withdrawn (4).

This paper describes the CAHW surveillance trial and discusses the implications of the results for Tanzania and other countries. The authors also discuss the value of including information from CAHWs in national surveillance systems.

Methodology

The main objective of the trial was to test CAHW reporting systems by comparing key surveillance indicators in districts with and without a CAHW disease reporting system. Additionally, the trial aimed to assess the sustainability of three incentive models for CAHW reporting.

The study was carried out in Arusha and Manyara regions in the Northern Zone of Tanzania and was designed to test surveillance systems in areas that were representative of the predominant land-use systems in Tanzania; approximately 80% of Tanzanian livestock are reared on pastoral or agropastoral land. Given the importance of these mobile systems of livestock production in Tanzania, two predominantly pastoralist districts (Simanjiro and Monduli) and one mainly agropastoralist district (Babati) were involved in the study (Table I). An additional criterion

for the selection of these districts was the presence of previously trained CAHWs.

The trial was designed to assess six of the seven key requirements for effective surveillance (19) and was conducted over an 18-month period. Data collected from the three trial districts were compared with data from similar districts without CAHW reporting systems.

Acceptability

Acceptability is a measure of the willingness of those conducting surveillance and providing the data to generate accurate, consistent and timely data. Prior to the trial, two workshops were held with different stakeholders to ensure their involvement in and acceptance of the trial. The first workshop involved the assistant permanent secretary for the Ministry of Water and Livestock Development, the Director of Veterinary Services and his assistant and the coordinator of the Pan African Programme for the Control of Epizootics – Tanzania. This senior-level representation assured government acceptance of the trial. During the workshop, it was agreed that three incentive models of CAHW reporting would be tested (Table II).

The second workshop involved DVOs, Livestock Field Officers (LFOs) and CAHWs. In this workshop, the people that would be collecting the information participated in designing systems that they thought would be the most sustainable from their specific point of view. The reporting

Table I
Characteristics of the three trial districts

Characteristic	District		
	Simanjiro	Monduli	Babati
Total area (km^2)	19,941	14,201	6,069
Human population density (km^2) [a]	5	12	59
Number of tarmac roads	0	3 [b]	0
Total number of households	32,582	41,112	59,970
Number of villages with mains electricity	0	5 [c]	4
Land classification	Arid to semi-arid	Arid to semi-arid	Mid-altitude agricultural land; some low-lying semi-arid areas
Vegetation	Sparse acacia and commiphora scrub land	Sparse acacia and commiphora scrub land	Small cultivated plots; sparse acacia and commiphora scrub land in the lower areas
Land use	Semi-nomadic pastoralism; some scattered settled agriculture	Semi nomadic pastoralism; some scattered settled agriculture	Smallholder agriculture; limited pastoralist activity in the lowlands
Livestock population			
Cattle	500,000 [d]	325,180 [e]	407,778 [a]
Goats	250,000 [d]	233,009 [e]	148,600 [a]
Sheep	150,000 [d]	164,907 [e]	63,500 [a]

a) 1999 census data
b) including the main Nairobi–Arusha road and the Arusha–Ngorongoro road
c) limited to villages along the main tarmac roads
d) 2001 census data
e) district council estimates

Table II
Incentive models for community-based animal health worker (CAHW) disease surveillance in the three trial districts

Incentives	District		
	Simanjiro	Monduli	Babati
Training CAHWs to collect samples	Yes	No	Yes
Memorandum of understanding between village government and CAHWs, stipulating monthly reporting	No	No	Yes
Paying a fuel allowance to government Livestock Field Officers for supervising CAHW reporting activities	Yes	No	No

format to be used by the CAHWs (see Appendix) was designed in this workshop and subjected to a one month pilot test prior to the collection of data. In both workshops, it was further agreed that, for government stakeholders, the financial cost of a system was an important indicator of acceptance. Consequently, the cost of each incentive model was assessed during the trial.

After the trial, a final evaluation workshop was conducted to review lessons and experiences and to assess stakeholder acceptance of the CAHW disease reporting system.

Timeliness

Timeliness is a measure of the ability to detect, diagnose and report disease within time frames related to the transmission cycle of the disease(s) in question. In the trial, timeliness was measured as the time taken for CAHW reports of disease events to reach government LFOs. It was assumed that CAHWs could not influence the flow of information between LFOs, DVOs, the VIC and the National Epidemiology Unit.

The trial incorporated specific targets for timeliness. The CAHWs were to submit reports to LFOs on the last day of every month, LFOs were to report to DVOs by the fifth day of every month, DVOs were to report to the VIC by the tenth day of every month and the VIC was to report to the epidemiology unit by the fifteenth day of every month.

Sensitivity

In the context of surveillance, sensitivity is a measure of the capacity of the system to detect a high percentage of field events with a clinical or epidemiological appearance that is compatible with the disease(s) in question. One way to increase the sensitivity of a surveillance system is to increase the number of trained people involved in it. The numbers of CAHWs, LFOs and DVOs involved in each of the trial districts are shown in Table III.

In each of the three trial districts, the CAHWs were not expected to cover the entire district; instead they covered only their home community areas. Sensitivity was measured as the number of disease events reported by CAHWs as a percentage of the total number of disease events reported to the VIC for the district as a whole. Also, monthly reporting rates in the trial districts were compared with monthly reporting rates in two neighbouring districts without CAHWs: Hanang and Ngorongoro.

Table III
Numbers of veterinary workers in each of the trial districts

Type of worker	District		
	Simanjiro	Monduli	Babati
Community-based Animal Health Worker	10	18	16
Livestock Field Officer (LFO)	3[a]	5[b]	5[c]
District Veterinary Officer	1	1	0

a) all three LFOs had motorbikes and fuel
b) three LFOs had no vehicles; two LFOs had motorbikes but no fuel
c) all five LFOs had motorbikes but no fuel

Specificity

In the context of surveillance, the specificity of a system describes how well the system can provide definitive diagnoses for a high percentage of disease-compatible field events upon investigation. In the trial, it was assumed that specificity was largely determined by the ability of CAHWs to correctly identify diseases at field level based on clinical observation and examination. To test diagnostic performance, each CAHW was interviewed every month by a veterinarian from the VIC using a standardised list of questions. The CAHWs were asked to describe how they recognised the most common diseases and, for active cases, to explain the reasoning behind their diagnoses. For active cases, the veterinarians cross-checked the CAHW diagnoses by direct physical examination of the animals in question. Based on these procedures, CAHW case diagnoses were categorised as follows:

– very good: the CAHW pointed out or described all the clinical signs of the disease, and the veterinarian agreed with the CAHW's field diagnosis

– good: the CAHW pointed out or described most of the clinical signs of the disease, and the veterinarian agreed with the CAHW's field diagnosis

– fair: the CAHW confused some clinical signs with those of other diseases but was still able to recognise the major signs of the disease. This scoring indicates that the veterinarian disagreed with the CAHW's field diagnosis; the CAHW could score well on the description of diseases, but if he or she failed to diagnose a disease correctly, the score would be recorded as 'fair'

– poor: the CAHW diagnosed diseases by 'guess work' that was not based on basic veterinary knowledge; the veterinarian disagreed with the CAHW's field diagnosis.

Representativeness

A representative surveillance system will observe both the occurrence of health events over time and the distribution of these events in relation to the livestock population at any given point in time. Therefore, representativeness has both temporal and spatial elements. The temporal coverage of the system was assessed by comparing seasonal variation in CAHW reporting of East Coast fever (ECF) with the anticipated seasonal variation of the disease, which was judged from rainfall patterns and existing data from the

Arusha VIC. East Coast fever is one of the most important and studied diseases in Arusha region, and good seasonal incidence data were available from the integrated tick and tick-borne disease control programme.

The spatial coverage of the system was measured by comparing the pre-trial area covered by LFOs with the post-trial area covered by CAHWs. In addition, CAHW reporting coverage was compared with information on livestock density and seasonal movements to determine the coverage of major livestock populations throughout the year.

Simplicity

The simplicity indicator assumes that surveillance systems should be easy to understand and implement by all users. The indicator also considers system costs, because simple systems are usually less costly than complex systems (19). The trial aimed to set up and test a reporting system that could be understood by all users, sustained by government funds in the future and easily replicated in other areas. The CAHWs involved in the trial received a minimum level of training but had lived with livestock and livestock diseases their entire lives. The use of CAHWs was intended to minimise the setup costs of the reporting system and to increase coverage. Indicators of simplicity were discussed in the final stakeholder evaluation workshop.

Results

Acceptability

Stakeholder analysis of acceptability showed that both CAHWs and LFOs found transport and communication problems to be the two major limiting factors in the reporting system. However, despite these problems, there was a general acceptance that disease reporting using all three models was beneficial to the communities. Examples of vaccination programmes that were initiated in response to disease reports were given as evidence of the benefit and acceptability of the reporting system at community level. The CAHWs were willing to continue reporting so long as the reporting forms were made available. However, CAHWs were willing to incur the cost of delivering reports to the LFO or DVO only for notifiable diseases, where the community will benefit from some form of intervention.

Regarding the costs of reporting, the incentive model used in the Monduli district was the least-costly (Table IV), but this district produced far fewer reports than Simanjiro. Although the cost per case reported per month was 35% higher in Simanjiro than in Monduli, CAHWs from Simanjiro produced 3.6 times more reports than CAHWs from Monduli.

Table IV
Costs involved in the community-based animal health worker (CAHW) reporting system

Costs (Tanzanian Shilling)	District		
	Simanjiro	Monduli	Babati
Number of CAHWs	10	18	16
Livestock Field Officer fuel costs	40,000	0	0
Sampling equipment costs	47,000	0	68,000
Reporting forms	10,000	18,000	16,000
Fuel cost per month *	63,532	91,320	92,100
Cost per CAHW per month	**16,053**	**6,073**	**11,006**
Average CAHW cases reported per month	473	242	172
Average cases reported per CAHW	47	13	11
Average cost per case reported per month	**33.9**	**25.1**	**64.0**

Exchange rate Tanzanian Shilling to $US = 1,070
* fuel costs are the fuel costs to the project of monitoring the CAHWs

The final stakeholder workshop for the trial concluded that CAHWs had an important role to play in the national disease reporting system. The workshop suggested that the National Epidemiology Unit should examine the cost of including CAHWs in a national surveillance methodology and that the results of the trial should be disseminated to all other districts of Tanzania. An additional recommendation was that the roles and responsibilities of CAHWs need to be formalised under the Veterinary Act.

Timeliness

On average, CAHWs submitted their reports to LFOs within a week of the agreed submission time. Report submission by CAHWs was heavily influenced by the availability of the LFO. For example, in Simanjiro, where the LFO was paid a fuel allowance and could visit CAHWs, the reports were submitted on time each month, with very few exceptions. In addition to submitting these monthly reports, some CAHWs would report outbreaks of notifiable diseases, such as anthrax, as soon as they were observed. However, some important diseases, such as contagious bovine pleuropneumonia (CBPP) and foot and mouth disease (FMD), were only reported in the monthly reports. This was attributed to a lack of community confidence in the vaccines for these diseases, and thus there was little desire for vaccination programmes to be implemented. On average, one month elapsed between the submission of a report by a CAHW to an LFO and the receipt of the report by the VIC.

Sensitivity

Relative to the pre-trial period, there was a substantial increase in the number of livestock disease cases reported

to the VIC in the three trial districts (Table V). It should be noted that the CAHWs were not expected to cover the whole district. When the submissions received by the VIC were analysed in more detail, it was evident that CAHWs accounted for increases of 95%, 59% and 81% in disease case reporting from Monduli, Simanjiro and Babati districts, respectively.

As the number of disease cases reported to the VIC decreased in the two control districts, report submission to the epidemiology unit (which measures the number of reporting forms received, including reports of no disease, rather than the number of different cases reported) was compared with those of all other districts in Arusha region. The results are shown in Figure 1.

Table V
Number of disease cases reported before and during the trial

Districts	Mean monthly reporting rate			
	Number of cases reported by community-based animal health workers		Total number of cases to the Veterinary Investigation Centre	
	Before trial	During trial	Before trial	During trial
Trial districts				
Monduli	0	242	141	422
Simanjiro	0	473	444	579
Babati	0	172	0	278
Control districts				
Hanang	0	0	236	49
Ngorongoro	0	0	178	9

Sensitivity was also assessed by examining the number of CAHW reports submitted and the number of reports received by the VIC as percentages of cattle population (Table VI).

Specificity

The diagnostic abilities of CAHWs are presented in Figure 2. In 88% of cases diagnosed by CAHWs and cross-checked by a veterinarian, the CAHW's diagnosis was judged to be 'very good' or 'good'. In only 1% of cases was the CAHW's diagnosis categorised as 'poor'.

Representativeness

Figure 3 shows the temporal variation in the number of CAHW reports of ECF in each trial district together with rainfall data. The number of reported cases of ECF followed the pattern that would be expected for the disease, i.e. a high incidence in the wet season and an exceptionally low incidence in the dry season.

Table VI
Mean number of disease reports as a proportion of the number of cattle at risk per month

District	Community-based animal health worker (village level)	Veterinary Investigation Centre (district level)
Monduli	0.6%	0.13%
Simanjiro	0.9%	0.12%
Babati	0.3%	0.07%

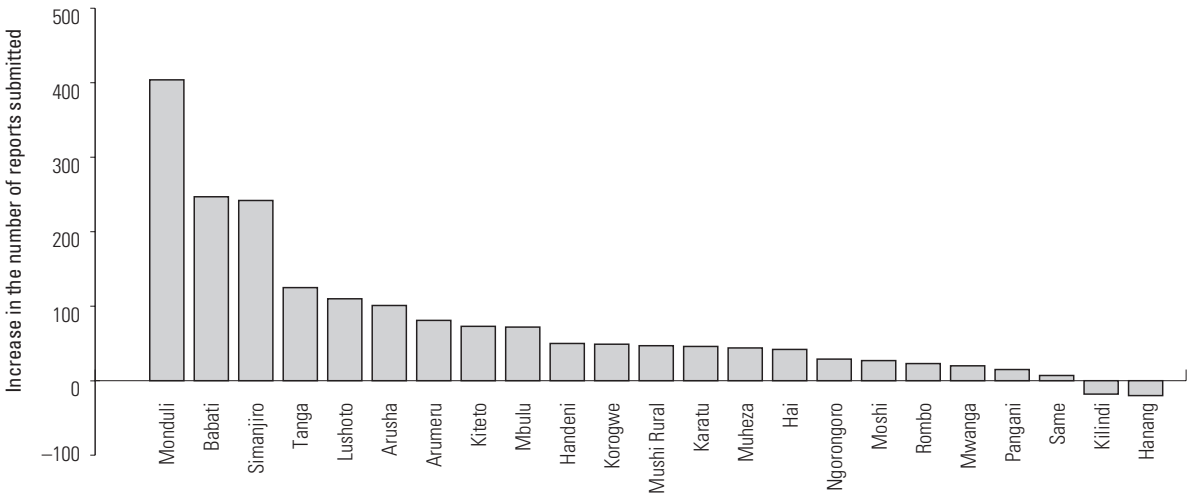

Fig. 1
Livestock disease reporting by district in Arusha region during the trial period

Note: the first three (Mondoli, Simanjiro and Babati) are the trial districts, and the two control districts are Ngorongo and Hanang

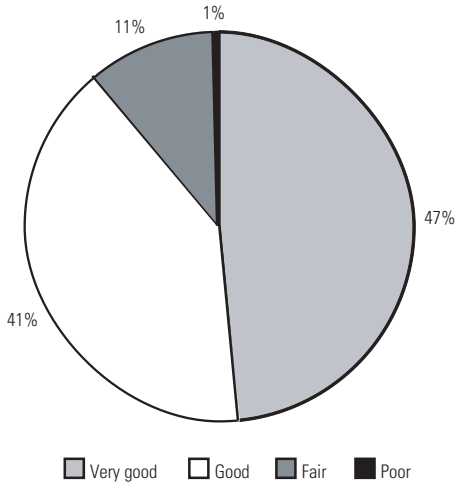

Fig. 2
Veterinarians' categorisation of community-based animal health workers' diagnostic ability by case (*n* = 170)

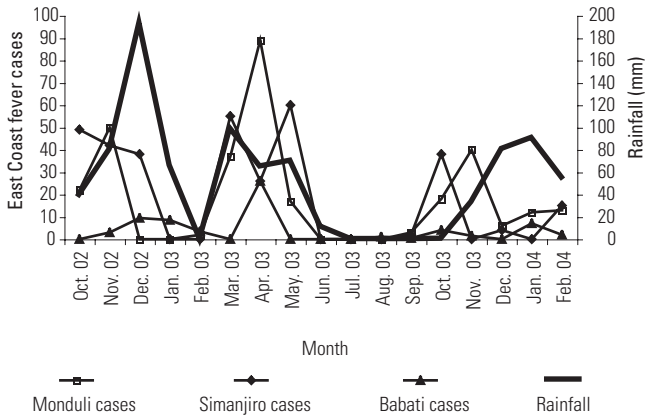

Fig. 3
Temporal variation in community-based animal health workers' reports of East Coast fever

On average, an LFO who was equipped with a functional motorbike covered an area with a radius of approximately 30 km. In comparison, a CAHW without a motorbike covered an area with a radius of approximately 7.5 km. However, it was common for LFOs to have a motorbike but no fuel (Table III). In these cases, LFOs used their motorbikes when a livestock keeper was willing to pay for the fuel. Therefore, in those areas accessible only by motorbike, LFO disease reporting was influenced by the wealth of the individual cattle owner rather than the need to report a specific disease. When no payment was offered for fuel, LFO coverage was the same as CAHW coverage.

Estimates of the areas covered by disease reporting before and during the trial are shown in Table VII.

Simplicity

The final stakeholder workshop included CAHWs, LFOs, DVOs and government epidemiologists. Discussion of various aspects of the reporting system showed that all of these users understood the system, and, therefore, the system was simple. One of the main components of the system tested was its reliance on existing local knowledge of diseases. The reporting system was combined with reporting formats that were designed with input from the CAHWs and a simple system for submitting reports to LFOs.

Discussion

In common with trials in other African countries (2, 7), this trial demonstrated that CAHWs can add considerable value to official disease surveillance systems. The trial provided quantitative indicators of sensitivity and geographical coverage, and demonstrated substantial improvements in these indicators relative to the pre-trial situation (Tables V, VI, VII, Fig. 1). In the period 2002 to

Table VII
Geographical coverage before and after introducing the use of community-based animal health workers (CAHWs)

District	Area covered by reporting system			
	Before CAHW trial		During CAHW trial	
	Area covered [a]	Proportion of district covered [b]	Area covered [a]	Proportion of district covered [b]
Monduli	883.9 km² (5 LFOs)	6.2%	4,065.9 km² (5 LFOs, 18 CAHWs)	28%
Simanjiro [c]	530.34 km² (3 LFOs)	2.65%	2,298.14 km² (3 LFOs, 10 CAHWs)	11.5%
Babati	883.9 km² (5 LFOs)	14.6%	3,712.38 km² (5 LFOs, 16 CAHWs)	61.16%

LFO: Livestock Field Officer
a) assumes that LFOs used their motorbikes only when fuel was paid for by individual livestock keepers; therefore, comprehensive reporting was limited to an area with an average radius of 7.5 km
b) see Table I for district areas
c) during the trial, the fuel costs for LFOs in Simanjiro were covered by the project

2003, national-level disease reporting in Tanzania increased by 17% owing to the training and awareness-raising activities of the National Epidemiology Unit throughout the country. In Arusha region, disease reporting increased by 118%, and approximately 49% of this increase was attributable to increases in reporting in the three trial districts. The target for district-level reporting set by the epidemiology unit is based on the number of reporting forms received rather than the number of cases of disease reported. The epidemiology unit have stated that their target, in relation to OIE guidelines, is the submission of 20 disease reporting forms to VICs per district per month for 80% of the districts in the country.

The assessment of the specificity of the reporting system was based on professional assessment of CAHWs' clinical diagnoses and showed good agreement between veterinarians and CAHWs (Fig. 2). This finding agrees with findings from studies in other areas of Tanzania (8) and the results of a recent study in Kenya to evaluate the skills and knowledge of CAHWs, as assessed by a professor from the University of Nairobi (18). Furthermore, the trial findings support extensive literature on the sophisticated indigenous veterinary knowledge of African livestock keepers, particularly pastoralists and agropastoralists (12) and including the Maasai of Tanzania (13). A possible weakness of the trial was the limited use of laboratory tests to confirm diagnoses. However, it is recognised that laboratory tests for many important livestock diseases in the trial districts suffer from poor sensitivity, and the use of such tests as gold standards is inappropriate. For epizootic diseases, comparisons of quantitative reports of herder diagnosis with laboratory diagnosis have indicated that herder diagnosis is valid. For example, the positive predictive values of Somali herders' diagnosis of rinderpest and Maasai herders' diagnosis of FMD were 60% (10) and 73% (3), respectively, at herd level.

The final evaluation workshop for the trial was a useful opportunity to assess indicators such as acceptability and simplicity. Although none of the three incentive models tested involved direct payments to CAHWs (Table II), all three models produced substantial improvements in disease reporting at district level. These findings show that direct payments to private-sector CAHWs may not be required in order to strengthen a reporting system. However, CAHWs and communities did expect appropriate government action to result from the reporting of diseases such as CBPP and FMD. The reluctance of CAHWs to actively report outbreaks of these diseases was attributed to a fear of government action (due to the fact that government action would include a ban on the movement of animals from the area). The trials in both Simanjiro and Monduli districts were low-cost options (Table IV). In Monduli district, the trial required only the provision of reporting forms to CAHWs plus fuel and cost only US$5.70 per CAHW per month. Given the low costs in each trial district and the marked increases in disease reporting performance, the workshop recommended that the cost of a nationwide system should be estimated. Furthermore, this estimation should be based on the specific objectives of the national disease surveillance system.

A factor relating to the acceptability of the reporting system is the legal status of CAHWs in Tanzania. Although CAHWs have been providing useful clinical services in Tanzania for many years and this trial highlighted their important role in disease reporting, CAHWs are not recognised by the veterinary legislation. The final workshop highlighted the need for quality control and regulation of CAHWs and, consequently, the need for legal recognition. At the time of the workshop, a new Veterinary Act in Tanzania had been finalised, and this act provided scope for subsidiary legislation to support CAHWs. In May 2004, the OIE General Assembly endorsed changes to the OIE *Terrestrial Animal Health Code* to improve the recognition of the roles of the private sector and of veterinary para-professionals.

In addition to highlighting the need for legal reform, the trial indicated that improvements in the timeliness of disease reporting between LFOs and the VIC, and between the VIC and the central epidemiology unit, were required. Similarly, feedback mechanisms within the overall surveillance system also required strengthening. Despite these challenges, the trial clearly demonstrated the potential for CAHWs to improve disease reporting in Tanzania and to contribute to the national veterinary service.

Acknowledgements

This research was funded by the Department for International Development (United Kingdom) through a grant to the African Union/Interafrican Bureau for Animal Resources.

Appendix

Reporting document to be used by the community-based animal health workers

Animal health report

Name of animal health worker _____ Name of supervisor _____

Ward _____

Village _____

District _____

Region _____

Date	House hold	Type of animal	Age of animal	Number of animals that were affected	Number of animals in the village	Symptoms of the disease	Name of disease	Number of animals that died	Post-mortem signs	Number of animals treated	Number of animals that have been vaccinated	How was the disease diagnosed?	How did the disease enter the area?

Notifiable diseases: Please immediately report any suspected occurrence of any of the diseases below to your supervisor or the district veterinarian

1. Rinderpest
2. Foot and mouth disease
3. Contagious caprine pleuropneumonia/contagious bovine pleuropneumonia
4. Rabies
5. Anthrax
6. Lumpy skin disease
7. African swine fever
8. Newcastle Disease
9. Bovine spongiform encephalopathy

Participation des auxiliaires communautaires de santé animale au renforcement des systèmes de surveillance sanitaire en Tanzanie

R. Allport, R. Mosha, M. Bahari, E. Swai & A. Catley

Résumé

Un essai a été mené pendant 18 mois dans trois districts de la région d'Arusha, au nord de la Tanzanie, afin d'évaluer la contribution des auxiliaires communautaires de santé animale dans le cadre du système officiel de surveillance sanitaire. Les rapports sanitaires produits par ces auxiliaires ont été évalués au regard de six indicateurs d'efficacité dans le domaine de la surveillance sanitaire, à savoir, la sensibilité, la spécificité, la rapidité, la représentativité, la simplicité et l'acceptabilité. Trois modèles de mesures incitatives ont également été testés lors de l'expérimentation, afin d'évaluer la pérennité du dispositif et de déterminer quelles mesures sont le plus à même d'inciter les auxiliaires communautaires à déclarer la présence de maladies.

Aucun de ces modèles n'impliquait une rémunération directe de l'auxiliaire communautaire. Avant la participation des auxiliaires communautaires dans la surveillance sanitaire, les taux de déclaration d'incidents sanitaires des trois districts pilotes étaient respectivement de 0,13 %, de 0,20 % et de 0,12 % de la population bovine. Pendant la phase pilote, ces taux se sont élevés respectivement à 5,0 %, 5,6 % et 6,3 % de la population bovine. Les auxiliaires communautaires de santé animale ont également contribué à améliorer la couverture géographique et temporelle du système de surveillance sanitaire ainsi que la production de rapports délivrés dans les délais. Pendant la phase pilote, le taux de déclaration de maladies animales au niveau national s'est accru de 17 %, grâce à l'action de sensibilisation et de soutien menée en Tanzanie par le Programme panafricain pour le contrôle des épizooties. Dans la région d'Arusha, le taux de déclaration de maladies a augmenté de 118 %, et 49 % de cette augmentation est imputable à l'intensification des déclarations dans les trois districts pilotes, où les taux de déclaration ont largement surpassé ceux de n'importe quel autre district de Tanzanie. Les diagnostics cliniques établis par les auxiliaires communautaires de santé animale ont été confirmés par des vétérinaires dans 88 % des 170 cas examinés.
L'accroissement des déclarations de maladies redevable à la participation des auxiliaires communautaires de santé animale a permis à l'unité nationale d'épidémiologie d'atteindre ses objectifs relatifs aux lignes directrices de l'Organisation mondiale de la santé animale. Les auteurs en concluent que la participation de ces auxiliaires devrait être promue dans le cadre de la stratégie nationale de notification des maladies animales. Il conviendrait en outre de placer ces auxiliaires sous la tutelle des autorités vétérinaires tanzaniennes, processus qui exigera une réforme législative en la matière.

Mots-clés
Auxiliaire communautaire de santé animale – Pérennité – Surveillance sanitaire – Tanzanie.

■

Utilización de agentes zoosanitarios comunitarios para reforzar los sistemas de vigilancia de enfermedades en Tanzania

R. Allport, R. Mosha, M. Bahari, E. Swai & A. Catley

Resumen
En tres distritos de la región de Arusha, al norte de Tanzania, se llevó a cabo durante 18 meses una experiencia para evaluar el uso de agentes zoosanitarios comunitarios como parte de un sistema oficial de vigilancia de enfermedades. Para evaluar los informes remitidos por ese personal se utilizaron seis indicadores de eficacia de la vigilancia sanitaria: sensibilidad, especificidad, puntualidad, representatividad, simplicidad y aceptabilidad. Por otra parte, para estudiar las posibilidades de implantación duradera del sistema y determinar los incentivos necesarios para que los agentes comunitarios notifiquen efectivamente los casos de enfermedad, se ensayaron tres modelos distintos de incentivos, ninguno de los cuales entrañaba un pago directo al personal. Antes de la experiencia, los casos de enfermedad notificados en los tres distritos

suponían el 0,13%, 0,20% y 0,12% de la población bovina. Durante los 18 meses, dicha proporción aumentó hasta llegar al 5,0%, 5,6% y 6,3% respectivamente. Gracias a los agentes zoosanitarios comunitarios también mejoró la cobertura espacial y temporal del sistema de vigilancia de enfermedades y la puntualidad de los informes. En el curso de la experiencia, el nivel de notificaciones de enfermedad en todo el país creció en un 17%, gracias a las actividades de sensibilización y apoyo del Programa Panafricano de Control de las Epizootias en Tanzania. En la región de Arusha, ese guarismo aumentó en un 118%, proporción de la que un 49% podía atribuirse al incremento de las notificaciones en los tres distritos donde se aplicaba la experiencia. El número de notificaciones provenientes de esos distritos superó con creces el de cualquier otro distrito de Tanzania. Los veterinarios confirmaron el diagnóstico clínico de los agentes zoosanitarios comunitarios en un 88% de los 170 casos clínicos examinados.

El incremento de las notificaciones resultante del trabajo de los agentes comunitarios fue suficiente para que la unidad nacional de epidemiología alcanzara sus objetivos en relación con las directrices de la Organización Mundial de Sanidad Animal (OIE). Los autores llegan a la conclusión de que en la estrategia nacional para la notificación de enfermedades conviene fomentar el uso de agentes zoosanitarios comunitarios. Por otra parte, esos agentes deben pasar a depender de las autoridades veterinarias tanzanas, proceso que requerirá, entre otras cosas, la oportuna reforma legislativa.

Palabras clave

Agente zoosanitario comunitario – Continuidad a largo plazo – Tanzania – Vigilancia sanitaria.

References

1. Admassu B. (2003). – Primary animal healthcare in Ethiopia: the experience so far. *In* Primary animal health care in the 21st century: shaping the rules, policies and institutions. Proc. International conference (K. Sones & A. Catley, eds), 15-18 October 2002, Mombasa. African Union/Interafrican Bureau for Animal Resources, Nairobi, 38-40.

2. Baumann M.P.O. (1990). – The nomadic animal health system (NAHA-system) in pastoral areas of Central Somalia and its usefulness in epidemiological surveillance. MPVM Thesis. University of California.

3. Catley A., Chibunda R.T., Ranga E., Makungu S., Magayane F.T., Magoma G., Madege M.J. & Vosloo W. (2004). – Participatory diagnosis of a heat-intolerance syndrome in cattle in Tanzania and association with foot-and-mouth disease. *Prev. vet. Med.*, **65** (1-2), 17-30.

4. Catley A., Leyland T., Mariner J.C., Akabwai D.M.O., Admassu B., Asfaw W., Bekele G. & Hassan H.Sh. (2004). – Para-veterinary professionals and the development of quality, self-sustaining community-based services. *In* Veterinary institutions in the developing world: current status and future needs (C. de Haan, ed.). *Rev. sci. tech. Off. int. Epiz.*, **23** (1), 225-252.

5. Central Intelligence Agency (CIA) (2005). – The world factbook. Website: www.cia.gov/cia/publications/factbook/ (accessed on 16 September 2005).

6. Iles K. (2002). – Participative training approaches and methods. *In* Community-based animal healthcare: a practical guide to improving primary veterinary services (A. Catley, S. Blakeway & T. Leyland, eds). ITDG Publishing, London, 104-149.

7. Jones B.A., Deemer B., Leyland T.J., Mogga W. & Stem E. (1998). – Community-based animal health services in Southern Sudan: the experience so far. *In* Proc. 9th International Conference of Association of Institutes of Tropical Veterinary Medicine (AITVM), 14-18 September, Harare. AITVM, Utrecht, 107-133.

8. Magayane F., Woodford J.D., Magoma G., Makungu S. & Kondela A. (2001). – A preliminary assessment of key technical competence and customer views of CAHWs during their first nine months of operation in the Lake Zone of Tanzania. Animal Health Services Project, Ministry of Water and Livestock Development, Dar es Salaam.

9. Mariner J.C. (2002). – Community-based animal health workers and disease surveillance. *In* Community-based animal healthcare: a practical guide to improving primary veterinary services (A. Catley, S. Blakeway & T. Leyland, eds). ITDG Publishing, London, 240-272.

10. Mariner J.C. & Roeder P.L. (2003). – Use of participatory epidemiology in studies of the persistence of lineage 2 rinderpest virus in East Africa. *Vet. Rec.*, **152** (21), 641-647.

11. Mariner J.C., Jeggo M.H., van't Klooster G.G.M., Geiger R. & Roeder P.L. (2003). – Rinderpest surveillance performance monitoring using quantifiable indicators. *Rev. sci. tech. Off. int. Epiz.*, **22** (3), 837-847.

12. Martin M., Mathias E. & McCorkle C.M. (2001). – Ethnoveterinary medicine: an annotated bibliography of community animal healthcare. ITDG Publishing, London.

13. Minja M. & Allport R. (2001). – Ethnoveterinary knowledge among the Maasai of Simanjiro District, Northern Tanzania. Dar es Salaam University Press.

14. Nalitolela S., Allport R., Ndanu H. & Shongon L. (2001). – Impact of animal health improvement on food security of a pastoralist community in Simanjiro District. *In* Proc. 19th Tanzania Veterinary Association Annual Scientific Conference, Arusha International Conference Centre, 4-6 December. Tanzania Veterinary Association, Morogoro, 27-39.

15. OIE (World Organisation for Animal Health) (2003). – Terrestrial Animal Health Code, 12th Ed. OIE, Paris.

16. Peeling D. & Holden S. (2004). – The effectiveness of community-based animal health workers, for the poor, for communities and for public safety. *In* Veterinary institutions in the developing world: current status and future needs (C. de Haan, ed.). *Rev. sci. tech. Off. int. Epiz.*, **23** (1), 253-276.

17. Roger F., Thonnat J., Hendrikx P. & Domenech J. (2004). – Les systèmes de suivi et de surveillance des maladies et le rôle des acteurs de santé animale publics et privés : l'expérience de l'Afrique. Disease monitoring and surveillance systems and the role of public and private animal health agents: the experience of Africa. *In* Veterinary institutions in the developing world: current status and future needs (C. de Haan, ed.). *Rev. sci. tech. Off. int. Epiz.*, **23** (1), 137-145.

18. Rubyogo J.C., Murithii P.M., Agumbah G.J.O. & Obhai G. (2005). – Assessment of the technical competence and ethical behaviour of community-based animal health workers in Mwingi District, Kenya. *Trop. anim. Hlth Prod.* **37** (4), 267-276.

19. Thacker S.B., Parrish R.G. & Trowbridge F.L. (1988). – A method for evaluating systems of epidemiological surveillance. *World Hlth Stat. Q.*, **41** (1), 11-18.