FREIE UNIVERSITÄT BERLIN - ADDIS ABABA UNIVERSITY

A DESCRIPTION OF THE PRIMARY ANIMAL HEALTH PROGRAMMES IN SELECTED AREAS OF SOUTHERN SUDAN AND ETHIOPIA AND A FIRST ASSESSMENT OF PROGRAMME IMPACTS

A thesis submitted in partial fulfillment of the degree of Master of Science in Tropical Veterinary Epidemiology at the Freie Universität Berlin and Addis Ababa University

by

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To:

My mother Kojo for encouragement

My father Lokonyungi for bearing the burden and

My wife Dyanga, my children Modi and Abba for their patience and endurance

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LIST OF ABBREVIATIONS

ACCOMPLISH	Action committee to promote local initiatives and self help
AHA	Animal health assistant
AHT	Animal health technician
AMREF	African Medical Research Foundation
CAHW	Community animal health worker
BQ	Black Quarter
CBPP	Contagious bovine pleuropneumonia
CHW	Community health worker
DELIVERI	Decentralised livestock development service in southern Indonesia
DAR	Directorate of Animal Resources
FAO	Food and Agricultural Organisation
GOs	Governmental Organisations
GTZ-GVT	Deutsche Gesellschaft für Technische Zusammenarbeit (German Technical Co-operation) German Veterinary team.
HS	Haemorraghic Septicaemia
LDCC	Livestock development co-ordinating committee
MAFAO	Ministry of Agriculture, Food and Agriculture Organisation
MoA	Ministry of Agriculture
NGO	Non governmental organisation
NICODO	Nile community development organisation
PA	Participatory appraisal
PAHC	Primary Animal health care
PARC	Pan African Rinderpest Campaign
PHC	Primary health Care
RP	Rinderpest
TBA	Traditional birth attendant
UNICEF	United Nations Children Fund
VDC	Village development committee
WHO	World Health Organisation

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ABSTRACT

In selected areas of southern Sudan (Juba, Terekeka, Kapoeta) and Ethiopia (Afar, Zone 3 and 5; North Wollo) a study was conducted with the objectives to describe primary animal health care activities and approaches, to determine the level of community participation in animal health services delivery, to assess the efficiency of primary animal health care workers and, thus, to provide a first assessment of the impact of PAHC activities on livestock disease control and livestock production in the study areas

In using participatory appraisal (PA) methods as well as structured questionnaires active data were collected through 90 and 30 livestock owner group interviews, as well as through 53 and 9 CAHW and 15 and 22 government animal health worker questionnaires during January to May 2001 in southern Sudan and during July and August 2001 in Ethiopia, respectively.

PA data collected included disease changes, milk uses and other benefits obtained from healthy animals, community participation in PAHC implementation and preferences in animal health services delivery. Triangulation was used for the PA data collected in the field; for analysis of quantitative PA data also factor changes were determined.

Structured questionnaire data were collected on demographics, activities and work constraints of CAHW and government veterinary workers. Additionally, government veterinary staff was also asked on the livestock disease situation as well as on their assessment of community animal health care delivery in the respective study areas. Activity ratios were calculated to quantify and compare CAHW treatment and vaccination activities.

There was a substantial impact on the disease situation attributed to CAHW activities. Rinderpest, CBPP, and mange were considered important before establishment of PAHC and decreased thereafter, while BQ, ECF, and PPR were not affected by the activities of PAHC in southern Sudan. In Ethiopia, CBPP, BQ, anthrax and camel/cattle trypanosomosis were considered the most important diseases before PAHC establishment but decreasing afterwards.

ECF, CBPP, and BQ were found to be still the most important diseases in the study areas in southern Sudan while in Ethiopia CBPP, BQ and anthrax were most important. Transport, lack of drugs and vaccines were the major constraints in both study areas.

After the establishment of PAHC programmes milk for children and for sale as well as livestock for sale and dowry payment increased while ghee making decreased in southern Sudan. In Ethiopia, milk for sale increased but milk for children and ghee making decreased. However, the increased sale of livestock in Ethiopia was rather attributed to lack of food due to drought and other environmental factors than to PAHC activities.

CAHW services were preferred in three of the five study zones in southern Sudan and in one of the three areas in Ethiopia.
In the study areas 30-85% of the initial number of CAHW trained were still found active in the field. CAHW in Kobo woreda / Ethiopia attained activity ratios of up to 60% of those of government animal health workers.
Community participation in the PAHC programmes studied was at functional levels in the southern Sudan and the North Wollo programme in Ethiopia.

In conclusion the PAHC programmes studied produces results which when improved further could reach levels comparable to government activities. At present PAHC seems to be the most feasible option for the delivery of animal health services to the study areas as far as infrastructure and livestock production systems in these areas are concerned.

It is therefore recommended that the government service should take a more co-ordinating role in the implementation of PAHC programmes where experiences are shared and resources are used efficiently in order to achieve better results.

1. INTRODUCTION AND OBJECTIVES

1.1. Introduction

Deterioration of animal health services delivery in many developing countries has been reported (Zessin, 1996; Huhn and Baumann, 1996) and various reasons are given. Leonard *et al.* (1999) attributed this to stagnant economies with increased responsibilities of states, as well as inadequate and unpredictable access to foreign exchange. Furthermore the recession of the global economy is said to reduce donor support to the developing countries (Holden, 1999). Turkson *et al.* (1999) see also the influence of the structural adjustment programmes supported by World Bank and the International Monetary Fund initially aiming at an economic recovery in these countries. As often different production systems exist within a single economy in a country, these systems can only be successfully addressed if different animal health delivery systems are in place (Mlangwa and Kisauzi, 1994a). The western like conventional way of veterinary service delivery by many governments of the developing countries is criticised and even considered unsuitable (Zessin and Carpenter, 1985). This has raised a debate and discussion on reform and restructuring of the veterinary services is on the agenda (Mlangwa and Kisauzi, 1994; Zessin, 1996; Odeyemi *et al.*, 1998).

In recognition of the shortcomings of the conventional veterinary service delivery system, many development agents including NGOs and UN organisations started using primary animal health care approaches in the delivery of animal health services in rural areas of the developing countries as early 1970's. This approach was selected and encouraged by these organisations because of its participatory nature, an approach popularised in rural development (Catley, 1999a).

Southern Sudan with an approximate area of 650,000 km^2 is bordered by Ethiopia to the East, Uganda and Kenya to the South, the Democratic Republic of Congo to the Southwest and the Central African Republic to the West. An approximate population of 5.5 million lives in this area of which Dinka, Nuer, Murle, Buya and Toposa are mainly pastoralists, while Mundari, Latuka and Didinga tribes are the mainly Agropastoralists (Mogga, 1998). They keep an estimated population of 5.8 million heads of cattle and twice as many sheep and goats (Jones *et al.*, 1998). Most of the areas with high livestock population lack or have no access to veterinary services. This lack of accessibility could be explained by the absence of veterinary establishments, poor road and market infrastructures,

remoteness from main cities, reluctance of professionals to live in these areas, insecurity and the mobile nature of livestock owners (Jones *et al.*, 1998).

Ethiopia, one of the countries with the highest population of livestock in Africa has 35 million heads cattle, 1.05 million camels, 16.95 million goats, 22 million sheep, 5.2 million asses and 55.6 million chicken (FAO, 1999). Except for the nationally sponsored vaccination campaigns and disease prevention measures the animal heath services are decentralised according to the 14 regional states. The health services are mainly delivered through the public veterinary services in veterinary clinics. These services are not adequate especially in the pastoral and rural areas of the country. Moorhouse and Ayalew (1994) reported the only thirty percent of the total livestock population is covered by the public veterinary clinics. Berhanu (1996) identified the lack of personnel, veterinary drugs and equipment and poor staff mobility as the main cause to the poor delivery of services.

Although the use of primary animal health care (PAHC) is expanding, useful assessments of its impact are rare and far from being standardised (Martin, 2001). Thus, this study was designed to describe assess the impact of PAHC in southern Sudan and Ethiopia using participatory assessment method as one recommended methods as recommended for areas with poor infrastructure, such as southern Sudan and the Afar area in Ethiopia but combined with conventional epidemiological methods.

1.2. Objectives

The objectives of this study therefore are:

- to describe primary animal health care activities and approaches in selected areas of southern Sudan and Ethiopia;
- to assess the effectiveness and efficiency of primary animal health care workers in the delivery of animal health services in selected areas of southern Sudan and Ethiopia;
- to determine the level of community participation and adoption of PAHC in the provision of animal health services in selected areas of southern Sudan and Ethiopia and
- to assess the impact of PAHC activities on livestock disease control and livestock production in selected areas of southern Sudan and Ethiopia.

2. LITERATURE REVIEW

2.1. Veterinary services in general

In principle an animal health delivery services system consists of curative, preventive, public health, promotional, regulatory and back-up or facilitating components (Mlangwa and Kisauzi 1994a; Zessin, 1996).

In Africa, since the colonial times veterinary services delivery has been the monopoly of the governments and their main emphases were on the control of epidemic diseases (Holden, 1999). Curative and other services were neglected although highly demanded by livestock owners who are even willing to pay for (Leonard *et al.*, 1999; Leyland and Akabwai, 2000). Furthermore, the organisational structure of veterinary services did not change from that inherited at independence in many countries of Africa (Cheneau, 1985). Leyland and Catley (2000) pointed further to the non-existence of veterinary services in pastoral areas and stated that if existing at all services are deteriorating further. In response to this development workers and economists have come up with economic theories and development concepts for suitable delivery systems in developing countries. Holden (1999) and Leonard *et al.* (1999) described the theory of public and private goods which allows to identify and differentiate the role of the government and the private sector in veterinary service delivery. Mlangwa and Kisauzi (1994a, 1994b) and Zessin (1996) suggested that the design of any services delivery should account for the production system as so-called client-oriented service. Mlangwa and Kisauzi (1994b) advocated the development of private services, which should be based on auxiliaries and technicians rather than on self-employed veterinarians. Cheneau (1985) favoured the use of auxiliary personnel to be paid by livestock owners associations. However, Leyland and Catley (2000) proposed the linking of private veterinarians to community animal health workers. Already Schwabe and Kuojok, (1981) as well Zinsstag *et al.*, (2000) suggested the combination of human and livestock health services for pastoral communities.

2.2. Primary health care

The international conference on primary health care (PHC) in 1978 the Alma Ata Conference developed the concept of primary health care and defined it as: "Health care based on practical,

scientifically sound and socially acceptable methods and technology, made universally accessible to individuals and families in the community through their full participation, and at costs that the community and the country can afford to maintain at every stage of their development, in the spirit of self reliance and self determination" (UNDP, 1983; WHO, 2000).

This concept was developed after realising that the health model from the industrialised countries which emphasis on high technology hospitals and curative medicine was not suitable for developing countries (UNDP, 1983). Thus, primary health workers should include community health workers (CHWs), traditional birth attendants (TBAs), village midwives and sanitary workers.

In southern Sudan, PHC was implemented in 1976 by the autonomous administration of the respective regional state government. With support from AMREF, WHO and the national Ministry of Health a policy and guidelines for the establishment of PHC was enacted. Medical assistants were then send for training as trainers for the primary health workers and Schools were established in Lirya in eastern Equatoria, Lirangu in western Equatoria, Acord in Rumbek, Dole hills in Malakal, Kwajok in Wau and Baidid in Bor (Lolik, 1976). The local people participated in the by selection of candidates for PHCW training, the building of health units, sanitation programmes, and the construction of roads to the health centres.

2.3. Primary animal health care

Martin (2001) defined community animal health care as "animal health services provided by the community for the community". This means that community associations or individuals take the responsibility to plan, manage, deliver, and finance the provision of services to their own communities. Other authorities and projects have defined these workers differently. For instance, Baumann (1990) defined the Nomadic Animal Health Auxiliary (NAHAs) worker in Somalia as "an independent, privately-practising, informally trained person of pastoral origin who is not on the payroll of any government service nor development project. He is an auxiliary in the sense of being a self-employed complement to the official service, a person who lives a pastoral life himself". DELIVERI (2000) defined these workers as farmers who are selected by their communities and then trained to provide a basic animal health service at village level. "They may charge a fee for their service and charge for drugs that they administer, so they are in effect providing a private animal health service alongside the government service". CAHWs usually differ from other veterinary paraprofessionals because those have been trained and salaried by the

state. CAHWs are generally unsalaried, work part-time, and usually have lower levels of education and training.

PAHC has been applied to pastoral and other low input-output livestock production systems and in remote areas with poor infrastructures (Hüttner *et al.*, 2000). Different names for these delivery systems in different places are used but most share similar goals and features, which include

- low-cost strategies for livestock health and management supported by a strong extension component;
- community participation and self-help;
- part-privatisation and commercialisation of services which involve measures ranging from long-term subsidisation to complete cost-recovery (Hüttner *et al.*, 2000)

Successes and benefits of this approach have been reported by Sollod and Stem, (1993); Baumann, (1990); Leyland and Akabwai, (1999); Jones *et al.*, (1998); Hüttner, (2000) to mention only a few. However, difficulties, problems and shortcomings in the use of PAHC have also been expressed. Turk (1995) mentioned, initial expenses and recurrent costs, labour requirement, long-term effectiveness, the difficulty in achieving the objectives, government policies and civil strife as some of the constraints to PAHC implementation. Leyland *et.al.* (2000) warned of the failure of PAHC, as experienced in the primary human health service, due to the lack of a common understanding of 'community participation' eventually resulting in mass recruitment and training of CHWs sidelining the role of the community.

2.4. Primary animal health care in Africa

Involvement of local people in veterinary service provision was practised already during the colonial period in many countries in Africa. Herders were trained as vaccinators or disease reporters in Sudan (Jack, 1961), Nigeria (Henderson *et al.*,1973), Uganda (Carmichael, 1973), Tanzania (Lowe, 1973), North Somalia (Peck, 1973). During these times the trained herders were used to control diseases considered as a priority by the government (Catley, 1999).

The idea was later picked up again in the rangeland project of Ethiopia in 1976 (Sandford, 1981). In Sudan, a paravet programme was started in 1986 (Almond, 1991). In the 80's the approach attracted increasing numbers of development agencies as well as NGOs who used it widely in many countries in Africa (Catley, 1999a). Some countries where the use of PAHC is reported are Senegal (Obel-Lawson 1992), Somalia (Baumann, 1993), Chad (Hammel, 1995), Lesotho (Abdel-Messiah, 1996),

Uganda (Kasirye, 1998), Zambia (Imakando, 1998), Tanzania (Njau, 1998), Kenya (Kajume, 1998), Malawi (Hüttner, 2000) and Mozambique (Vetaid, 2001).

2.5. Veterinary services in southern Sudan

2.5.1. General

Proper establishment of veterinary services started in southern Sudan in 1949 deteriorated to its lowest level in the sixties due to civil strife. Yet, more work and effective service was seen during the implementation of externally supported Rinderpest control projects such as Joint Project 15 (JP-15) and Joint Project 28 (JP-28) which in the end failed to achieve even the 60% targeted vaccination coverage (Majok and Schwabe, 1996). However, following the signing of the peace agreement in 1972 between the Government of Sudan and representatives of southern Sudan, where regional autonomy was granted the services again picked up. Under the autonomous administration animal health services became part of the Directorate of Animal Resources in the Regional Ministry of Agriculture. Several international institutions also became involved in the delivery of animal health services by providing funds and technical support to the directorate. These organisations included World Bank, FAO, UNDP, German Veterinary Team (GTZ-GVT), and ILACO (Mogga, 1986; Majok and Schwabe, 1996). Supervised by the Provincial Veterinary Departments, the implementation of animal health activities in the field was carried out by the District Veterinary Office through fixed clinics at the district headquarters and out stations managed by veterinary assistants and stockmen. Mobile teams were periodically set-up mainly to conduct vaccination campaigns. Vaccination and treatments were either free or subsidised and the control of epizootic livestock diseases by mass vaccination was the main preoccupation of the veterinary services, however, with enormous support from international organisations and agencies. With further support from organisations like the GTZ and World Bank vaccination activities intensified from 1975 to 1979 but again failed to achieve the targeted 70 to 80 % Rinderpest vaccination however again attributed to absence of transport infrastructure, too few professional staff, and the lack of recurrent and capital budgets (Majok and Schwabe, 1996).

2.5.2. Primary animal health care in southern Sudan

Oxfam UK and Ireland was the first organisation to started a PAHC programme in southern Sudan in 1986 in Terekeka district (Almond, 1991). With the escalation of the civil war and the subsequent lack of basic services 'Operation Lifeline Sudan Southern Sector' (OLS/SS), a

consortium of UN agencies and NGOs, launched decentralised community based animal health programmes in the rebel held areas of the southern Sudan (Jones *et al.*, 1998). UNICEF assumed the role of the co-ordinator of the programme (Blakeway, 1995), and by 1998 the programme had trained about 700 CAHWs (Jones *et al.*, 1998). As a rule communities themselves selected the people to be trained as primary animal health care workers. The NGOs and the UN agencies initially provided inputs in the form of vaccines, drugs, equipment and training. In doing so the livestock owners are provided with vaccines and drugs at reasonable costs where the returns are to flow back to a revolving fund to assure programme continuity.

Later in 1996, the programme was replicated in the government controlled areas of southern Sudan and became known as the 'Operation Lifeline Sudan/Northern Sector' (OLS/NS). PARC and regional co-ordination offices were opened in Juba, Malakal and Wau to participate in the programme by providing technical advice on disease control. UNICEF also took-up the role of co-ordination and provided start-up drug and training funds.

Livestock development co-ordinating committees (LDCC), were constituted in each region which bring all organisations working in the livestock sector together in order to provide a forum for Co-ordination of the PAHC activities, however its structure differed from region to region (Munyua, 2001).

In the case of Equatoria, GOs, NGOs, and community based organisations (CBOs), already on the ground doing PAHC activities, which included NICODO, ACCOMPLISH, DAR, Oxfam and Bir, became part of the PAHC network.

NICODO, the acronym for Nile Community Development Organisation being formerly Nile Milk Producers Co-operatives Society (NMPCS) but now a CBO was established by the former beneficiaries of the MAFAO project as a co-operative society in Juba. ACCOMPLISH (Action Committee to Promote Local initiatives and Self-help), also a CBO was started as early as 1979 to carry out development activities in Terekeka district. These two local organisations played the most prominent roles in the implementation of PAHC in the area. First with support from Oxfam and later from UNICEF/OLS these organisations have set up their own revolving drug funds to continue delivering services on their own.

Though the government is involved in the implementation of PAHC activities no legislation or regulations in southern Sudan does exist for the use of PAHC in animal health delivery

2.6.1 Training and human resources development of animal health personnel in the Sudan

Sudan has three universities that has a veterinary faculty, from which about 200 veterinarians graduate annually; another university (Sudan University) trains diploma technicians majoring in animal production and extension. Earlier, the veterinary stockmen school in Omdurman which conducted three to five month training courses was the only recognised centre for training of animal health (veterinary) assistants and stockmen. This school is now closed and training for middle cadre animal health workers has been left to the Regional State authorities however, lacking standardised regulations and curricula. The usual practice in some states is that secondary school dropouts are employed as stockmen and given on the job practical field training; with time and some formal three months courses they progress to the rank of veterinary assistant.

In southern Sudan there had been initiatives to start centres for training lower cadres of animal health workers. These centres include the Malakal School of Veterinary Stockmen and MAFAO Farmers and Stockmen Training School in Juba, the Yei Agriculture Training Centre and the Yambio Institute of Agriculture. The Yambio institute conducts diploma level training but the main subjects taught are dealing with plant agriculture and extension. Most of these institutions did start the training but with lack of funds and civil war these centres were closed down (Leju, 1998).

2.6.2. Training of PAHC workers in southern Sudan.

The first PAHC worker training in 1985 in MAFAO Training Centre, for which staff of the Directorate Animal Resources developed the curriculum, was mainly practical with pictorial visual aids Almond, (1991). In 1996, when UNICEF OLS/NS became involved in the northern sector curriculum used in the southern sector was adopted. Training is mainly practical and participatory with emphasis on local diseases and livestock health problems in the localities. Three types of training for three different cadres of PAHC workers are provided, (i) community vaccinator (CV) are given training of 7-10 days on how to vaccinate Rinderpest, (ii) community animal health worker (CAHW) is trained for 15-21 days on how to vaccinate, diagnose and treat

diseases and (iii) animal health auxiliaries (AHA) secondary school leaver trained for 9-12 months a more advanced level than the CAHW including also some animal production aspects.

2.7. Animal health services in Ethiopia

2.7.1. General

In 1993, Ethiopia was decentralised into 14 states, which also resulted to the decentralisation of animal heath services except for the nationally sponsored vaccination campaigns and disease prevention measures. The administration of the Animal health services at the federal level has been restructured and renamed "Animal Health Technology and Regulatory Service" which consists of the following teams: Expertise in Quarantine and inspection, Epidemiology unit Laboratory and field service unit, Nationally implemented projects of PACE, NLDP, and FITCA.

At the Regional level veterinary services team is under Regional Bureau for Agriculture and at the zonal level are technical teams under the zonal bureau for agriculture. Services are provided at Clinical centres by at woreda Offices, which are managed with veterinarians and subclinics at various locations managed by animal health assistants and technicians (AHA/AHT). Drugs Supply at these clinics is unreliable.

2.7.2. Veterinary manpower training in Ethiopia

Since 1979 the Faculty of Veterinary Medicine of the Addis Ababa University graduates 25-30 veterinarians (MoA, 1996) per year. The faculty also trains animal health assistants who are recognised as major work force in veterinary services delivery in the country. The animal health assistants (AHA) are trained for two years and annually around 80 AHA are graduated (MoA, 1996). Animal health technicians however, are trained for nine months at regional training centres. As far as training uniformity is concerned all veterinary professionals as well sub-professionals are trained on a definite national curriculum (MoA, 1996).

2.7.3. Primary animal health care in Ethiopia

Primary animal health care activities could be traced as far back as 1976 to the World Bank funded Project in the Borana region (Sandford, 1981). However, also in Ethiopia the lack of trained manpower and operational government funds coupled with lack of infrastructure resulted in poor veterinary services in the remote areas of the country.

Each organisation being it a GO, NGO or a UN agency applies a different approach, strategy and training curriculum during the implementation of animal health services projects, as there is no centralised body in place to co-ordinate these activities. Different local regulations also exist for the use of CAHWs; for example in north Wollo, CAHWs are not allowed to vaccinate or use injections for treatment, while in Afar CAHWs are allowed to inject and vaccinate.

No policy or legislation concerning the use of PAHC exists in Ethiopia. Nevertheless, the government veterinary services have been using this approach in many of its projects such as PARC (Mariner *et al.*, 1995; Berhanu, 1996), the Afar Pastoralist Development Project (APDP) (Dawit, 1992), the Third and Forth Livestock Projects TLPD/FLPD (MoA, 1996), and the South Eastern Rangeland Project SERP (Crothers, 1993). Nowadays primary animal health care has however become an area of discussion and dispute within the veterinary profession at a number of professional veterinary association meetings, and national workshops (MoA, 1996).

2.8. Impact assessment of livestock projects and the use of participatory appraisal methods in research and in the field

The development of participatory appraisal (PA) methods was a result of the criticism of formal research and survey methods which often produced large quantities of unusable data at high cost (Chambers 1983). Bulmar and Warwick (1983) described the criticism of development workers about formal data collection methods and reviewed the use of questionnaires in light of practical value of the data produced, methodological constraints, financial and time considerations. Even other limitations for use of questionnaire surveys were reported (Zarkovick, 1966; Moris, 1970; Zeller and Carmines, 1980). The use of questionnaires was considered a "western" research tool in a foreign setting making it culturally insensitive (O'Barr *et al*., 1973; Chen and Murray, 1976). Chambers (1983) argued that in rural areas of underdeveloped countries questionnaire surveys were difficult to design and administer, time consuming and expensive to implement, and often produced results which are either wrong or which could only be confirmed by more research. He argued that using PA avoids or minimises "rural development tourism biases" such as spatial, project, person, temporal, diplomatic and professional (Chambers 1983). Rural development tourism was a phrase used by Robert Chambers to explain the behaviour of researchers and other professional when collecting data. These professional meet people by the road side or near urban centre to collect information (spatial bias), they go to areas where projects exist (project bias), contacting rural people through intermediaries (person bias), make visits only in the dry season

(temporal bias) and prefer to meet the educated or the progressive and avoids the poor (diplomacy bias). Edwards (1990) and Vaillancourt *et al.*, (1991) considered some questionnaire surveys used by veterinarians as poorly designed and biased. Trend (1978) stated that combined approaches were useful but only if separate studies were conducted and qualitative and quantitative results were combined. Problems with the use of PA have also been reported. Guijt and Cornwall (1995) outlined some of the concerns which include lack of conceptual clarity, transparency and accountability, emphasising information extraction with the rhetoric of political correctness, and agendas which have been driven more from outside than from within the community.

Different methodologies have been used in the impact assessment of livestock projects (Rushton *et al.*, 1999; Hüttner *et al.*, 2000; Jost *et al.*, 2000; Romero *et al.*, 2000). PA methods were used in the evaluation of the United Mission to Nepal's Paravet Project (Young *et al.*, 1994). ActionAid-Somaliland (1994, 1998) used PA methods as part of a participatory and "soft systems approach" in its programme reviews in Somaliland. In a review commissioned by Oxfam UK/Ireland of the community-based animal health project in Karamoja, Uganda (Catley, 1997) these methods were applied whereas scoring tools incorporated into a questionnaire based assessment of the Oxfam UK/Ireland animal health project in Wajir, Kenya were used (Odhiambo *et al.*1998). Catley (1999a) applied PA and scoring tools in community-based animal health projects in southern Sudan of the Veterinaires Sans Frontieres, Belgium and Veterinaires Sans Frontieres, Switzerland. PA methods were also applied in the Veterinary Services Support project in the Somali National Regional State in Ethiopia (Catley *et al.*, 1997).

The philosophy behind the use of participatory appraisal methods is based on a more visual approach and, thus, empowering the non-literate on the idea to encourage farmers to facilitate village-level analysis of problems and opportunities themselves (Chambers, 1993), and on the use of indigenous knowledge of livestock owners, which infact is extensive among pastoral communities in southern Sudan. Allowing people to identify and describe issues using their own language and measures is said to give the people a voice and some sense of ownership in the process of inquiry, and therefore allows to analyse issues in a new way. Arguably, these features of PA are particularly relevant to communities, which have been marginalised and subjected to severe hardships (Catley, 1999).

2.9. Historical background of participatory appraisal methods

Participatory appraisal (PA) is the term which refers to a range of methods for data collection, learning and facilitation, which enables local people to play a role in defining, analysing and solving their problems (Catley 2000a). Participatory rural appraisal (PRA) and participatory learning and action (PLA) are some of these methods (Catley, 2000a). These approaches were launched in late 1970's in developing countries. Among others the universities of Chiang Mai and Khan Kaen, both in Thailand contributed to the development of these methods. In the late 1980's the International Institute for Environment and Development (IIED) became the leading institution in the development of these methods (McCracken *et al.*, 1988). Since then the methods have been used by many different institutions including the World Bank, in various fields including education, agriculture, and human health for different purposes including training, information collection, research, management and planning (Catley, 2000a). In research, attention of the researcher is particularly drawn to methods such as:

- Interviewing and visual methods with different social groups in the target community;
- Use of a checklist (rather than a questionnaire);
- Use of different methods to allow for analysis and cross-checking of results (triangulation)
- Management of group interviews;
- Using secondary data and;
- Direct observations.

Attitudes in PA use require the researcher to adopt a behaviour, which demonstrates:

- respect for local perceptions and customs, and the willingness to learn from rural people.

2.10. Definition of terms used in monitoring and evaluation and impact assessment

Monitoring is a continuos process of information gathering on an ongoing project or programme to show whether objectives within the control of management are being achieved.

Evaluation determines relevance, efficiency, effectiveness and impact of activities in the light of their objectives. Evaluation is carried out at specific point in time which could be at the middle period of the project implementation or at the end (Martin 2001).

Impact is the effect of a project/programme on local communities and *impact assessment* is the process of measuring and describing the changes which have occurred in a community, relating this

to the project activities, and understanding the link between these changes and human welfare (Catley 1999a). Authors classify impact differently, Martin (2001) differentiates between *ex ante impact assessment* i.e. the assessment before project implementation to predict the out comes of the project and *ex post* impact assessment which looks at the projects outcomes and, thus, measures the benefits that the project has achieved against its costs.

Indicators are variables used to measure changes in a given situation. They are the tools for monitoring and evaluating the effects of an activity. When selecting indicators for measuring changes, they have to be specific, verifiable, cost effective, reliable and easy to calculate. However, indicators also are classified differently. Catley (1999) differentiates between the *process indicator* usually quantitative, measuring the implementation of project activities, and *impact indicators*, which measure changes which occur as a result of project activities.

2.11. Veterinary application of participatory appraisal methods

There is a wide range of PA methods and tool being used for investigation of livestock issues. which include various interviewing, scoring and ranking methods; also visualisation tools such as seasonal calendars, maps, Venn diagrams and flow diagrams are among the methods used (Catley, 2000)

Cornwall (1992) as well as Waters-Bayer (1994) compiled the first collated descriptions of participatory appraisal methods. Although initially these methods were mainly used by NGOs in small animal health programmes, they have now been adopted by continent wide programmes such PARC and in particular remote areas of the Horn of Africa (Catley 2001). Limitations of the use of these methods include the production of qualitative data, which cannot readily be statistically analysed. Catley (2000) outlined constraints expressed by veterinarians in Africa using these methods, these include lack of financial resources, lack of suitable training courses, negative attitudes among veterinarians and poor public awareness of the approach.

3. MATERIALS AND METHODS

The study was conducted in southern Sudan and Ethiopia from January to September 2001 whereby field investigations were carried out for a period of four months between January and April in southern Sudan, and in Ethiopia for a period of two months i.e. between June and July 2001

Active and passive data were collected using participatory appraisal methods (PA) and conventional questionnaire methods. Secondary data and background information on activities such as treatments and vaccinations were collected in the respective PAHC programmes as well as government veterinary services units.

3.1. Description of study sites

3.1.1. Southern Sudan

3.1.1.1. Bahr el Jebel State

Juba area

Juba is the capital and administrative centre of Bahr el Jebel State and province. The province is located at latitude 31.55 E and longitude 4.82 N, with an annual average rainfall of 800-1000 mm. Juba City is the base for many NGOs and UN agency field offices working in southern Sudan. Business activities are based on supplies of manufactured goods coming from Khartoum by air and river routes. The urban population is multicultural but in the suburbs as well as in the entire province the Bari is the predominant ethnic group. The Bari are crop cultivators but keep a substantial number of livestock under a sedentary production system. The cattle population, estimated at 60,000 is mainly found in the northern part of the province because the southern part is infested with tsetse flies. However, the sheep and goat population is estimated to double the number of cattle.

Terekeka province

Terekeka province is situated north of Bahr el Jebel province. It is located at latitude 31.73 E and longitude 5.44 N, with an area of 6,000 of square kilometers, an average temperature of 20-30 ^{0}C and an annual average rainfall of 800-1000mm. The Mundari are the predominant tribe of this province consisting of the four sub-tribes Deregen, Bari, Nyangwara and Korbura. The Korbura and the Bari

are the riverine groups residing along the banks of the river Nile. All these groups are agropastoralists keeping cattle, sheep and goats under a transhumance system. Livestock, which is estimated at 500,000 heads of cattle, and 750,000 sheep and goats, play a great role in the lives of the Mundari people. Besides contributing to their diet in form of milk, occasionally blood and meat, livestock is used in the payment of marriages and settlement of penalties and compensation, ritual sacrifices, exchange for grain and cash sales to purchase goods and other services.

3.1.1.2. Eastern Equatoria State

Kapoeta Province

Kapoeta province is situated on latitude 33.57 E and longitude 4.77 N, on the eastern corner of southern Sudan bordering Ethiopia to the East, Uganda and Kenya to the South. Topasa, Buya and Didinga are the predominant ethnic groups occupying this area. The area has semi-arid climatic conditions with an annual rainfall of 500-800mm. The inhabitants are agropastoralists keeping an estimated population of 779,000 cattle, 500,000 sheep, 400,000 goats and some camels and donkeys. Although cattle are highly valued sheep and goats thrive well and goat milk contributes substantially to the family diet. Besides milk, blood and occasionally meat, livestock is used for payment of dowry, settlement of penalties and compensations, cash sales and exchanged for other goods and services.

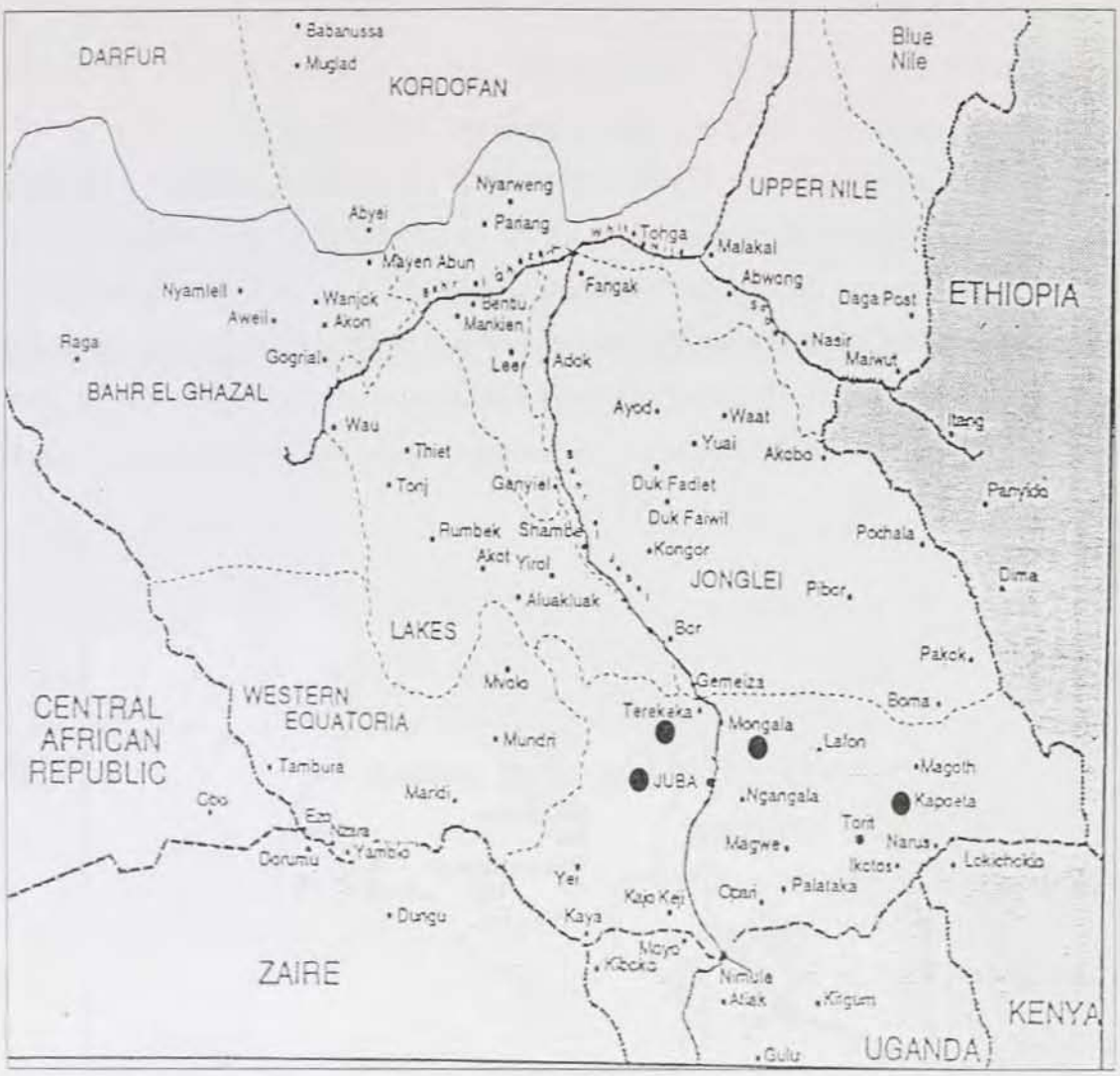

Figure 1 Map of southern Sudan showing the study area

3.1.2. Ethiopia

3.1.2.1. Afar regional state (Zone 3 and 5)

The Afar National Regional State (ANRS) one of the ten regional states in Ethiopia, is situated in the east of the country. The climate in zone three and five is semi-arid with an average rainfall of 600mm. a temperature range between 19-29 °C and an altitude of 1500m above sea level. The inhabitants are mainly pastoralists moving seasonally with the whole family and their huts in search of water and pasture for their livestock. The population of livestock in the state consists of 84,600 heads camels, 214,500 cattle, 114,700 sheep, 230,800 goats, and 17,500 asses (Central statistics authority, 1995)

3.1.2.2. North Wollo zone in Amhara Regional State

The north Wollo Zone one in Amhara National Regional State is about 375 km north of Addis Ababa. The terrain of the area consists of both high and low lands with numerous lakes, mountains, hilly and sloppy areas, rivers, streams and lakes. The lowland area is at 1,500 m.a.s.l and the highland up to 3,320 m.a.s.l. In the highland rainfall ranges from 967–1,763 mm and temperature from 3 to 21.6 °C, while in midland the rainfall ranges from 733–1453mm and temperatures 11.6 to 28.7 °C. In the lowland Rainfall ranges from 117-475mm and temperature from 14.3-30.8 °C. The people are sedentary agropastoralists keeping cattle, sheep, goats, camels, donkeys, and horses. Cattle are an important source of draught power for tilling the land.

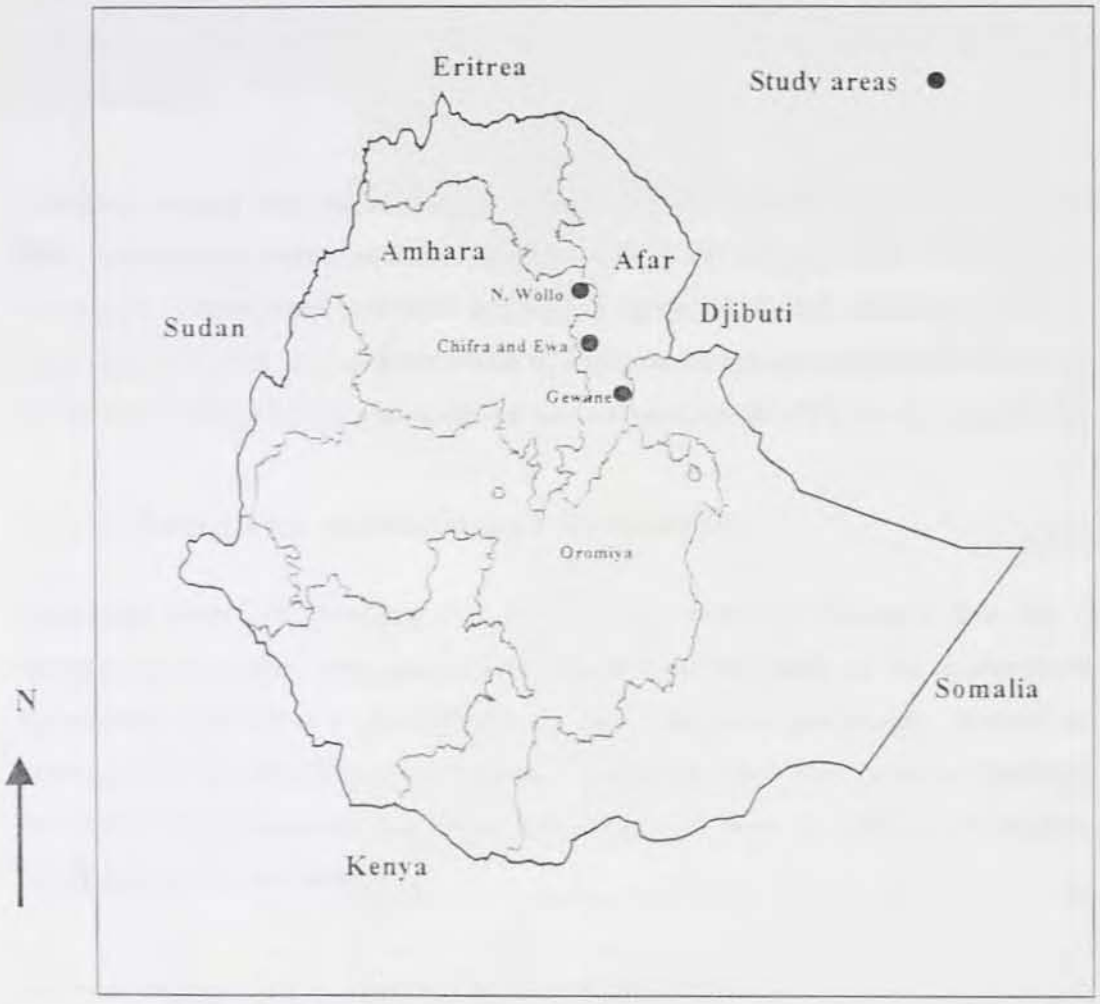

Figure 2 Map of Ethiopia showing the study areas.

3.2. Study procedures

3.2.1. Stratification of the study area

In southern Sudan the study area was stratified into zones based on the time of the start of the respective primary animal health care project. Data were collected in the areas of Juba south, Juba north, Mongalla, Kapoeta and Terekeka which are named zones 1, 2, 3, 4 and 5, respectively.

Similarly, three zones in Ethiopia according to PAHC project and administrative areas were zone 1 the Gewane and Telalak woredas (districts) served by Farm Africa, in Zone 2 north Wollo province supervised by Save the Children (UK), and zone three the Chifra and Ewa districts (woredas) served PARC Ethiopia.

Livestock owners were interviewed in-groups stratified by age, gender and leadership into women, men, community leaders and Adolescents Age group ranging from 10 to 15 years old. Three production systems were dealt with in the study areas, which included sedentary livestock keepers in Juba south in Sudan, and in north Wollo in Ethiopia, transhumant agropastoralists and pastoralists in Terekeka, and Kapoeta, as well as the administrative zones 3 and 5 of Afar regional state.

3.2.2. Sampling methods and strategies

Multistage purposive sampling was used in this study. In Equatoria five out of nine PAHC implementation zones were purposively selected for the study in the Equatoria states based on accessibility and security. In Ethiopia the two sites were purposively selected on the basis of accessibility. The sampling unit of interest, for PA interviews was the above described group and for the structured questionnaire interviews, individuals who were selected on convenience basis i.e. their willingness to be interviewed.

3.2.3. Secondary (passive) data collection

Secondary data in this study were defined as information already collected during project activities, i.e. reports and records from government and NGO veterinary establishments. The type of the data collected included data on treatments, vaccination and Rinderpest seromonitoring in the selected study sites. Further, data on CAHW training, refresher training, actively working CAHWs in the field, animal health personnel in veterinary establishments, organisational structures, drugs and vaccine supplies, evaluation reports, training curricula and reporting formats were collected.

Background information on local disease names, seasonal disease patterns, livestock populations, livestock seasonal movements and livestock management systems, as well on PAHC project objectives and operational strategies were also collected.

3.2.4. Primary (active) data collection

3.2.4.1. Primary (active) data collection using structured questionnaire

A structured questionnaire (interviewer administered) was used to collect data on CAHW characteristics, treatment and vaccination records, educational levels, livestock ownership, community role, delivery services, diseases, work constraints and livestock keeping problems.

Another questionnaire (self administered), for government animal health workers was used to collect data on livestock diseases, animal health services, livestock keeping problems, work related problems, and further data to assess the performance of PAHC and the participation of livestock keepers in the implementation of PAHC. The questionnaire (Annex 1) was pre-tested both in southern Sudan and Ethiopia and re-adjusted accordingly.

3.2.4.2. Primary (active) data collection using participatory appraisal interviews

Interviewing Procedures

The "before and after" proportional piling tool (Catley, 1999a) was used to qualify changes in disease control, in milk use and in benefits received from healthy animal. Informants were asked to identify the local indicators for the parameters to be measured (Table1). All indicators for a particular parameter were written in the local language on pieces of paper each paper, bearing one indicator. Informants were asked to not more than six indicators for each parameter. The papers were then laid separately on the ground or tagged on different everyday objects a piece of wood a stone and tree leaves. The informants were arranged to sit in a way that all participants see the objects/papers clearly. Using a pile of "*lalop*" seeds (*Banaites aegyptiaca)* the informants were asked to divide on the indicators according to their prioritisation. A literate informant in the group or an assistant was asked to read out these indicators from time to time to recall as they discuss and score. During the scoring of the "before" situation a pile of 100 seeds was used, whereas in the "after" situation the

informants were free to increase, decrease or leave the pile according to scores of an indicator. The informants were also allowed to rearrange the piles until they had arrived at the result all agree.

Prior to the scoring, the time series tool was used to define the "before and after time frame" (Kirsopp-Reed, 1994 ; Catley, 1999a). Informants were asked to mention the different time periods where organisations have been delivering animal health services in their areas. In addition to this, names of individuals involved in the delivery were asked, as this was much easier for the informants to recall.

Preference proportional piling as described by Kirsopp-Reed (1994) was used to measure the most preferred animal health services in the area again "*lalop*" seeds and following the same procedures as in "before and after"proportional piling.

Participation of beneficiaries in the implementation of PAHC was measured by asking livestock owners, project staff and community leaders by means of a semi-structured interviews on the stages of the project cycle and on project implementation with particular reference to needs assessment, leadership, organisation, resource mobilisation and management. The responses were then compared to the seven-type of community participation as shown in Table 2 (Pretty, 1994, Cornwall, 1996). Organisational charts social contracts and other documents were also viewed and cross-checked with the responses from the informants.

A checklist, serving as a guide and consisting of the main points to be investigated during the PA interviews (Annex 2) was prepared, pre-tested and adjusted accordingly, both in southern Sudan and Ethiopia, prior to the investigation proper. Before conducting the interview exercise an introduction explaining the purpose of the exercise was carried out with the informants.

Generally interview lasted for 1 to 2 hours to discuss on 2 to 3 parameters depending on the will of the informants to continue with the interview. Throughout the interviews "*lalop*" seeds were used for scoring, as these were common in the study areas in Ethiopia and southern Sudan, visible to the informants and easy to handle.

3.2.5. Parameters measured

Table 1. Parameters measured in the study by using PA methods.

Parameter	Changes of an indicator to be measured	Method used
Disease control	Effect of PAHC Livestock mortality	Before and after proportional piling
Production	Benefits derived from healthy animals Milk usage	Before and after proportional piling
Animal health services	Preference	Preference proportional piling
Community participation	Level of participation at project cycle Participation in needs assessment, management, leadership, organisation, and resources mobilisation.	Semi structured interviews

In order to know livestock owners' perception of the changes due to PAHC, parameters changes to be measured and methods used for measuring the changes are presented (Table 1).

Table 2 Seven types of community participation (Pretty, 1994 ; Cornwall 1996)

Manipulative participation (co-option)	Community participation is simply pretence, with people's representatives on the official boards who are unelected and have no power.
Passive participation (compliance)	Communities participate by being told what has been decided. Involves unilateral announcements by an administration or project management without listening to people's responses. The information belongs only to external professionals.
Participation by consultation	Communities participate by being consulted or by answering questions. External agents define problems and information gathering process, and so control analysis. Limited if any local decision-making and professionals are under no obligation to take on board people's views.
Participation for material incentives	Communities participate by contributing resources such as labour, in return for material incentives (e.g. food, cash). Local people have no stake in prolonging practices when the incentives end.
Functional participation (co-operation)	Communities' participation is seen by external agencies as a means to achieve project goals. People participate by forming groups to meet predetermined project objectives; they may be involved in decision-making, but only after the major decisions have already been made by external agents.
Interactive participation (co-learning)	People participate in joint analysis, development of action plans and formation of or strengthening of local institutions. Participation is seen as a right not just the means to achieve project goals. The process involves interdisciplinary methodologies that seek multiple perspectives and make use of systemic and structured learning processes. As groups take control over local decisions and determine how available resources are used, so they have a stake in maintaining structures or practices.
Self-mobilisation (Collective action)	People participate by taking initiatives independently of external institutions to change systems. They develop contacts with external institutions to resources and technical advice they need, but retain the control over how resources are used. Self-mobilisation can spread if governments and NGOs provide an enabling framework of support. Such self-initiated mobilisation may or may not challenge existing distributions of wealth

To understand the participation of communities in the in PAHC different types of participation are presented (Table 2).

3.2.6. Data analysis

Data were stored using the database management software ACCESS 97 (Microsoft Corporation). Statgraphics Plus 2.1 (Manguistics, Inc., Rockville, Ma., USA) was used for the descriptive analysis of the questionnaire data. Ratios and percentages analysis and graphs were performed by Microsoft Excel 97 (microsoft Corp). SPSS for Windows Version 9.0 (SPSS Inc., Chicago Illinois, USA) was used for the distribution analysis of disease changes

3.2.6.1. Triangulation

Triangulation is the process of describing and analysing situations using a variety of methods and different data sources. It is a way of cross-checking information by taking the results of one method and comparing them to results of a different method or existing data. Preliminary analysis was carried out in the field by comparing secondary data (records and reports) with actively collected data from the different respondents by means of PA methods. Any pronounced difference was investigated and hypotheses for the difference made and tested (Catley 1999a; Mariner, 1996)

3.2.6.2. Factor Change

The Factor change is a measure to quatify the magnitude and the direction of change of an indicator (variable) of the parameters diseases, milk use, and benefits (see Table 1) and it is calculated as follows: By adding scores assigned to each indicator by the respective stratified group in a study zone for the 'before' and 'after' situations, the difference between the two scores can then be calculated as the change. The change difference is thereafter divided by the "before" value leading to "factor change" value, which indicates both the direction and magnitude of change. A positive factor change (FC) for milk and other benefits will indicate an increased quantity of milk and benefits compared to the "before" situation. However, a positive FC for diseases will indicate increase in disease and, thus, no improvement.

3.2.6.3. Activity Ratio

An activity ratio was used to measure the CAHW activities in treatment and vaccination. The ratio is calculated in dividing the average number of animals treated/vaccinated for a particular disease by a CAHW by the same activity of a government worker on the same disease in the same district. The

activity ratio thus, serves to elucidate the differences between "full-time" professionals and "part-time" CAHWs and, thus, better defining the present and future potential of the latter.

4. RESULTS

Though interest in the application of primary animal health service delivery is on the increase, encouraged in particular by international development agencies and NGOs, in marginalised rural and insecure areas in developing countries, little is known about quantifiable results and the impact of this approach.

This study was conducted to describe the community based animal health services delivery systems and assess its impact in southern Sudan and Ethiopia.

4.1. Secondary data analysis results

4.1.1. Southern Sudan

Retrospective records of treatment vaccinations and training of CAHWs were collected from government veterinary services departments and organisations implementing PAHC activities at the selected sites. In southern Sudan data were collected from the time when the entire southern Sudan was under one autonomous administration, and also from Equatoria State when southern Sudan was divided into more states.

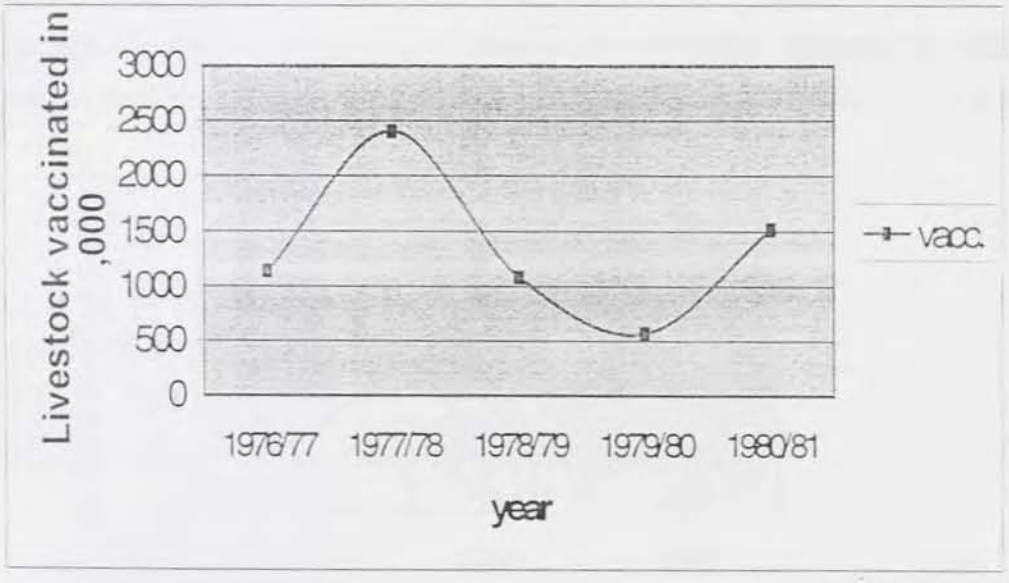

Figure 3 Livestock Vaccination (RP, HS, CBPP, BQ, and anthrax) trend of the southern Sudan regional government veterinary services. Estimated cattle population 5.5 million, 1976-81.

Vaccination was the major activity of the veterinary department with financial and technical support from World Bank, FAO, UNDP, GTZ-GVT and ILACO. A cyclical trend declining upto 1980 and increasing in 1980/81 becomes apparent (Fig.3)

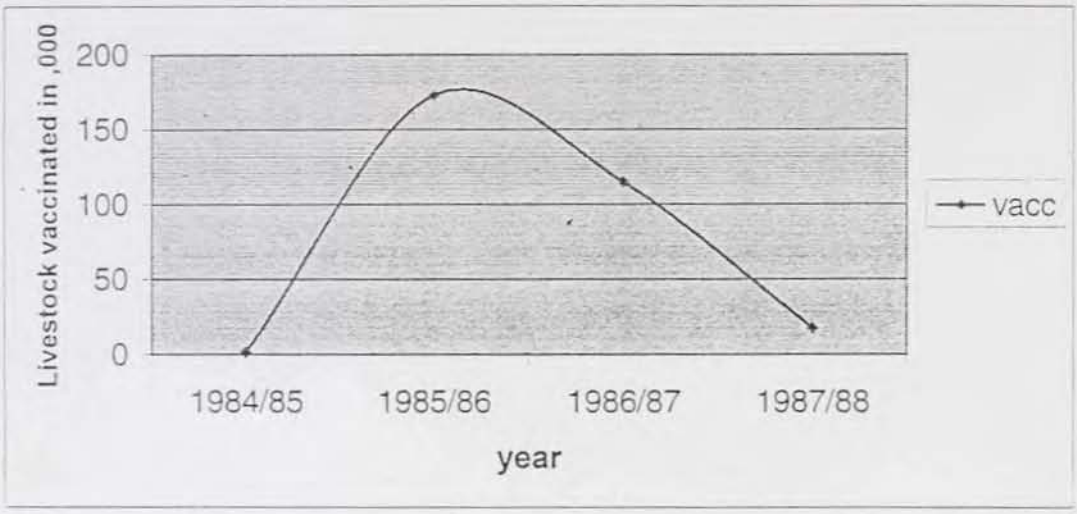

Figure 4 Livestock vaccination of Rinderpest, CBPP, HS, Anthrax, BQ and Newcastle trend of the Equatoria state government veterinary services from 1984 to 1988. (estimated livestock population 1,257,495).

Veterinary services were again divided into more autonomous administrative unites when southern Sudan was split up into more states in 1993 of which Equatoria region was one. This redivision affected the vaccination campaign in the new states. Although the vaccination increased between 1984 and 1986 it again started declining to its lowest level in 1988 (Fig.4)

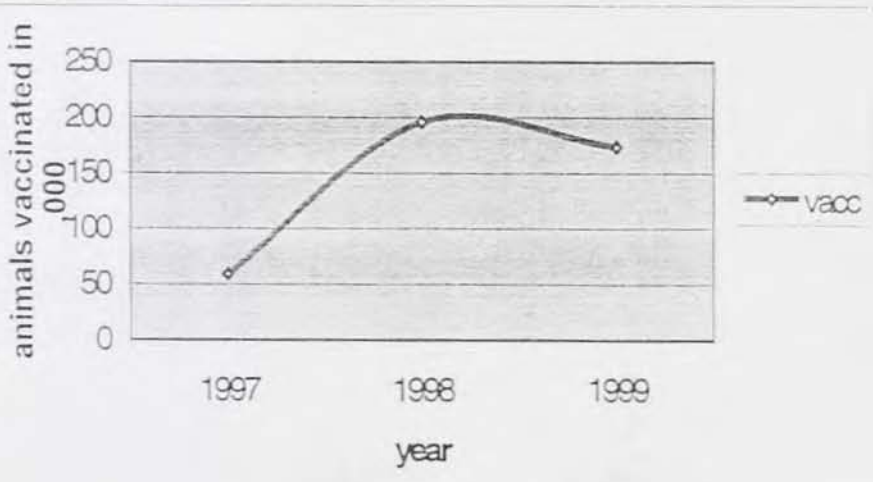

Figure 5 Livestock vaccination (RP, HS, CBPP, BQ, and anthrax) trend of the primary animal health programme of OLS/NS in southern Sudan from 1997 to 1999

The vaccination trend (Fig 5) in Equatoria shows a rising curve between 1997 to 1999. During the time period from 1988 to 1997, government activities were negligible except for local NGOs in a few areas supported by Oxfam/UK.

Table 3 CAHW training and re-training by organisation and geographical area in southern Sudan.

Organisation	Area	Trained in 1986 and 1993	last retrained 1995 and 1996	trained 1998	Trained 1999	Retrained 1999	retrained 2000	Retrained 2001	Active in 2001
ACCOMPLISH	Terekeka/Tali	19	19						5
NICODO	Juba centre	12	12						9
NICODO	Luri, Jebel Lado			14				14	9
NICODO	Mongalla				18			8	13
NICODO	Juba centre				6	4			4
DAR-Torit	Laudo			13		13			9
DAR-UNICEF	Lafon			21			14		11
ACCOMPLISH	Juba/Terekeka			41			22		35
PARC-UNICEF	Liggi			30					3
DAR-UNICEF	Toposa				32			19	14
DAR-UNICEF	Buya/Didinga				25			2	2

Table 3 CAHW training and re-training by organisation and geographical area in southern Sudan.

Organisation	Area	Trained in 1986 and 1993	last retrained 1995 and 1996	trained 1998	Trained 1999	Retrained 1999	retrained 2000	Retraine d 2001	Active in 2001
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NICODO	Mongalla				18			8	13
NICODO	Juba centre				6	4			4
DAR-Torit	Laudo			13		13			9
DAR-UNICEF	Lafon			21			14		11
ACCOMPLISH	Juba/Terekeka			41			22		35
PARC-UNICEF	Liggi			30					3
DAR-UNICEF	Toposa				32			19	14
DAR-UNICEF	Buya/Didinga				25			2	2

Liggi, Buya/Didinga and Toposa whereas particularly in the active dairy areas served by NICODO a large percentage of CAHWs is still active. In Terekeka/Tali served by ACCOMPLISH the earliest training, was done only low numbers of CAHWs still active.

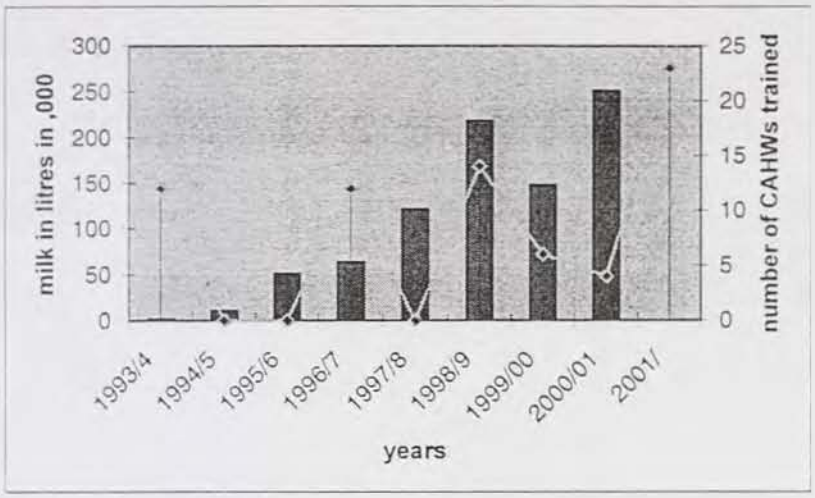


Figure 6 Records of milk supplied to NICODO sales centres in Juba and CAHWs trained.

Milk records were collected from the sales section of the NICODO organisation and plotted against the number of CAHWs trained at different points in the successive years. The milk supplied was always on the increase except in the year 1999/2000 whereas the number of CAHWs trained did not match with the milk increases (Fig.6).

4.1.2. Secondary data Ethiopia

Data from both government and PAHC systems were collected from three sites of the Chifra and Ewa districts (woredas) where the PAHC programme was implemented by PARC, North Wollo administrative zone where a PAHC system supported by Save the Children UK is implemented and in Gewane centre where the PAHC supported by FARM Africa is implemented covering Gewane, Telalak and part of Amibara woredas in the Afar National Regional state.

vaccination records of CAHW workers in Afar and Amhara regions in Ethiopia, 1998–1999

		External parasites		Internal parasites		General treatment*		Vaccination	
Woreda	Unit	Animals treated per worker	Activity ratio	Animals treated per worker	Activity ratio	Animals treated per worker	Activity ratio	Animals vaccinated per worker	Activity ratio
Habru	Government	2737.4		2699.8					
	CAHW	801.8	0.29	390.25	0.14				
Kobo	Government	4925		4860.2					
	CAHW	2871	0.58	410.3	0.1				
Chifra	Government					6521		13103.3	
	CAHW					106.6	0.02	3324.6	0.3
Ewa	Government					3074		7304.0	
	CAHW					431.3	0.14	2645.0	o.4

Activity ratio=animals treated/vaccinated by a CAHW divided by the number of animals treated/vaccinated by a government veterinary worker
*=all other disease treatments

In an attempt to qualify the performance of the CAHW with regards to treatment and vaccination and to relate it to the average number of animals treated or vaccinated by a government veterinary worker an activity ratio was performed. A high activity ratio was noted in Kobo where the CAHW was able to achieve more than half the number of treatment a government worker. In Habru the CAHW, however, attained nearly thirty percent of the number of animals treated against external parasite, by a government veterinary worker (Table 4).

4.2. Structured questionnaire results

The purpose of the CAHW questionnaire was to assess the performance of the CAHWs, to describe the demographic characteristics of the CAHWs, the ownership of livestock and their community roles in addition to work related constraints.

The questionnaire administered to the government veterinary workers was to record their assessment of the disease situation, their work conditions, the level of community participation in the implementation of PAHC and the performance of CAHWs in animal health delivery.

4.2.1. Results of questionnaire in southern Sudan.

The questionnaires were administered to community animal health workers and veterinary officers, veterinary assistants and stockmen from the government veterinary services in Terekeka, Juba, and Kapoeta in southern Sudan. A total of 53 CAHWs and 15 government staff were interviewed.

4.2.1.1. Results of CAHWs questionnaire in southern Sudan

4.2.1.1.1. Description of CAHW characteristics

Table 5 Demographic characteristics of CAHWs (n=53) in selected areas of southern Sudan, 2001

Characteristic	Category	Frequency	%
Age	19-26	10	18.9
	27-35	23	43.4
	36-50	20	37.7
Married	yes	46	86.8
	No	7	13.2
Ownership of cattle	Own	42	79.3
	Not own	11	20.8
Ownership of sheep	Own	51	96.2
and goats	Not own	2	3.7
Means of transport	On foot	35	66.0
for work	Bicycle	18	33.9
Other income	Cultivation	31	58.5
activities	Employment	8	15.1
	Trading	5	9.9
	No/other	9	17.0
Education	No school	20	37.7
	Primary level	18	34.0
	Intermediate without certificate	9	16.9
	Intermediate level	1	1.9
	Secondary level without certificate	5	9.4

Some demographic characteristics of the CAHWs are summarised in Table 5. Most of the respondents were married and only a small number of CAHWs do not own cattle (20.8%) or sheep and goats (3.8%). A substantial number of CAHWs (38%) did not go to school at all and a similar proportion does only have primary school education. More than half of the CAHWs earns further income from cultivation.

Number of livestock owned by CAHWs

Table 6 Break-down of livestock population ownership of the CAHW (n=53) in selected areas of southern Sudan, 2001

No. animals owned	No. CAHWs	%
Cattle		
Nil	11	20.8
1-10	15	28.3
11-20	12	22.6
21≤50	10	18.9
51≤100	5	9.4
Sheep and goats		
Nil	2	3.8
1-10	19	35.9
11-20	10	18.9
21≤30	8	15.1
31≤50	14	26.4

The largest proportion of CAHWs own 1-10 cattle, and or Sheep and goats. Large numbers of livestock, i.e. more than 50 cattle and or more than 30 small ruminants, are owned by 9% and 23% of the respondents respectively. (Table 6)

Community engagement

Table 7 Community engagement of CAHW in addition to PAHC work in southern Sudan, 2001

Variable	Frequency	%
No engagement	35	67.9
Chief	4	7.6
Militia	3	5.7
Catechist	3	5.7
Cattle camp leader	2	3.8
Guinea Worm campaigner	2	3.8
Community Health worker	1	1.9
Bone setter	1	1.9
Village Development Committee chairman	1	1.9
Youth leader	1	1.9

CAHWs were asked to mention their roles in other community activities and agendas. Table 7 shows that the two thirds were not involved in any community engagement at all. Eleven of the respondents are in involved in community leadership roles including a chief and cattle camp leaders, catchiest, village development chairman and youth leader while three are involved in a technical work much related to CAHW work i.e. community health worker, guinea worm campaigner and bone setter.

4.2.1.1.2. CAHW Activities

Treatments and visits

Table 8 Frequency of CAHW (n=53) weekly treatments, visits, number of days busy on CAHW work and distances moved southern Sudan, 2001

Variable	Mean	Median	Mode	Range	Minimum	Maximum
Treatment						
Cattle	20.3	15	10	48	2	50
Sheep and goats	17	10	10	66	4	70
Visits						
Number of herds	12.4	10	10	49	1	50
Number of Villages	4.3	3	2	14	1	15
Number of camps	4.8	4	5	9	1	10
Number of days busy in PAHC	4.8	5	5	5	2	7
Distance covered (km) for CAHW activity	8	5	5	24	1	25

The summary statistics given in Table 8 quantify the actual weekly activities of a CAHW. At the time of conducting the study on average a CAHW treated about 20 heads of cattle and 17 sheep and goats per week in about 12 herds, 4.3 villages and 4.8 camps. With these activities a CAHW is busy with CAHW work for 4.8 days and moves within a radius of 8 km to these camps and villages.

CAHW Potential

Table 9 Potential weekly CAHW coverage given sufficient drugs and a bicycle in southern Sudan (n=53) 2001

Variable	Mean	Median	Mode	Range	Minimum	Maximum
Potential coverage						
No. Livestock	465	400	300	1900	100	2000
No. Villages	5.7	5	5	14	1	15
No. Herds	17	15	10	47	1	15
No. Camps	6	5	5	14	1	15

If a CAHW would be provided with enough medicines and a bicycle she/he could cover the average population of 465 heads of livestock,1.4 (32.6%) more villages, 4.6 (37.1%) more herds and 2.2 (41.6%) more camps. In this study a village was a cluster of homes (households) and geographically defined, a herd is an aggregate of livestock owned and herded by a household, and a camp consists of herds aggregated together for night accommodation and herded in one place

CAHW complaints and comments

Table 10 CAHW complaints and comments on PAHC programmes in southern Sudan, 2000

Complaint/comment	Number of times complaint or comment mentioned
Provision of incentive	18
Provision of a bicycle	11
Regular replenishment with drugs	11
Protective dressing and uniform	8
More training	7
Enlightenment/dialogue with farmers	4
Poorly organised community	4
Food-for-work provision	2
Presence of a veterinarian in the field	2
Poorly managed project	2
Not generating enough income	2
Farmers buy their own drugs to treat their animals	2
Competition	1

From Table 10 complaints and comments as mentioned By CAHWs could be grouped into

- improvement of working conditions (regular replenishment with drugs, presence of a veterinarian in the field, more training, bicycle),
- institutional/organisational set-up (enlightenment/dialogue with farmers, poorly organised community and poor project management), and
- CAHWs' income (incentive, not generating enough, food for work).

Provision of incentive was mentioned most often followed by provision of a bicycle, more training and organising the beneficiary community.

4.2.1.1.3. Animal health services preferred

Table 11 Ranking of animal health delivery services by CAHWs (n=53) in southern Sudan, 2001

Service Rank	Zone (1=most important, 5=least important).				
	Juba South (n=16)	Juba north (n=16)	Mongalla (n=8)	Kapoeta (n=15)	Terekeka (n=8)
Government services	1,2,3	2	1	1	4
CAHWs services	1	1,3	1	1	1
Traditional drugs and treatments	3	3	2	2,3	3
Drugs from private sources	2	1,2,4	2,3	4	2

The summary ranks as given by CAHW for the use of animal health services delivery in the study area in southern Sudan are presented (Table 11) CAHW and government services were ranked number one in Juba south, Mongalla and Kapoeta. In Terekeka, however, government service ranked low compared to CAHW services. Drugs from private sources received varying but also higher scores than traditional drugs and treatment with Kapoeta being the exception.

Ranking of diseases, work and livestock production constraints

Table 12 Disease Ranking by CAHWs by zone in southern Sudan 2001

Zone (No. CAHWs)	Disease rank (1=most important, 5=least important)						
	ECF	CBPP	BQ	HS	RP	FMD	CCPP
Juba south (n=16)	1	2,3	4			5	
Juba North (n=16)	1,5		2			3	
Mongalla (n=8)	1	3,4,5					
Kapoeta (n=15)	1	1,2	4	1	2		3,5
Terekeka (n=8)	1,3	1,2	4,5				

The CAHWs were asked to rank livestock diseases in order of importance in their areas. Table 13 gives the summary of the disease ranks in the different zones. ECF was considered the most important disease as it was ranked number one in all five zones of the study area. CBPP was seen as the second most important disease as it ranks two in three zones and one in Kapoeta and Terekeka. Rinderpest, however, was only mentioned in Kapoeta zone and ranked as number two.

Table 13 Graphical presentation of the relative frequency of disease ranks following Table 12, southern Sudan, 2001

Disease rank 1= most important 5= least important	Disease						
	ECF	CBPP	BQ	HS	RP	FMD	CCPP
1	*****	**	-	*	-	-	-
2	-	***	*	-	*	-	-
3	*	**	-	-	-	*	*
4	-	*	***	-	-	-	-
5	*	*	*	-	-	*	*

* represent a single disease ranking response
- disease was not mentioned/ranked

The graphical representation as given in Table 13 gives us a better idea on the importance of a particular disease. ECF appears to be the most important as it was ranked five times number one, followed by CBPP which was ranked number one twice and number two three times.

Table 14 Ranking of work constraints by CAHWs in southern Sudan, 2001

Constraints	**Zone Rank** (1=most important, 5=least important)				
	Juba South (n=16)	Juba North (n=16)	Mongalla (n=8)	Kapoeta (n=15)	Terekeka (n=8)
Lack of drugs and vaccines	2	3	1	2	1
Lack of transport	1	1	1	1	2
Lack of recognition	3	4	3	3	4
Lack of co-operation from livestock owners	3	2	4	4	3
Others e.g. insecurity			5	5	

In Table 14 a summary of the ranking of constraints as experienced by CAHWs in their work is presented. In most zones (1, 2, 3 and 4) lack of transport was considered as being the most important but similar or more important as lack of drugs, it has to be noted that lack of co-operation of livestock owners played an important part among these constraints.

Table 15 Ranking of livestock production constraints by CAHWs in southern Sudan, 2001

Livestock production constraints	Juba South (n=16)	Juba north (n=16)	Mongalla (n=8)	Kapoeta (n=15)	Terekeka (n=8)
Diseases	1	1	1	1	1
Water	4	4		3	-
Theft	2	2	2	4	3
Raiding		3	3	2	-
Grazing			4		4
Insecurity					5

Livestock production constraints in the five PAHC zones were also ranked by the respondents in the study. As shown in Table 15 diseases are the single most important constraints in all zones followed by theft of livestock. Insecurity apparently is not or the least considered livestock keeping constraint.

4.2.1.2. Results of the questionnaire administered to Government veterinary staff in south Sudan

4.2.1.2.1. Animal health services preferred

Table 16 Ranking of animal health delivery and livestock services (1= most preferred, 5= least preferred) by government workers in southern Sudan (n=15)

Service provider	Zone			
	Juba south (n=7)	Juba north (n=1)	Kapoeta (n=5)	Terekeka (n=2)
Government services	1	1	1	2
CAHWs services	-	2	2	2,3
Traditional drugs and treatments	2	-	3	-
Drugs from private sources	3,4	-	4	1

- indicates service not ranked

Veterinary service delivery was assessed by the government veterinary workers in the study area (Table 16). Not surprisingly, the respondents considered government services to be the most preferred whereas CAHW services were the second most preferred. However, Private drug sources play the greater role in Terekeka.

4.2.1.2.2. Disease Ranking

Table 17 Livestock disease ranking by government veterinary workers (n=15) by zone in southern Sudan, 2001

Zone	Disease ranks (1=most important, 5=least important.)									
	ECF	CBPP	BQ	HS	RP	FMD	Mange	Blood. Parasites	flukes	Anthr
Juba south (n=7)	1	2,3	5			4				
Juba north (n=1)	1	2	3			4		5		
Kapoeta (n=5)	5	2			1			2		4
Terekeka (n=2)		1	4	4			3		5	

Blank space means disease not mentioned and no ranking done

The results for animal disease ranking in the four zones (Table 17) by government veterinary staff show again that ECF was most important in Juba South and North. RP was ranked number one in Kapoeta while in Terekeka CBPP took the first place but was considered the second most important disease in Juba South and North as well as in Kapoeta.

Table 18 Graphic presentation of the relative frequency of disease ranks following Table 17

Disease rank 1=most important, 5=least important.	Disease									
	ECF	CBPP	BQ	HS	RP	FMD	Mange	Blood parasites	Liverfluke	Anthra
1	**	*	-	-	*	-	-			
2		***	-	-	-	-	-	*	-	-
3		*	*	-	-	-	*	-	-	-
4		-	*	*	-	**	-	-	-	*
5	*		*	-	-		-	*	*	-

* indicates a single disease ranking response
-Indicates the disease was not mentioned/ranked

Considering the frequency (Table 18) ECF was twice ranked as number one and once as five while CBPP, ranks one once and ranks two three times.

Work constraints

Table 19 Work constraints reported by government veterinary workers (n=15), southern Sudan, 2001

Zones	Constraint (ranks 1=most important, 5=least important.)				
	Lack of drugs and vaccines	Lack of transport facilities	Lack of incentive	Lack of co-operation from livestock owners	Bad roads
Juba south (n=7)	1	2	5	4	3
Juba north (n=1)	-	-	-	2	1
Kapoeta (n=5)	1	1	3	2,5	4
Terekeka (n=2)	1	2		3	2

Lack of drugs and vaccines is a major problem in Juba south, Kapoeta and Terekeka. Lack of transport was a major constraint in Kapoeta while bad roads are the most important constraint in Juba North. However, lack of incentives seems to be a constraint of no importance.

4.2.1.2.3. Assessment of CAHWs work and participation of livestock keepers

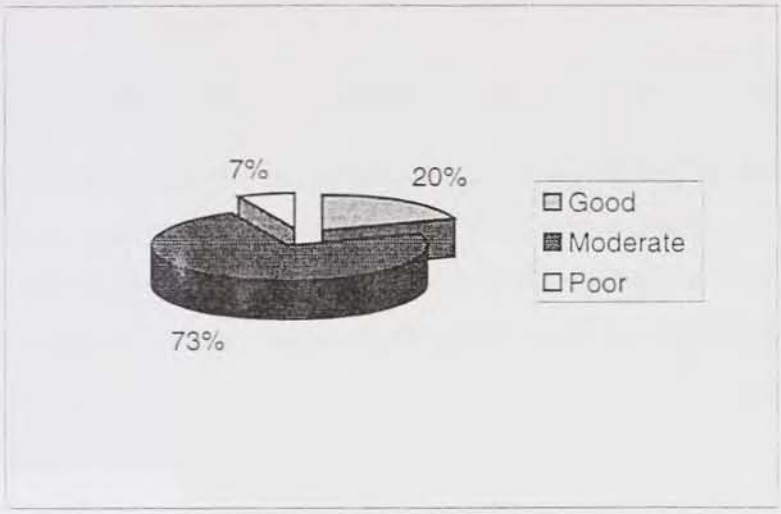


Figure 7 Assessment by government veterinary staff (n=15) of the performance of CAHW activities in southern Sudan, 2001

The government veterinary workers were asked to assess the work of community based animal health workers in the delivery of animal health services in the area. Of all the government workers who responded 73% considered the CAHW work as moderately good and 20 % even as good (Fig 7).

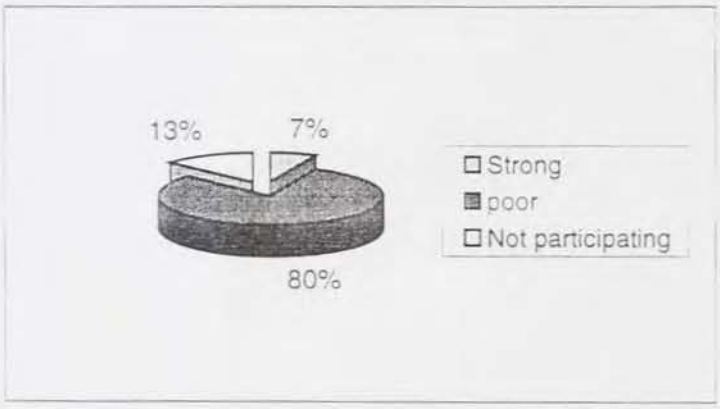


Figure 8 Assessment by government veterinary staff (n=15) of the participation of livestock owners in the implementation of PAHC programmes in southern Sudan, 2001

When assessing the participation of livestock owners in the implementation of PAHC in the study area. 80% of the government veterinary staff considered it poor, 13% said that livestock owners were not participating at all, while only 7% see livestock owners strongly participating

4.2.2. Structured questionnaire results of Ethiopia.

In Ethiopia the questionnaire was administered to government animal health assistants (AHAs) at the administrative zonal veterinary office of zone three, and to AHAs and animals health technicians (AHT) at the woreda veterinary clinics in Gewane and Telalak woredas in Afar Region. In North Wollo the questionnaire was administered to zonal veterinary officers and in the three woreda veterinary clinics of Kobo, Gubalafto and Habrou. All together 9 CAHWs and 22 government veterinary workers were interviewed

4.2.2.1. PAHC Ethiopia questionnaire results

Eight CAHWs where interviewed in Gewane and Telalak in Afar and only one CAHW was interviewed in north Wollo, as access to the other CAHWs was not possible due to muddy roads during the rainy season. Selection of respondents was based on convenience.

4.2.2.1.1. Description of CAHWs

Demographic Characteristics

Table 20 Demographic characteristics of CAHWs (n=9) in Afar and Amhara regions in Ethiopia 2001

Variable	Category	No. respondents	%
Age in years	19-26	2	22.2
	27-35	5	55.6
	36-50	2	22.2
Marriage	Yes	7	77.8
	No	2	22.2
Ownership of camels	Yes	5	55.6
	No	4	44.4
Ownership of cattle	Yes	8	88.9
	No	1	11.1
Ownership of sheep and goats	Yes	9	100
	No	0	0
Means of transport	On foot	8	88.9
	On bicycle	1	11.1
Other income sources	Livestock trade	1	11.1
	Nil	7	77.8
	Cultivation	1	11.1
Educational level	No school	6	66.7
	Primary	3	33.3
Other community engagement	Clan leader	1	11.1
	Nil	8	88.9

The demographic characteristics of CAHWs in terms of age, livestock ownership, means of transport, other income sources than livestock and educational level are given in Table 20. Among the respondents interviewed the majority (56%) were aged between 27 and 35 years, a high number is married. Almost all Ethiopian CAHWs have no additional source of income, however they all own livestock with at least small ruminants. In general, the education level is low. When asked whether CAHWs also play other community roles, only one was an acting clan leader.

Number of livestock owned by CAHWs

Table 21 Breakdown of Livestock population ownership for CAHWs in Ethiopia (n=8)

No animals owned	Frequency	%
Camel	No CAHWs	
Nil	4	44.4
1-10	1	11.1
11-20	2	22.2
20≤50	2	22.2
Cattle		
1–10	1	11.1
11–20	4	44.4
21≤50	3	33.3
51≤100	1	11.1
Sheep and goats		
1-10	2	22.2
11-20	0	0
20-30	3	33.3
30≤50	4	44.4

Categorising CAHWs according to the number of livestock owned, the majority own high numbers of cattle and sheep and goat while 44% do not own camels (Table 21)

4.2.2.1.2. CAHWs activities

Treatment and visits

Table 22 Frequency of weekly treatments, visits, number of days occupied by CAHW work, and distance moved by CAHWs (n=9) in Ethiopia, 2001

Variable	Mean	Median	Mode	Range	Minimum	Maximum
Treatment						
Camels	3.4	3	3	8	2	10
Cattle	6.1	6	7	8	2	10
Sheep and goats	19.4	20	20	30	10	40
Visits						
No. Herds	8.8	7	7	11	4	15
No Villages	3.9	4		5	1	7
No Camps	4.9	5	5	6	3	5
No Days busy	4	4	4	2	3	5
Distance covered (in km)	9.3	8		18	20	2

Weekly activities of the CAHW in Ethiopia were assessed, accordingly the CAHWs treated weekly on average 3.4 camels, 6.1 cattle, and 19.4 sheep and goats.

CAHW Potential

Table 23 Potential weekly CAHW coverage given sufficient drugs and a bicycle in Ethiopia, 2001

Variable	Mean	Median	Mode	Range	Minimum	Maximum
Potential coverage						
No. livestock	966.7	700	500	1800	200	2000
No. villages	5.6	6	8	9	1	10
No. herds	11.8	10	10	14	6	20
No. camps	6.7	7	7	14	1	15

The potential capacity to do the job if she/he is provided with sufficient drugs and a bicycle for transport was also assessed (Table 23). According to this self-assessment 966.7 livestock, 5.6 villages, 11.8 herds and 6.7 camps could be covered by a CAHW the study areas in Ethiopia

4.2.2.1.3. Animal health Services ranking

Table 24 Ranking by CAHWs (n=9) of livestock services preference in Ethiopia, 2001

Service	Rank	%
Government	2	75
CAHW	1	100
Private	3, 4	37.5
Traditional	3, 4	37.5

When the CAHWs were asked to rank the most preferred animal health services (Table 24), all CAHWs ranked CAHW as the most used and preferred delivery service. Three quarters of them think government services are the second preferred services. Private and traditional services were put in third place.

4.2.2.1.4 Ranking of diseases work and livestock production constraints

Diseases

Table 25 Disease Ranking by CAHWs(n=9) by zone in Ethiopia, 2001

Zone	Disease rank (1= most important disease to 5=least important disease)							
	CBPP	BQ	Anthrax	FMD	Diarrhea	Mange	Camel abscess	Ticks (*merzger*)
Afar	1		2	4,5		4	3	
North Wollo	4	2	1		5			3

In order to assess the disease situation in the study areas in Afar and Wollo the respondents were asked to rank the diseases their area by importance (Table 21). CBPP was considered the most important disease in Afar anthrax took the second place. Whereas in north Wollo area it was considered to be the most important followed by BQ.

Work constraints and animal production constraints

The CAHWs ranked lack of transport as the single most important constraint to carry out their CAHW work. Recognition from livestock owners was not a major cause although some livestock

owners are not very much co-operative. The supply of drugs and vaccines was erratic and therefore considered a number two constraint. In addition to these, other constraints including lack of enough profit, high drug prices and lack of knowledge to diagnose and treat new disease were also mentioned.

4.2.2.2. Government veterinary staff questionnaire results

Government veterinary staff was interviewed in both north Wollo and zone three and five in Afar state with a total of 22 respondents.

4.2.2.2.1. Animal health service preference

Table 26 Ranking of livestock and treatment service preference by government veterinary workers (n =22) in Ethiopia 2001

Service Provider	Ranks (1=most important, 5=least important)	
	Afar (n=11)	North Wollo (n=11)
Government	1,2	1
CAHW	3	2
Private		2,4
Traditional	4	3

The government veterinary workers in the study area (Table 26) assessed veterinary service delivery. Government service was considered to be the most preferred in both in Afar and North Wollo area while CAHW service was second and third in North Wollo and Afar respectively. In general the services provided by CAHWs were considered second most important. Private drug sources was also preferred in North Wollo but not mentioned in Afar.

4.2.2.2.2. Ranking of diseases, work, and livestock production constraints

Table 27 Disease ranking by government staffs (n=22) in zone three and five in Afar region and north Wollo zone in Amhara regional state, Ethiopia, 2001

Rank 1=most important, 5=least important	CBPP	BQ	Anthrax	Internal parasites	Pasteurolosis	External parasites	Footrot
Afar	1,2		3,4	3		3	4,5
North Wollo		1,3		2	4,5		

Blank space means the disease was not mentioned

The respondents ranked CBPP as disease number one and two in Afar while internal parasites, anthrax and external parasites took the third position (Table27). In North Wollo, BQ was ranked both number one and three while internal parasites was ranked number two. An equal number of respondents ranked BQ as number one as well as three in Wollo.

Table 28 Ranking of livestock production constraints by government veterinary workers (n=22) in Ethiopia, 2001

	Zone (Ranks 1=most important, 5=least important)	
	Afar (n=11)	North Wollo (n=11)
Disease	1	1
Water	2	3
Grazing	3,4	2
Raiding	4	
Theft	5	5

Disease was most important constraint both in Afar and north Wollo. Water was ranked second in Afar, while grazing constraint was ranked two in North Wollo raiding and theft was not major constraint although to some extent found in Afar.

Table 29 Work constraints as ranked by government workers (n=22) in Ethiopia, 2001

Ranks1=most important, 5=least important	Lack of drugs and vaccines	Lack of transport facility	Lack of incentive	Lack of cooperation from livestock owners	Bad roads
Afar	1	2	3	5	4
Woldiya	-	1,2	3	4,5	-

Work constraints were assessed in north Wollo and in zone three and four of Afar region by the government veterinary worker in Table (29). In Afar lack of drugs and vaccines was the major

problem followed by transport problems. Lack of incentives was ranked third, while bad roads and lack of co-operation from livestock owners was ranked fourth and fifth respectively.

4.2.2.2.3. Assessment of CAHW work and participation of livestock owners

CAHWs work by government veterinary staff

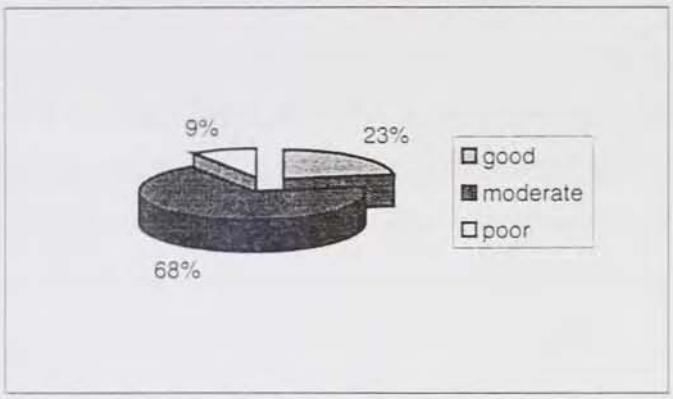


Figure 9 Assessment by government veterinary staff. (n=22) of the performance of community based animal health workers in Ethiopia, 2001

CAHW work in the delivery of animal health services was assessed by government workers (Fig 9) the majority considered the CAHW work as moderately good while 23% considered the performance of the CAHWs as good.

Participation of livestock owners

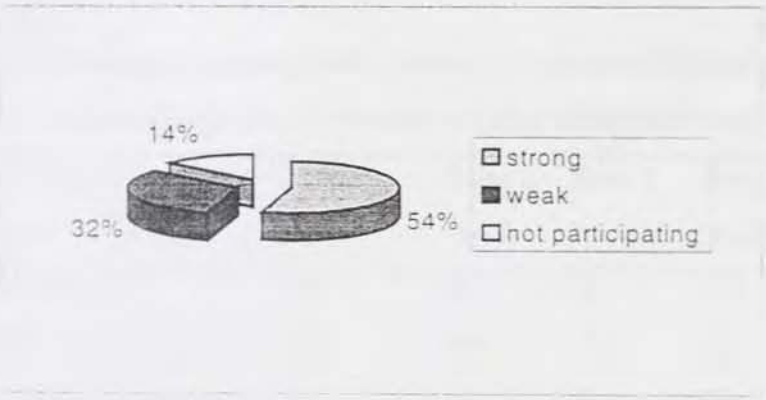


Figure 10 Assessment by government veterinary worker of the participation of livestock owners in the implementation of PAHC programmes in Ethiopia, 2001

The government veterinary workers also assessed the participation of the livestock owners in the implementation of PAHC (Fig.10) majority of the veterinary workers considered the livestock owners to be strongly participating.

4.3. Participatory appraisal results

Participatory appraisal interviews were administered to groups of livestock owners in the selected sites in southern Sudan and Ethiopia. The purpose of these interviews was to assess the impact of PAHC activities on disease control and animal production, the preferred animal health delivery system and the participation of livestock owners in the implementation of PAHC programmes. Each group was interviewed on 3 to 4 parameters taking about one and half to two hours. The number of the members per group ranged from 4-8.

4.3.1. Using proportional piling and preference

4.3.1.1. Southern Sudan

Group interviews in southern Sudan 90 groups interviews were conducted, of which 36.4% were men, 21.2% were women, 20.2% were adolescents, and 22.2% community leaders.

4.3.1.1.1. Animal health delivery services preference

Table 30 Scoring of animal health delivery by groups of livestock keepers (n=17) in the five animal health delivery zones in southern Sudan using preference proportional piling, 2001

Animal health delivery through	Zone 1 (n=4)	Zone 2 (n=3)	Zone 3 (n=4)	Zone 4 (n=3)	Zone 5 (n=3)	Total
Government	108	84	84	119	59	454
CAHW	138	96	37	42	60	373
Traditional treatments	35	36	58	45	34	208
Drugs from private sources	103	72	119	73	46	413
Prayer (*Nyagata*)				8		8
Witchcraft	9	21	3			33

Blank space means the indicator was not mentioned and therefore not scored in the area

The respondents groups were asked to mention the most preferred health services in the area, six types of services were identified and the informants were asked to score the most preferred service by the people in the area using preference proportional piling. As shown in Table 30 CAHW service received highest scores in zone 1, 2 and 5, government services in zone four, but private drug sources received the highest score in Zone 3. Traditional treatment, however, was scored low, witchcraft as well as prayer basically do not play a role. Summing up the total score of each service in all zones indicated that 30 % of the informant groups prefer government services, while 28% preferred private services. 25% choose CAHWs as the best option and 14% traditional service.

Table 31 Scoring of livestock disease change (before and after the establishment of PAHC) by livestock keepers at the four health delivery zones of Juba and Terekeka areas in southern Sudan using proportional piling, 2001

	Zone 1 (n=6)		Zone 2 (n=7)		Zone 3 (n=3)		Zone 5 (n=5)		Sur
	Before/ after	FC*	Before/ after	FC*	Before/ after	FC*	Before/ after	FC*	Before/ af
Nyanatek (RP)	174/51	-0,7	132/25	-0,8	114/8	-0,9	113/37	-0,7	533/121
Lokido/Abutpuo (CBPP)	135/86	-0,4	145/98	-0,3	70/39	-0,4	137/76	-0,5	434/299
Twan lo Juba (ECF)	61/270	3,4	40/146	2,7	46/82	0,8	20/113	4.6	167/611
Daat (FMD)	51/40	-0,2	46/31	-0,3	13/13	0	58/44	-0,2	168/128
Twan Lo liggi (BQ)	10/71	0,3	9/115	11,8	24/24	0	34/25	-0,3	77/235
Lodengelle ?	38/29	-0,6			10/10	0	11/20	0,8	59/59
Lobit/Luach (emaciation syndrome)	55/38	-0,3	24/0	-1			79/38	-0,5	79/38
Twan lo Yidin (PPR??)			0/15	∞	0/48	∞	0/75	∞	0/138
Lupupuri (Mange)	10/4	-0,6	53/32	-0,4	7/3	-0,6			70/39
Aternum (madness)	38/55	0,4	8/0	-1			27/19	-0,3	111/74
Nyongi durjo (Anthrax)	16/3	-0,8							16/3
Kolora (Infectious diarrhia sheep/goats)					22/19		38/25	-0.3	60/44
Jonga Ngui (HS)			21/10	-0,5					21/10
Jonga chom (flukes)			10/5	-0,5					10/5
Masudu (swelling-mastitis)	8/8	0							8/8
Amur (fever)							47/28	-0,4	47/28
Adony (three days sickness)							8/4	-0,5	8/4
Modok/Abut-nyin (blindness)							13/10	-0,2	13/10

FC= factor change, ∞= FC is infinity, ?=no agreed equivalent of scientifically known disease, ??=Symptoms similar to the scientific name

The scores for livestock disease changes given by groups of informants in zones 1, 2, 3, and 5 are summarised in Table 31. Many of the local disease names in zones 1, 2, 3, and 5 were the same or similar. From Table 31 it can be seen that RP, CBPP, ECF, emaciation syndrome (*tryps*) and FMD were considered the most important diseases in all the zones before the PAHC establishment. In the time after, RP, CBPP, and the emaciation syndrome have drastically gone down by a range of 30-90% in all the zones while ECF, BQ and "madness" increased (positive FC) in zone 1 and 2. In zone one RP, CBPP, mange, FMD and ECF were important before PAHC establishment, but in the `after` situation ECF and BQ became the most important ones. In zone three RP, CBPP, ECF, BQ, and diarrhoea were highly scored in the `before´ situation but in the `after` situation again ECF and *Loyidin* (PPR) became the most important diseases. In zone 4, RP, CBPP, mange decreased but FMD, BQ and *Lodengelle* did not change. In case of, PPR the FC increased infinitely as the disease was not available before. In general except for ECF, BQ, and PPR which are considered as new diseases there is substantial decrease in livestock disease after the establishment of PAHC.

Table 32 Scoring of livestock disease changes (before and after the establishment of PAHC) by livestock keepers in Kapoeta in southern Sudan using proportional piling, 2001

	Before/after (n=4)	FC
Nyechoke (RP)	13/130	0,9
Louko (CBPP)	72/40	-0,8
Lowath (BQ)	14/7	-1,0
Nyetula (sudden death HS?)	20/17	-0,2
Lokoit (emaciation syndrome)	27/19	-0,4
Nyekalokan (Anthrax)	47/41	-0,1
Nyemitina (mange)	7/7	0
Lopid (Anaplasmosis)	25/22	-0.1
Naiidid (CCPP)	52/51	-1

In Kapoeta area, nine disease entities were identified out of which RP was considered the most important disease after the establishment of the primary animal health project, increasing drastically with FC of 0,9 (Table32). CBPP was considered the most important before but substantially reduced after PAHC introduction. Except for RP there was improvement in the disease situation at various degrees.

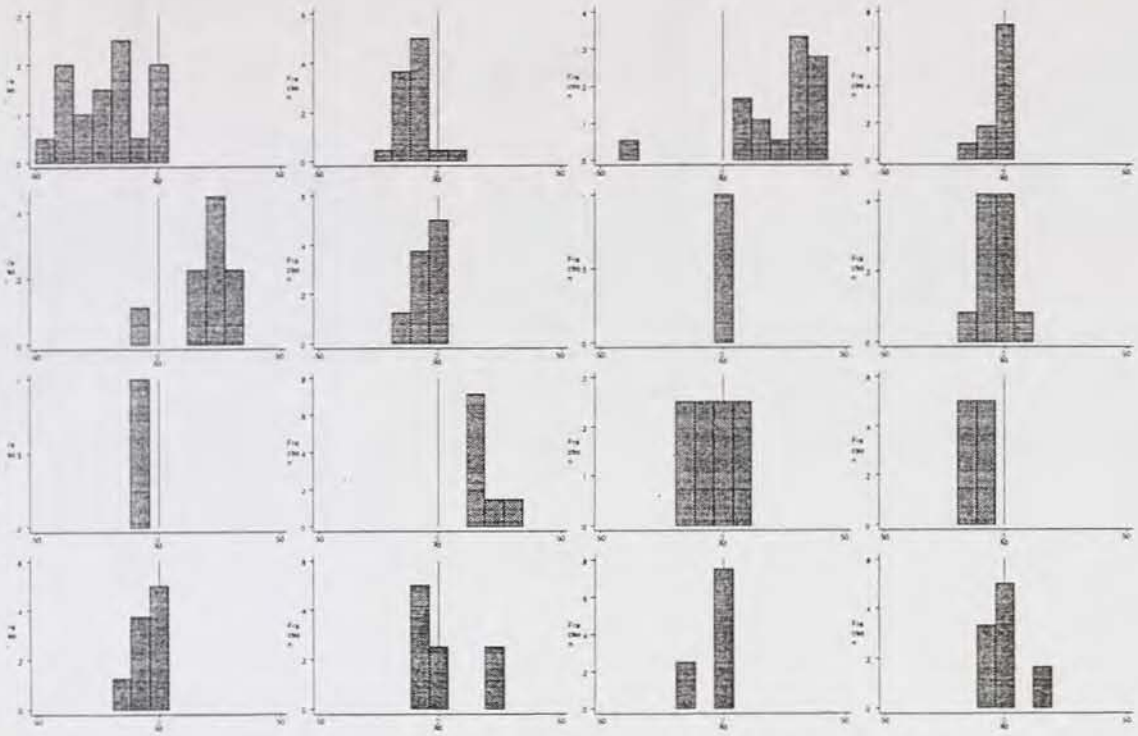


Figure 11 Distribution of disease frequency changes as determined by 'before and after' proportional piling with groups of informants, southern Sudan, 2001

First row (from left to right):
RP(min [Xd]–45;max [Xd] 1), **CBPP**(min [Xd]–20;max[Xd]10); **ECF** min[Xd]–41max 40); **FMD**(min -13[Xd]–45;max [Xd]0);

Second row (from left to right)

BQ(min [Xd]–7;max [Xd] 33), **HS** (min [Xd]–12;max [Xd] 3), **CCPP**(min [Xd]–2;max [Xd]1) **TRP** (min [Xd]–15;max [Xd]9)

Third row (from left to right)

3D(min [Xd]–4;max [Xd] 0) **PPR** (min [Xd]0); max [Xd]30) **ANTHRAX** (min [Xd]–13;max [Xd]5) **FLUK**((min [Xd]–14;max [Xd]0)

Forth row (from left to right)

MB(min [Xd]–12;max [Xd]2) **KOLO** (min [Xd]–7;max [Xd]20), **ANAP** (min [Xd]–14;max [Xd]0)

ATER(min [Xd]–8;max [Xd]17)

Fifth row (from left to right)

BL(min [Xd]–3;max [Xd]0) **AM**(min [Xd]–10;max [Xd] (min [Xd]–45; max [Xd] (min [Xd]–45;max [Xd] (min [Xd]–45;max [Xd]

The differences between the before and after scores of sixteen diseases were plotted in (Fig .11) RP, FMD and MB 3 D and flukes are completely distributed to the left (negative factor change), i.e. becoming less important in the study areas after the establishment of PAHC ECF and PPR were completely distributed to the right positive side of while BQ was mainly distributed to the right (positive difference), indicating a positive factor change i.e. more important after the establishment of PAHC.

Table 33 Scoring of benefits received from healthy animals by informants in the five zones where primary animal health programmes are being implemented in southern Sudan by using proportional piling, 2001.

Indicator	Zone 1 (n=3)		Zone 2 (n=3)		Zone 3 (n=4)		Zone 4 (n=4)		Zone 5 (n=5)		Total	
	Before/ after	FC*	Before/ after	FC*	Before/ after	FC*	Before/ after	FC*	Before/ after	FC*	Before/ after	**Summary FC***
Dowry payment	55/80	0,5	64/88	0,4	90/144	0,6	93/217	1,3	125/178	0,4	427/707	0,7
Milk for children	86/60	-0,3	88/122	0,4	83/91	0,1	94/104	0,1	128/122	-0,1	479/499	0,1
Sale of animals and by-products	57/91	0,6	38/59	0,6	49/102	1,1	34/66	0,9	79/126	0,6	257/444	0,7
Payment of loans and fines	12/16	0,3	13/20	0,5	11/26	1,4			79/64	0,2	135/146	0,1
Ghee	26/22	-0,2	13/10	-0,2	9/9	0,0			10/10	0,0	58/51	-0,1
Meat for home use	5/6	0,2	9/9	0,0					15/9	-0,4	29/24	-0,2
Livestock as a bank/reserve	36/45	0,3	10/30	2,0	48/50	0,04	94/105	0,1			188/230	0,2
Employment source	14/19	0,4			11/14	0,3					25/33	0,3
Gift to kin			24/30	0,3	18/30	0,7	30/20	-0,3	10/8	-0,2	52/68	0,2
Performance of traditional rites					56/45	-0,2	6/8	0,3	89/68	-0.2	151/121	0,2
Power							28/37	0,3			28/37	0,3
Blood			17/13	-0,2							17/13	-0,2

*FC = factor change

Blank space means the indicator was not mentioned/scored

Important benefits obtained from keeping healthy livestock were mentioned and scored by informants in the study area in southern Sudan (Table 33). Generally, dowry payment (defined as livestock and or it's by-products given to the family of a bride as an appreciation in the event of marriage).as well as sales of livestock and livestock products in all the zones increased from the 'before' situation. With regards to milk for children there was an increased only in zones 3 and 4 but decreased in zones 1and 2. Ghee decreased in nearly all the zones.

Table 34 Scoring of milk uses in the five zones of southern Sudan by groups of livestock owners using proportional piling, 2

Indicator	Zone 1 (n =3)		Zone 2 (n=3)		Zone 3 (n=2)		Zone 4 (n = 3)		Zone 5 (n=5)		Total	
	Before/after	FC*	Before/after	FC*	Before/after	FC*	Before/after	FC*	Before/after	FC*	Before/after	FC*
Milk for sale	53/230	3,3	25/23	-0,1	111/92	-1.5	35/42	1,7	93/90	-0,03	317/477	0,5
Milk for children	114/72	-0,4	5/30	6	23/58	0.2	13/35	0,2	28/94	2,4	183/294	0,6
Milk for ghee making	58/28	-0,5	33/18	-0,5	75/68	-0.1	60/52	-0,1	71/6	-0,9	297/172	-0,7
Milk for visitors	61/71	0,2	25/25	0	40/48	0.2	15/36	1,4	55/55	0	196/235	0,2
Milk for km	50/40	-0,2	12/5	-0,6					29/15	-0,5	91/60	-0,3
Milk for poor	36/31	-0,1			23/8	-0.7	19/29	0,2	19/39	-1,1	97/107	0,1
Fresh milk for family							45/31	-0,3			45/31	-0,3
Milk for cheese making							10/12	0,3			10/12	0,2

*FC= factor change

Blank space means that the indicator was not mentioned

Result of uses for milk scored for before and after the establishment of PAHC in the study area (Table 34), there was an increase in milk for sale in zone 1 and 4, while in zones 2, 4 and 5 there was a decrease. Milk for children increased in all the zones except for zone 1, the highest change was observed in zone two with a positive factor change (FC) of 6. Milk for ghee making decreased throughout the zones with the lowest in zone 5. Milk for visitors increased in zones 1, 3 and 4, but did not change in zone 2 and 5. Milk for kin and for the poor decreased except in zone 4. Fresh milk for family and cheese making were indicators only mentioned in zone 4. In general the trend was similar in all the zones with an increase on one or two uses.

4.3.1.2. Participatory appraisal results in Ethiopia

A total of 30 PA group interviews were conducted specifically 18 interviews (60%) involved with men groups, 4 (13.3%) were women, 4 (13.3%) involving adolescents, 3(10%) comprised of community leaders and 1 (3.3%) was general comprising of members from the four categories.

4.3 1 2 1 Animal health delivery methods

Table 35 Scoring of animal health delivery by livestock keepers in Ethiopia using preference proportional piling, 2001

Animal health delivery through	Telalak (n=1)	Gewane (n=5)	Kobo (n=1)*	Total
Government(*Gibrina*)	45	128	57	230
CAHW(*Yegebre Hakim)*	5	173	32	210
Traditional treatments	30	44	11	85
Private drugs sources *(Yegil)*	20	85	0	105
Prayer *(Dua)*		71		71

*= non stratified respondent group

Six animal health delivery systems were identified by informants in the three study areas in Ethiopia (Table 35) CAHW services are the most preferred services in Gewane area. However, in Telalak and Kobo informants consider government services to be the best followed by CAHW services given the second place in Kobo, and traditional treatments were considered second in Telalak.

4.3 1 2 2 Livestock disease change

Table 36 Scoring of livestock disease changes by livestock owners before and after the establishment of PAHC in Telalak and Gewane woredas (districts) in Afar region and Kobo woreda in Amhara region by using 'before and after proportional piling, 2001

Disease	Gewane		Telalak		Kobo		Total	
	Before/ after (n=6)	FC*	Before/ after (n=2)	FC*	Before/ after (n=1)*	FC*	Before/ after	FC*
Masangale/gublo (CBPP)	145/76	-0,5	24/18	-0,3			169/94	-0,4
Gano/Abasanga (Anthrax)	61/49	-0,2	15/11	-0,3	28/21	-0,3	104/81	-0,2
Degahabe (RP)			14/0	-1,0			14/0	-1
Abeb (FMD)	63/69	0,1	17/55	2,2			80/124	0,6
Haraite/Abagroba (BQ)	16/10	-0,4			25/13	-0,5	41/23	-0,4
Andero (Pasteurolosis)	73/62	-0,2					73/62	-0,2
Ginni (stiff neck/back)	39/36	-0,6					39/36	-0,1
Galidale (camel abscess)	41/31	-0,2					41/31	-0,2
Sole (cattle tryps)	41/30	-0,3	21/10	-0,5			62/40	-0,4
Indahe (helminths)			24/18	-0.3			24/18	-0,3
Geramole (camel tryps)	20/24	0,2	56/27	-0,5			56/27	-0,5
Intifue?			33/18	-0,5			33/18	-0,5
Ikak (Mange)					9/4	-0,6	9/4	-0,6
Tekmat (Diarrhoea)					18/6	-2	18/6	-0,7
Mezger (ticks)					20/8	-0,6	20/8	-0,6
*Boshet***	29/18	-0,4					29/18	-0,4
Kahoo (Pneumonia in camel)	40/38	-0,1					40/38	-0,1

*= non stratified respondent group

**='Bashet' glance at the stable if one animal is left (new disease mainly in sheep and less in goats, characterized by diarrhoea, respiratory symptoms and very high mortality)

Livestock disease changes were score by groups of informants in the study areas in Ethiopia Table 36. CBPP anthrax, pasteurolosis, FMD and trypanosomosis were highly score before the establishment of the PAHC, CBPP and anthrax substantially decreased. Generally all diseases decreased except FMD after the establishment of the PAHC.

4.3.1.2.3. Changes of benefits derived from livestock.

Table 37 Scoring by livestock owners of changes in benefits obtained from healthy animals in Telalak and Gewane woredas (districts) in Afar region and Kobo woredas in Amhara region using proportional piling, 2001

	Telalak (n=3)		Gewane (n=5)		Kobo (n=1)*		Total	Total FC
	Before /after	FC	Before/ after	FC	Before/ after	FC	Before/ after	Befor /after
Milk *(Han/watat)*	69/41	-0,4	176/143	-0,2	17/20	0,2	262/203	-0,2
Sale of animals and products (*Telemo/shiaji*)	28/92	2,3	73/140	0,9	25/39	0,6	126/271	1,2
Skins/hides (*Galabo)*	20/21	0,1	48/33	-0,3			68/54	-0,2
Ghee (*Subah*)	58/25	-0,6	131/59	-0,6			71/84	-0,2
Performance of traditional rites	7/9	0,3	48/51	0,1			55/60	0,1
Meat for home use (*Hado/cigaa*)	14/15	-0,2	14/15	0,1	7/10	0,4	35/40	0,1
Transport (*Araho/magwagwaj)*	45/39	-0,1	35/25	-0,3	10/20	1.0	45/42	-0,1
Animal as bank/reserve			24/23	0,04			24/23	-0,01
Ox-Ploughing (*Maraji*)					41/46	0,1	41/46	0,1

*= non stratified respondent group
Blank space means the indicator was not mentioned and therefore not scored in the area

The results of scoring change Ethiopia in benefits obtained from healthy animals before and after the establishment of PAHC in three districts in the study area in are presented (Table37). In Kobo all the indicators mentioned increased with the highest scores for transport. Ox-ploughing was the highest scored variables in Kobo both in the 'before and after' situation although the change was small compared to the other indicators. In Gewane and Telalak milk for children, animals for sale and ghee making were more important benefit but the changes differed; for instance, milk for children and ghee decreased in both areas while sale of livestock increased.

4.3.1.2.4. Milk uses

Table 38 Scoring of milk uses by livestock owners in Gewane and Telalak woredas of Afar Regional state using before and after proportional piling, 200

	Telalak (n=2)		Gewane (n=2)		Total	
	Before/ after	FC	Before/ after	FC	Before /after	Summary FC
Milk for sale (*Lemo/Telemo*)	12/42	2,5	27/60	1,2	39/102	1,6
Milk for children	26/24	-0,1	25/21	-0,2	51/45	-0,1
Ghee making (*Subah*)	63/41	-0,4	51/22	-0,6	114/63	-0,5
Fresh milk for family consumption	40/32	-0,2	21/19	-0,1	61/51	0,2
Milk for visitors	19/19	0	39/32	-0,2	39/51	0,3
Milk for cosmetics making (*Suguti*)	24/24	0			24/24	0
Cheese making (*Mutuk*)	16/16	0	13/8	-0,4	29/24	-0,2
Milk for poor			25/20	-0,2	25/20	-0,2

Blank space means the indicator was not mentioned and therefore not scored in the area

Eight important uses for milk were identified and scored by informants in the study area in Ethiopia. Table 38. In Telalak only milk for sale increased after the establishment of the PAHC in the area whereas milk for children, for ghee making, and for the family decreased, milk for visitors, cosmetics and cheese making did not increase from the quantity before the establishment of PAHC. In Gewane area the only increase noted was in milk for sale, other uses decreased. The use of milk for cosmetics was explained as extracting milk fat for hair dressing and as body lotion especially for the young men and girls.

Major concerns on the decrease in milk uses and benefits were expressed during the interview by the informants, therefore, further investigation were carried out. According to the informants this decrease was attributed to other factors such as drought and insecurity. Two informant groups one each from Gewane and Telalak were asked to list the reasons for lack of increase of milk despite availability of health service in the areas. Four main reasons were identified (Fig.12)

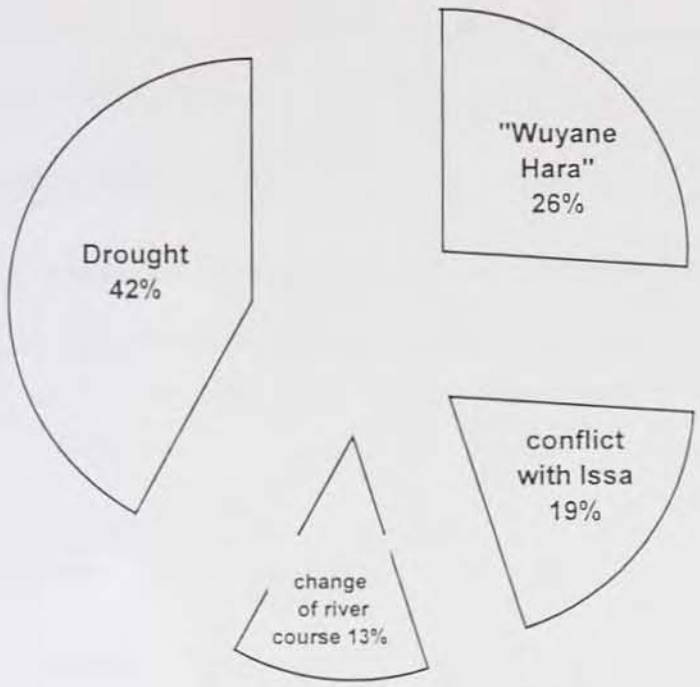


Figure 12 Reasons for lack of increase of milk in livestock in Afar as given by informants in Gewane and Telalak woredas, 2001.

As displayed in Fig 12 drought is considered the single most important factors followed by '*Wuyane Hara*' (*Prosophis juliflora*), a weed tree not browsed by livestock except for a few seed pods, which invaded and superseded the indigenous trees. Conflict with the neighbouring Issa tribe prevented some grazing area from being used. Furthermore a change in the course of the River Awash and other small streams was observed causing destruction of grazing land through sand deposits. A further effect is that those rich grazing grounds, which used to be near the river site now are waterless.

4.3.2. Results measuring community participation in primary animals health activities using semi-structured questionnaires

Community participation is an essential PAHC feature in order to develop the capacity of livestock owners to manage the delivery of animal health services themselves. One aim of this study was to assess the level of participation by communities in the PAHC programmes in southern Sudan and Ethiopia.

Active data were collected through semi-structured interviews with project beneficiaries, project staff, and government veterinary staff, passive data from project monitoring and evaluation reports. These data were then compared to the seven types of community participation (Table 2). Indicators common to PAHC programme implementation were selected by the investigator, to measure participation parameters.

4.3.2.1. Southern Sudan

4.3.2.1.1. Community participation according to project cycle

Table 39 Levels of community participation according to the project cycle in the implementation of primary animal health programme in selected areas of southern Sudan, 2001.

Factor	Indicators	Result			
		Zone 1	Zone 3	Zone 2 and 5	Zone 4
Needs assessment	Problem identification Methods	Meetings, w/shop with com. reps. CD, PRA	Meetings, w/shop with com. reps. CD, PRA	Meetings, w/shops with com. reps CD meetings, PRA	Meetings, w/shops with com. reps. CD meetings, PRA
	Prioritisation Method	Problem/disease ranking with com.	Problem/disease ranking with com	Problem/disease ranking with com.	Problem/disease ranking with com.
Planning and design	Sets selection criteria	EC with com reps	EC with com reps	EC with com reps	GO with com leaders
	Who are involved in planning	EC and staff and CSM in w/shop, meetings	EC and staff in w/shop, meetings	EC and staff in w/shop, meetings	GO staff and donors
Implementation	Who selects CAHWs	Com. Com leader	Com. Com leader	Com. Com leader	Com leader
	Major decisions on DRF	EC Donor	EC Donor	EC Donors	GO Donors

Com. reps= community representatives
CD= Community dialogue
EC= Executive committee
GO= governmental organisation
Staff=NGO staff
Com leaders = community leaders (clan leaders, traditional chiefs and camp leaders)

Indicators common to PAHC activities were used to describe the level of participation Table 39. in the project cycle. The communities studied participated well in the needs assessment and prioritisation of objectives. However, in the planning stage of the PAHC programme mainly community representatives were involved. However in zone 4 the planning to the monitoring communities were hardly involved.

Generally, there was a high community participation of in the needs assessment but as the project cycle continues participation decreases with being lowest in monitoring and evaluation.

4.3.2.1.2. Implementation factors

Table 40 Level of community participation according to factors in the implementation of primary animal health programme in southern Sudan, 2001

Parameters	Indicators	Results			
		Zone 1	Zone 3	Zone 2 and 5	Zone 4
Management	Decision on drugs purchases	EC/staff com. reps	EC/staff com. reps	EC/NGO staff com.reps	GO staff
	Pricing of drugs	EC/staff com. reps. LDCC	EC/staff com. reps. LDCC	EC/staff/com.reps. LDCC	GO/staff LDCC
Leadership	Committees	E.C, VDCs* Traditional chiefs	Nil	EC VDCs* Traditional chiefs	Nil
	Decision process	EC. Meetings CSM meetings W/S Com.reps.	EC/staff meetings w/shop with Com leaders Com reps	E.C/Staff. Meetings W/Shop with com.reps CD LDCC	GO CD com. leader LDCC
Organisation	Membership Obligations	CSM (shares and milk supply)	Non	Non	Non
	Process of choosing committees	Elections	Nil	Elections	Nil
Resources Mobilisation	Decision on use of revolving drug fund	EC/staff CSM Donors	EC/staff Donors	EC/staff/Donors	GO/Donors
	Decision to replace CAHW	EC/CSM	NA	EC	GO Com. leader
	Decision to train more CAHWs	EC Donors	NA	EC Donors	EC Donors

Com. reps=selected community representatives
CD= Community dialogue
EC= Executive committee
GO= governmental organisation
Staff=NGO staff
CSM=cooperative society members
VDCs*= village development committee
NA = not applicable

When looking at community involvement in project implementation broken down to certain parameters (Table 40) the communities were only represented in major management decisions like purchase and pricing of drugs. With regards to leadership communities participated through committee formations only in three zones (1, 3, 2 and 5). Such executive committees who are always elected play a greater role in the affairs of the programmes in all zones except zone four.

However in zone four most of the implementation process did not involve communities neither their representatives.

When comparing our findings to the Pretty 1994 and Cornwall 1996 Table 2 the PAHC programmes in zone 1, 2 and 5 are at the level of "functional Participation" (Co-operation) because donors still do have to some extend control over these projects. However zone 4 compares well with "participation by consultation" the lowest level of participation.

4.3.2.2. Ethiopia

4.3.2.2.1. Project cycle

Table 41 Levels of community participation according to the project cycle in the implementation of primary animal health programme in selected areas in Ethiopia, 2001.

Parameters	Indicators	Results	
		Gewane	North Wollo
Needs assessment	Problem identification methods	Meetings, w/shop With com. reps. CD , PRA	Meetings/w/shops with com. reps CD meetings
	Prioritisation method	Problem/disease ranking with com.	Problem/disease ranking with com
Planning and design	Who are involved in Planning	Com. reps. Staff. GO staff	staff AHMC. GO staff
	Who sets selection criteria	Com. reps. Staff. GO staff	staff AHMC. GO staff
Implementation	Who selects CAHWs	Com.	Com.
	Supervision of CAHWs	NGO staff. GO staff com leaders	AHMC. GO staff
Monitoring evaluation and Impact assessment	Who designs methods	Staff. GO staff Com reps	AHMC. GO staff
	Method	Staff. GO staff. Com reps.	staff. GO staff. Com reps External evaluator

Com. reps= selected community representatives
CD= Community dialogue
EC= Executive committee
GO= governmental organisation
Staff=NGO staff
VDCs*= village development committee
AHMC= animal management committee

Also PAHCs programmes were assessed for the participation of the communities in the project cycle, Table 41. In general Communities highly participated in problem identification and prioritisation. From planning and implementation in Gewane upto monitoring in except the

selection of CAHWs communities were only represented. However, in North Wollo committees as well as selected community representatives participated in the stages from planning to implementation and monitoring.

4.3.2.2.2. Implementation factors

Table 42 Level of community participation according to factors in the implementation of primary animal health programme in Ethiopia, 2001

Parameters	Indicators	Results Gewane	North Wollo
Management	Decision on purchases (drugs)	Staff	GO staff, AHMC
	Pricing (drugs)	Staff	GO staff AHMC
Leadership	Committees formed	Nil	AHMC
	Decision process	Meetings, w/shop staff, GO staff Com. reps	Meetings, w/shop staff, GO staff Com. reps
Organisation	Membership obligations	Nil	Nil
	Process of choosing committees	Nil	Election
Resources mobilisation	Decision on the use of DRF	Staff	GO staff AHMC
	Decision to replace a CAHW	NA	NA
	Decisions to train more CAHWs	Staff, Com	staff, GO,

Com. reps= community representatives
CD= Community dialogue
EC= Executive committee
GO= governmental organisation
Staff=NGO staff
VDCs*= village development committee
NA=Not applicabe

When looking at the participation parameters as shown in Table 42. The communities in North Wollo the participated through committees but with remarkable government involvement in decision making on the day-to-day activities. In Gewane NGO staff took the major role decision making and also no committee existed for the implementation of the project.

When comparing our results to the Pretty (1994) and Cornwall (1996) Table the Gewane project is seen at the level of Participation for material incentive". The North Wollo project however fits well at a higher level of "Functional participation" Co-operation.

5. DISCUSSIONS

5.1. Southern Sudan

5.1.1. Vaccinations trends in southern Sudan

During the period from 1976 to 1981 there were intensified livestock vaccination activities carried out by the government veterinary services in southern Sudan with external support from international donors whereas between 1981 and 1983 there were no activity reports due to the fact that southern Sudan was divided into more administrative states in which new veterinary administrations had to be set up. In Equatoria State for instance, proper vaccination started in 1985 peaked 1985/86 but went down to its lowest level in 1987/88 the resulting vaccination trends were, thus, fluctuating both during the time of one southern Sudan administration and the Equatoria administration. This cyclic trend reflects instability of animal health services delivery although there was apparent peace and international donor support in the area.

With the re-emergence of civil strife in southern Sudan in 1983 government animal health services which did exist deteriorated and virtually ceased to function. Private animal health services yet did not exist except for a few illegal drug vendors and human drug pharmacies selling limited quantities of livestock drugs. Livestock owners had no option left to treat their stocks other than to apply traditional treatment methods, which are known to have limited effects especially in disease outbreak situations.

Due to this lack of government veterinary services ACCOMPLISH was the first organisation to start the PAHC programme in Terekeka district before the war and it continued to provide services even during the insecure time in the district. This programme as a major project component of ACCOMPLISH became one of the most sustainable (Lo'diyo, 1998) and was used as an entry point for starting other projects like immunisation of children (Majok and Schwabe, 1996).

5.1.2. CAHWs and their activities in southern Sudan

PAHC principles require farmers to participate at all stages of a programme in the delivery of services to their livestock. Farmers select from among themselves candidates to be trained as CAHWs and eventually to pay for the services. The continuation of CAHW work, depends on many factors that include selection of the right candidate, some material benefits and status, continuous supply of inputs like drugs and equipment, follow up by the training institutions, and formation of organisations within the beneficiary community to supervise and support its CAHW.

The results of the study show varying percentages of CAHWs that are still active in 2001. In Liggi where no refresher training was done at all, the least active numbers of CAHW were found, and in Buya/Didinga only two were retrained. UNICEF directly supervised the Liggi programme as there was no particular NGO or CBO that had been assigned, however, lack of retraining and close supervision are apparently associated. The Buya/Didinga CAHWs were trained in Kapoeta town because their home area could not be accessed by the training organisation due to insecurity, thus, supervision by the organisation was not possible. In Terekeka/Tali where in 1985 the first CAHWs training was conducted a low percentage of active CAHWs was found. The high drop-out rate was said to be due to policy changes in the organisation, where each individual CAHW had then to generate benefit for Her/himself from the profit of drugs sale and services alone. Previously, these CAHWs were paid incentives from ACCOMPLISH and provided some "food for work" as these CAHWs were displaced from their home areas. Some of the drop-outs were among those interviewed in this study; they reported that they, however, continued their CAHW work by getting their needed drugs from private pharmacies and other sources, and thus, do not any further report to their training/supervising organisation. Assessment carried out by the respective organisations did not follow a uniform methodology. In some places it did not reflect the actual situation on the ground. For instance, observed during the field visits it was that a number of CAHWs in Mongalla, Kapoeta and Terekeka did not have any drugs with them in the field, would they had been properly supervised their drug stocks should have been replenished.

In Equatoria states, training funds and initial drug/vaccine start-up money were mainly provided by UNICEF/OLS and Oxfam. However, different regulations from the supervising/training organisations exist for the distribution of supplies to the CAHWs. For example, NICODO regulations require livestock owners to buy the drug directly from the organisation's office and

the CAHW is only called to administer the drug. Thus, she/he receives incentives for his/her service from the profit accumulated from the drug sale of the organisation and not from direct sale of drugs to the farmers. This regulation was put in place when NICODO was serving a small number of co-operative society members in Juba vicinity but now as a CBO with a wider area of operation with an outreach of 75 km and with greater number of CAHWs things became more difficult. Under this arrangement the CAHW becomes more of a project staff than remaining a normal community member, and, furthermore it does not make the CAHWs treat more animals and sell more drugs as long as she/he receives her/his incentives regardless of the quantities of drugs sold. An example of a system where CAHWs receive a certain percentage of his/her turnover was described for the BAHS in Malawi (Hüttner, 2000). Another way is that CAHWs generate their income directly from the profit of selling drugs which were given as a capital in the North Wollo PAHC programme (Berhanu, 1998). The adoption of such a system in Sudan would be more appropriate.

Although NICODO is a community organisation it does not make use of the sub-communities structures as beneficiaries should supervise the CAHWs. The organisation's future plans for the formation of village level committees are enclosed in Annex 5.

The fear that a trained CAHW runs away with drugs was common amongst the supervising organisations. In a case where there was no committee in the beneficiary community who nominated the CAHW or signed a social contract between the supervising organisation and the beneficiary communities, it would be difficult to trace such a run-away. The need to form veterinary co-ordinating committees (VCC) or village development committees (VDCs) in the future is indicated in the ACCOMPLISH and NICODO areas proposed future organograms (Annex 5 and 6).

In the supervising organisations policies and regulations for the building-up of a drug revolving fund through drugs sales exist. Using such a fund for the purchase of further drugs is expected to make these organisations more self-reliant. Some strategies, however, put more emphasis on the building of the fund than on the sustainability of the CAHWs themselves. Though ACCOMPLISH and NICODO through the years have established remarkable revolving funds (assumed to range from ten to twenty thousand US dollars) the CAHW drop-out rate is still high as shown.

Drug distribution policies and regulations, the formation of grass-root village organisations, drug revolving fund (DRF) rules and regulations play great role for the sustainablility of the CAHW system. Munyua (2001) identified similar problems when dealing with CAHWs and DRF during his assessment of the upper Nile and Western Kordofan PAHC programmes; he proposed models which place more responsibilities on to the communities the current and proposed structure is found in Annex 4. Berhanu (1998) in his assessment of the North Wollo of Save the Children Fund PAHC programme proposed that the relationship between CAHW and the drug provider should simply one as between buyers and sellers but the supervision should stay with the animal health management committee (AHMC) in the respective community. This study confirmed that the CAHW in fact is concerned on how to raise his/her personal income and how to improve the general organisation in the PAHC programme i.e. he/she only cares not for him/herself but also for community improvement.

The study has shown that CAHW and government veterinary services delivery as well as private services exist which all were considered to be important, however, at varying degrees. Private sources for livestock drugs include human drug pharmacies and stores as well as some individuals who usually sell antibiotics, antihelmenthics and trypanocidal drugs to livestock owners. Although the private services are not well organised and in some cases in the hands of non-professionals, they proved to be important in the study area. The main reason given by livestock owners for a higher preference for private drug sources was that it was always available and easily obtained without much restriction and bureaucracy compared to other sources. A similar finding was reported by (Catley *et al.*, 1997) while conducting a situation analysis on animal health services in the Somali National Regional State in Ethiopia.

This study showed that CAHW work was acceptable to the government veterinary services also as shown by and the employment of two CAHWs in Juba and another two in Kapoeta veterinary offices, which is another prove of the recognition of the skills of CAHWs.

5.1.3. Work constraints

In general there was agreement between the government veterinary workers and the CAHWs of the ranking of diseases in the study areas whereby ECF was ranked most important followed by CBPP. ECF was said to have been newly introduced from the border areas with Uganda to the study areas where cattle are naive to the disease. Treatment proved to be less successful, and

drugs such as *Butalex*® were said to be ineffective and/or expensive. Under-dosing and difficulties in recognising the disease symptoms at early stages by farmers, a prerequisite for early treatment, were reported as the main reasons for the ineffectiveness of ECF drugs in the area (Mogga *et al.*, 1999).

The study has also shown that lack of drugs as well as transport are the major constraints PAHC programmes are facing in the study area. However this is also related to the different policies for revolving drug funds and drug distribution of the supervising organisation resulting in delays in delivery or lack of distribution to certain areas.

5.1.4. Primary animal health care coverage

The idea of PAHC is to be auxiliary to the government services and on one hand and to provide services in areas not reached by the government service on the other hand. This study showed that a comparatively high number of livestock and a large area is now covered by the CAHWs and provided substantial animal health services compared to the time when services were erratic or not existing at all. It could be demonstrated that coverage would improve if enhanced by continuos drug supply and provision of appropriate transport means, although the weekly workload of 4.8 days is comparatively high considering the part time nature of the job but similar to results from Northern Malawi (Hüttner, 2000).

Selecting the right candidate for being trained as CAHW is crucial issue in any PAHC programme. Different selection criteria and procedures have been set up by different programmes such as livestock ownership, age and level of education. Most projects or programmes consider livestock ownership to be one of the most important criteria as the newly acquired skills are considered to be an additional incentive for a CAHWs to treat his/her own animals. Being a pastoralist or a farmer him/herself would not think of looking for other means of living such as a job in the town after the training. Livestock is also considered as collateral for the community properties like drugs, bicycles and equipment he/she is holding. The study looked at the demographics of the primary animal health workers. All CAHWs possess animals, at least some small ruminants. Most of the workers were between 27 and 35 years of age. This contrasts with the finding in BAHS programme in northern Malawi (Hüttner, 2000) where most workers were at the age of 39. The substantial lower age of our CAHWs could be due to the production system, i.e. transhumant systems in which usually the family is divided during certain periods of the year.

where mostly the younger members move with larger herds to look for grazing areas, while the older and children remain behind with a smaller herd. This gives an opportunity to the younger CAHW to serve a larger livestock population.

5.1.5. Impact of PAHC on livestock diseases

Diseases addressed by the PAHC programmes in the study area included the vaccination against Rinderpest, HS, BQ and CBPP, as well as treatment of tick-borne diseases, trypanosomosis, internal and external parasites. Among the factors that affect animal health in the study area are the lack of continuos supply of drugs and their quality, the livestock density in certain areas as well as environmental factors like lack of rains and insecurity, which forces the livestock movement to new areas posing the increased risk of getting new diseases. This study showed that livestock owners are no longer afraid of diseases such as RP, CBPP and mange which ranked high before the PAHC establishment and are now under control in most areas. However, in Kapoeta (zone 4) rumours of RP were circulating last in November 2000 making livestock owners more afraid. This area is still considered endemic to Rinderpest (Roeder, 2000).

Some diseases such as BQ and "madness syndrome", are seen as diseases, which increased after the establishment of PAHC, whereas ECF and PPR were reported to be new diseases. The increase of ECF and PPR and the subsequent lack of influence of PAHC is attributed to the fact that the disease were newly introduced in an area where proper diagnostic and control methods are not in place or had been developed. Such methods and activities are apparently beyond the scope of a PAHC programme. Frequent BQ outbreaks (locally given the name of an area 'Liggi') had been encountered in grazing area which had not been used previously.

5.1.6. Benefits

Pastoral and agropastoral communities developed various strategies for dealing with livestock wealth. These strategies include keeping of large herds as a risk insurance against diseases, droughts, crop failure or other calamities (Mogga, 1986). This implies that livestock keepers do not sell or dispose their animals during good years. In southern Sudan the various and numerous benefits from livestock as identified in the interviews include dowry, milk for children, sales, meat for family consumption, livestock kept as a bank or reserve, and payment of loans and fines. In this study a remarkable increase of livestock for dowry payment and for sales after the establishment of PAHC was identified while applying participatory methods to the stakeholders

involved. Increased sales of livestock and livestock products in our study areas where agropastoral and pastoral were production systems may not be a good indicator to measure increases in livestock production as far as livestock keeping strategies are concerned. Increase sales could be due to decreased milk or lack of human food like grain, which resulted from lack of sufficient rains leading to reduce pasture or even crop harvesting failure. It is also possible that livestock keepers changed their habits as many are becoming urbanised and sending their children to school. The situation in Juba may be an example for the evolution of an attractive milk market leading in turn to increased milk sale. In Kapoeta where reports of recurrent crop failure due to lack of rains, increased sale as an indicator for increased production, as a success of PAHC should be excluded.

5.1.7. Milk use

Milk constitutes the major component of the daily diet in pastoralist communities, and is used in various ways in the different communities, ranging from fresh milk consumption to processing. Mainly milk is for domestic use, but if market opportunities arise some milk is also sold to meet some of the family cash needs.

Livestock in zone 1 (Juba) is mostly owned by town dwellers that are either government employees or pensioneers, and is used for commercial dairying. However, most of the people interviewed were of agropastoralist origin (Mundari and Dinka) employed to herd these animals. Zone 1 and 2 are within urban Juba where the milk market is growing. Although most of the people in zone 2 are mainly displaced Mundari from Terekeka which still practice transhumance, they now move to areas within reach of milk markets.

The organisations NICODO and ACCOMPLISH have established milk marketing components that improved the hygienic processing of milk and thus, making it attractive to the consumer. Some livestock owners are now able to market up to 30 litres of milk earning up to 350 USD per month, which is substantially more than the monthly pay of a senior government worker in Juba. This study demonstrates the overall increase of milk marketed particular through NICODO, whether this can be solely attributed to improved animal health through the provision of CAHW service remains unclear. Changing habits in milk use with the creation of new milk markets may also have contributed. Ghee making traditionally applied when milk is abundant to preserve it for

use during the dry season is on the decrease throughout the zones possibly also an effect of the growing milk market.

5.1.8. Community participation in primary animal health care activities

Catley and Leyland (2001) refer to the promotion of community participation, as an important feature of aid projects, however, a common understanding or definition of the term is still desired.

This study attempted to measure the levels of community participation based on parameters and activity indicators common to PAHC programmes whereby different levels in the different programmes were found. In zone 2 and 5 where the PAHC programme is implemented by ACCOMPLISH, and zone 1 under NICODO high level of community participation were attained. Executive committees are elected by the communities and can make major decisions like purchase of drugs, replacement of a CAHW independent of the donor agents. However, there are criticisms on concerning participation in the organisations. Executive committees are reported to be formed from elite groups, consisting of town dwellers that are considered outsiders to the beneficiary groups in the rural areas. Most elections are conducted in the town away from where the majority of the beneficiary groups live. Buya (1998) described the ACCOMPLISH executive committee as a major obstacle to the participation of the Mundari beneficiary community in their development. NICODO, although now a community-based organisation, is still influenced more by the founding co-operative members and people living in far away areas like Mongalla are still marginalised from the decision making process. This makes the decentralisation of animal health services, a main feature of PAHC (Jones *et al.*, 1998) difficult to put in place in southern Sudan. However it is hoped that the remedy plans of ACCOMPLSH and NICODO for formation of VDCs (Annexes 5 and 6) is implemented and, thus, improve the situation substantially.

5.2. Ethiopia

5.2.1. Animal health delivery service

Government animal health services remain to be very poor in the study areas of Ethiopia attributed to the remoteness of these areas from the main cities. Lack of trained staff and drugs is

very common, clinics and sub-clinics are very few and situated mainly in the towns. Road infrastructure is poor and often cannot be used during the rainy season, which was in fact experienced during this study.

Although PAHC was established less than three years ago in Gewane the livestock owners more preferred PAHC to other services, reflecting obviously the satisfaction of the livestock owners with its services. PAHC was not preferred in Telalak which could be due to the fact that were fewer CAHWs (only 8 trained) compared to Gewane with 13 CAHWs. However, there were some concerns expressed especially with regards to the continuity of the programme in Gewane. Similar programmes were started but stopped now completely, leaving the area without any service as experienced in the past. PAHC programmes were reported to have been implemented in many parts of Afar, which included TLDP, Save the Children USA, APDP. In North Wollo PAHC was also started by FAO but also stopped after a short period of three years. However, fixed and limited study time did not allow the inclusion of these projects into this MSc thesis work.

5.2.2. Treatment and vaccinations records

An activity ratio was calculated to identify what level a CAHW could reach with regards to treatment and vaccination of livestock. This ratio however is limited to a few areas due to the difference in the way recording was done by government veterinary services and the PAHC unit as well as in time in which the activity took place. Direct comparison between the average treatment and/or vaccination government staff and that of CAHW workers the part time nature of the CAHW work and the restriction to specific activity areas. If we take the above mentioned limitations into account, the result of the showed a significant level a CAHW can attain. In Kobo for example treatment numbers for external parasites were more than half those of government workers and internal parasites 30 %. In Chifra and Ewa however, the performance was particularly lower as the programme objectives were mainly directed towards Rinderpest vaccination.

5.2.3. CAHW questionnaire discussion

The study shows that a CAHW can treat an average 3.4 camels, 6.1 cattle and 19.4 sheep and/or goats in one week meaning CAHWs have access to the livestock even if livestock owners move

with their livestock for grazing and watering during the different seasons. The CAHWs certainly have high potential to improve if provided with appropriate means of transport and continuos replenishment with drugs. Moorhouse and Ayalew (1998) reported coverage by the public veterinary service of only 30% in a woreda with a catchment area of 10 km. This situation is expected not to change for the better in short period of time, meaning CAHWs service will continue to be an important mode of service delivery to the livestock.

The majority of CAHWs go on foot to their PAHC work, are illiterate and nearly all have no other community work than PAHC. Contrary to the BAHS programme in Northern Malawi (Hüttner 2000) the majority of the CAHWs are aged between 27-35 years and therefore younger in age. For our case, in the pastoral systems younger men move with livestock to better grazing areas leaving older and children with a small stock behind and therefore giving the opportunity to the younger CAHWs to attend to the sick animals. This implies age should be an important criterion when planning CAHW selection.

With regards to diseases CBPP, BQ, internal and external parasites are the most important diseases in the study area. Rumours about out-breaks of Anthrax in humans and livestock (*Ladore*) in Afar area were reported (Promed; 2000) and also taken note of by this study as mentioned by the CAHWs. Again transport is the single most important constraint besides difficulties in managing new emerging diseases to the CAHWs and difficulties in managing new diseases.

5.2.4. Impact of PAHC on livestock diseases

The disease changes were prominent in areas with high activity of CAHWs like in Gewane where more CAHWs are deployed compared to Telalak area. In Kobo CAHW activities are ongoing for a longer period of time as the PAHC activities started earlier. PAHC activities in Gewane and Telalak were mainly concentrated on treatment of internal and external parasites, trypanosomosis, and vaccination against pasteurellosis, anthrax, CBPP and FMD. Consequently, CBPP, anthrax, pasteurellosis, camel abscess and cattle trypanosomosis, which were highly scored have been reduced. Now after the establishment of PAHC in their areas livestock owners have greater confidence in dealing with these diseases. However, FMD was never controlled instead it increased in Gewane and Telalak, as vaccination might not have been effective. In North Wollo although CAHWs were not allowed to vaccinate they play a great role in the mobilisation of

communities during vaccination campaigns organised by the government. This could well explain the reduction of diseases which, CAHWs do not dealt with directly by CAHWs.

5.2.5. Milk uses

Traditionally, people of Afar are totally dependent on livestock, they do not cultivate at all, although some irrigation is conducted along the Awash River. Camel milk is one of the most important food item which by customary regulations is communal, i.e. every person in the community whether he/she has camels or not, is entitled for its milk share. By custom it also forbidden to sell camel milk.

The result of milk use scoring showed in general, no increase for any other milk use than sale. An increase in the sale could be on the expense of other uses and not the result of increase in milk produced. Increased milk sale could mean that the milk is sold and the proceeds used for purchase of grain, to feed the family. The analysis should also be interpreted in light of the reaction of the livestock owners to environmental factors such as drought, weed plants in the grazing areas, changes in river course. For instance, droughts for the last two to three years were reported upto the extent of distributing relief in parts of the study area. The milk-marketing project initiated in Gewane did however, not have any effect as the centre is yet to recruit customers, and milk supply is still irregular in the project area.

5.2.6. Benefits

Milk again did not show any increase when scored as a benefit from keeping healthy livestock. Again, sale of livestock and livestock products showed an increase which could be explained by the above described phenomenon of the environmental conditions. The situation is different for Kobo in which case the adverse climatic conditions and the PAHC came up much earlier in North Wollo so the change in benefits could have well been caused by the primary animal health programme, and thus, reflect the impact of PAHC.

5.2.7. Community participation in the study areas in Ethiopia

There is an appreciable level of community participation mainly in the North Wollo programme. The animal health management committee elected by the beneficiary communities is seen as a crucial step into the right direction as it is involved in nearly every stage of the programme

implementation. Purchases of drugs and of equipment as well as storage is carried out by the government veterinary clinics. Although these arrangements were seen as a way of making the communities put emphasis on sustainability of the CAHW rather than on drug revolving fund. However, this could also be seen as removing the community control from an activity, which is fundamental to any PAHC programme. The programme in Gewane is seen as a new programme and at present uses the traditional leadership of clan leaders and peasant associations, without clear responsibilities. Without clearly spelled out roles for the traditional leaders and/or the peasant associations will not participate actively as they already have got their own responsibilities and roles within the community.

5.3 Conclusions and recommendations

The study showed that different PAHC approaches were being used both in southern Sudan and Ethiopia with different levels of involving the communities in implementation of the programmes. The study also demonstrated that PAHC reached appreciable results in providing services, and, if improved further, could gives results that would be comparable to government services. Furthermore, CAHWs can be used as entry points any further livestock development activities and last but not least they can and effectively be used in disease surveillance and disease control campaigns.

Production conditions and infrastructure in the study areas will not change in the near future which would favour the use conventional government veterinary services or the private service sector. PAHC therefore remains the only viable possible option for community oriented animal health care delivery in the study areas in southern Sudan and Ethiopia.

Indicators, including dowry payment, milk for children, Bank /reserve, payment for loans, ritual performance and ghee making were more often commonly mentioned by the livestock owners and proved to be useful indicators which could be adopted in future assessments.

In Ethiopia land is becoming increasingly scarce in the highland areas so that potential for livestock production in the lowland pastoral areas even needs to be further promoted. Lack of disease control of would affect the subsistence production on one hand, but on the other hand make livestock export difficult.

Further, government veterinary services at one point have used PAHC in livestock projects both in southern Sudan and Ethiopia but no legislation to regulate the use of the system has been developed and put into action.

There are quiet remarkable resources provided by NGOs and other development agencies for the delivery of animal health services through PAHC that could substantially contribute to the government efforts in the development of the livestock sector if properly co-ordinated.

It is therefore recommended that:

- Central government veterinary services take a more active role in the co-ordination of the PAHC activities, and thus, sharing of experiences, resources, standardising approaches and strategies could be accomplished;
- Investigation by the relevant governmental departments the diseases that are said to be new in the study areas should be carried out in order to recommend better ways of controlling them to PAHC programmes;
- Consideration of CAHWs as central elements and important resources in making a sustainable PAHC project, therefore formation of village committee right at the beginning of the project rather later with the responsibility of supervising the work and welfare of the CAHW should be carried out. Furthermore, signing of social contracts between NGOs and beneficiaries should always be carried out, and this contract should clearly outline the different roles to be played by the supporting NGO and the beneficiary community and
- Capacity building should be considered as an important component of the PAHC activities to gives some skills to the beneficiary communities for managing the PAHC programme.

6. REFERENCES

Abdel-Messiah, F. (1996): Basic animal health services in the Kingdom of Lesotho In: Zimmermann, W., Pfeiffer, D.U., Zessin, K.H. (eds): Primary Animal Health Care Activities in Southern Africa, Proceedings of an international Seminar held in Mzuzu, Malawi. February 26-March 8 1996. Feldefing: Deusche Stiftung für internationale Entwicklung. pp. 324-331.

ActionAid-Somaliland (1994): ActionAid Somaliland Programme Review/Evaluation October 1994. London: ActionAid.

ActionAid-Somaliland (1998): Programme Review by the Sanaag Community-based Organization., London: ActionAid.

Almond, M. (1991): A paravet programme in southern Sudan. Network papers 24c, London: Agriculture Development Unit, Overseas Development International.

Baumann, M.P.O. (1990): The Nomadic Animal Health System (NAHA-system) in pastoral areas of central Somalia and its usefulness in epidemiological surveillance in the Central Rangelands Development project. University of California-Davis: School of Veterinary Medicine, USA (MPVM. thesis).

Baumann, M.P.O. (1993): Can centralised structures meet demand in the field? In: Baumann, M.P.O., Janzen J. Schwartz, H.J. (eds): Pastoral production in Central Somalia. Eschborn: Deutsche Gesellschaft für Technische Zusammenarbeit (GTZ) GmbH. pp. 299-321.

Berhanu, A. (1996): Community based approach to Rinderpest eradication in Remote pastoral communities of Afar Regional State. *Journal of Ethiopian Veterinary Association Proceedings of the 10th conference*. Addis Ababa: Ethiopian Veterinary association. pp. 31-35.

Berhanu, A. (1998) Save the Children UK Project Evaluation North Wollo . Mid Term Review (unpublished).

Blakeway, S. (1995): Evaluation of the OLS livestock programme in Southern Sudan. Nairobi: UNICEF-OLS (unpublished).

Bulmar, M., Warwick, D.P. (eds): (1983): Social Research in Developing Countries: Surveys and Census in the Third World. Chichester: John Wiley and Sons Ltd.

Buya, A. (1998): ACCOMPLISH introduction In: Lo´diyo, J.A. (ed) ACCOMPLISH the making of a community based organisation. Juba: ACCOMPLISH. (unpublished)

Carmichael, J. (1973): Uganda 1909-1949. In: West G.P.(ed): A History of Overseas Veterinary Services, Part Two. London: British Veterinary Association. pp 339-352

Catley, A. P., Mohammed, A.A. (1996): The use of livestock disease scoring by a primary animal health project in Somaliland. *Prev. Vet. Med.* **23** (3), 175-186.

Catley, A., Said, M.S., Farah, M.A., Mohammed., A.S., Handule, I.M. (1997): Veterinary services in the Somali National Regional State, Ethiopia. A situation analysis. Save the children (UK)-Regional Bureau of Agriculture. Veterinary Services Support Project Somali National Regional State. Addis Ababa: Save the children (UK) (Unpublished).

Catley, A. (1999a): Monitoring and impact assessment of community-based animal health projects in southern Sudan. A report for Veterinaires Sans Frontieres Belgium and Veterinaires Sans frontieres Switzerland, London: IIED.

Catley, A. (1999b): Methods on the move. A review of veterinary uses of participatory approaches and methods focusing on experiences in dryland Africa, London: IIED.

Catley, A. (2000): The use of participatory appraisal by veterinarians in Africa. *Rev. Sci. Off. Int. Epiz.*. **19** (3), 702-714.

Catley, A., Leyland, T. (2001): Community participation and the delivery of veterinary services in Africa. *Prev. Vet. Med.* **49** (1-2), 95-113.

Central Statistical Authority, (1995): Ethiopian Livestock estimates. Volume I. Bulletin 52. Addis Ababa, Ethiopia.

Chambers, R. (1983): Rural Development: Putting the Last First. New York: Longman.

Chambers, R. (1997): Whose Reality Counts? Putting the Last First. London: Intermediate Technology Publications.

Chen, K.H., Murray, G.F. (1976): Truths and Untruths in Village Haiti: An Experiment in Third World Survey Research. In: Marshaal, J.F. and Polgar, S. (eds): Culture, Natality and Family Planning, Carolina Population Centre University of North Carolina.

Cheneau, Y. (1985): The organisation of veterinary services in Africa. *Rev. Sci. Off. Int. Epiz.* **5** (1), 107-154.

Cornwall, A. (1992): PRA for Livestock Issues. London School of Hygiene and Tropical Medicine (unpublished).

Cornwall, A. (1996): Towards Participatory Practice: Participatory Rural Appraisal (PRA) and the Participatory Process. In: De Koning, K., Martin, M. (eds): Participatory Research and Health: Issues and Experiences. London: Zed Books Ltd. pp 94-107.

Crothers, I. (1993): South East Rangelands Project (SERP) Final Report of Consultant Epidemiologist. Addis Ababa: Transitional Government of Ethiopia, Ministry of Agriculture Vol. 4 of 4.

Dawit, A. (1992): Community based primary animal health care: *In: Journal of the Ethiopian Veterinary Association, 11th proceedings*. Addis Ababa: Ethiopian Veterinary Association pp 126-138.

DELIVERI, (2000): Community based livestock services. Implementation guidelines http://www.deliveri.org/frames/introduction/default_cbs.htm

Edwards, J. R. (1990): Surveys and questionnaires: design conduct and analysis. In: Proceedings 143, Epidemiological skills in Animal Health. Refresher course for Veterinarians, Sydney, 1-5 October 1990. University of Sidney: Postgraduate Committee in Veterinary Science. pp. 151-158.

Fielding, W. J., Riley, J., Oyejola, B. A. (1998): Ranks are statistics: some advice for their interpretation. *RRA Notes* **33**, 35-39.

Food and Agriculture Organisation, (1999): FAOSTAT, FAO database. http://apps.fao.org/

Guijt, I. and Cornwall, A. (1995): Critical reflection of on the practice of PRA. *PLA Notes,* **24** ,2-7

Hammel, R. (1995): SECADEV working with Agropastoralists in Chad. Aridlands Information Network No.7. Dakar: ALIN.

Holden, S. (1999): The economics of the delivery of veterinary services. *Rev. Sci. Off. Int. Epiz.* **18** (2), 425-439.

Henderson, W.W., Beaton, W.G., Taylor, J.I., Kearney, W. (1973): Nigeria 1914-1945. In: West, G.P. (ed): A History of Overseas Veterinary Services, Part Two. London: British Veterinary Association. pp 183-211.

Huhn, J. E., Baumann, M.P.O (1996): The situation of Animal health care in Sub Saharan Africa: A compilation of constraints and required improvements of Animal health systems, research and veterinary education. In: Zimmermann, W., Pfeiffer, D.U., Zessin, K.H. (eds): Primary Animal Health Care Activities in Southern Africa, Proceedings of an international Seminar held in Mzuzu, Malawi: February 26-March 8 1996. Feldefing: Deusche Stiftung für internationale Entwicklung. pp 324-331

Hüttner, K., (2000): Impact assessment of a community based animal health service programme in northern Malawi. Massey University, New Zealand: MSc. Thesis.

Hüttner, K., Leidl, K., Pfeiffer, D.U., Jere, F., Kasambara, D. (2000): Impact assessment of a community based animal health service program in northern Malawi. In: Salmon, M.D., Morley, P.S., Ruch-Gallie, R. (eds): Proceedings of the 9th Symposium of the International Society for Veterinary Epidemiology and economics (ISVEE), Breckenridge, USA, August 6-11th 2000. http://www.cvmbs.colostate.edu/cveadss/isvee/ isvee.htm.

IIED and ActionAid Ethiopia (1992): Look Who's Talking: Report of a Training of Trainers Course in Participatory Rural Appraisal in Dalocha, Southern Shewa, Ethiopia. London: IIED Sustainable Agriculture Programme.

Imakando, M. (1998): Delivery of animal health services in East Africa, country report. In: Daborn, C., Nyau, P., Wood, S. and Martin, M. (eds): Proceedings of the Workshop held at the MS Danish Centre, Arusha, Tanzania.
http://www.vetaid.org/publications/arusha98/index.htm.

Jack, J.D.M. (1961): The Sudan. In: West, G.P. (ed): A History of Overseas Veterinary Services, Part One. London: British Veterinary Association. pp 123-143.

Jones, B.A., Deemer, B., Leyland, T.J., Mogga, W., Stem, C., (1998): Community based animal health services in southern Sudan: the experience so far.
http://www.vetwork.org.uk/baj_sudan.htm

Jost, C., Stem, C., Ramushwa, M., Twinamasiko, E., Mariner, J. (1997): Comparative ethnoveterinary and serological evaluation of the Karimojong community animal health worker in Uganda. In: Jongejan, F., Goff, W., Camus, E. (eds): Molecular Epidemiology, Hemoparasites and their Vectors, and General Topics. Montpellier Forth Biennial meeting of the Society for Tropical Veterinary Medicine, France, 5-9th 1997. *Annals of the New York Academy of Sciences*, **849**, 327-337.

Kajume, J.K. (1998): Delivery of animal health services in East Africa, Country report. In: Daborn, C., Nyau, P., Wood, S. and Martin, M. (eds). Proceedings of the workshop held at the MS Danish centre, Arusha, Tanzania.
http://www.vetaid.org/publications/arusha98/index.htm.

Kasirye, J.B. (1998): Delivery of animal health services in East Africa, country report. In: Daborn, C.; Nyau, P., Wood, S.; and Martin, M. (eds). Proceedings of the workshop held at the MS Danish Centre, Arusha, Tanzania
http://www.vetaid.org/publications/arusha98/index.htm.

Kirsopp-Reed, K. (1994): A review of PRA methods for livestock research and development. *RRA Notes* **20**, 11-36.

Leju, L. G. (1998): The importance of Agriculture Education and training for rural development with special reference to southern region. *Journal of Peace and Development Research.* Khartoum: University of Juba.

Leonard, D.K., Koma, L.M.P.K., Ly, G., Woods, P.S.A. (1999): The new institutional economics of privatizing veterinary services in Africa. *Rev. Sci. Tech. Off. Int. Epiz.* **18** (2), 544-561.

Leyland, T., Akabwai, D.M.O. (1998): Delivery of private veterinarian supervised community-based animal health services to pastoralist areas of the Greater Horn of Africa. In: Daborn, C. Nyau, P., Wood, S. and Martin, M. (eds). Proceedings of the Workshop held at the MS Danish centre, Arusha, Tanzania.
http://www.vetaid.org/publications/arusha98/index.htm.

Leyland, T.J., Catley, A. (2000): Animal health services in pastoralist areas of the Horn of Africa: Issues affecting the wider application of community based delivery systems. In: Salmon, M.D., Morley, P.S, Ruch-Gallie, R. (eds): Proceedings of the 9th Symposium of the International Society for Veterinary Epidemiology and Economics (ISVEE), Breckenridge, USA, August 6-11th 2000.
http://www.cvmbs.colostate.edu/cveadss/isvee/ isvee.htm

Lo´diyo, J.A. (1998): ACCOMPLSH The Making of a Community Based Organisation. Juba; Sudan: ACCOMPLISH: (unpublished)

Lolik, P.L. (1976): Primary health programmes in the southern Region Juba Sudan. (Unpublished)

Lowe, H.J. (1954): Tanganyika (now part of Tanzania)1900-1938. In:West, G.P. (ed): A History of the Overseas Veterinary Services ,Part Two London: British Veterinary Association pp. 297-325.

Majok, A.A. Schwabe, C. W. (1996): Veterinary Science as a Pastoral Development, among Africa's Migratory Pastoralists London: Bergin &Garvey. pp.137-150.

Martin, M. (2001): The impact of Community Animal Health Services on the Farmers in Low-income Countries: A literature Review Scotland: VETAID.

Mariner, J.C., van't Klooster, G.G.M, Berhanu, A. (1995): Rinderpest control in Ethiopia: Participatory approach to vaccination in remote pastoral communities: In: Zessin K.H. (ed): Proceedings of the VIII International Conference of Institutes of Tropical Veterinary Medicine held from 25 to 29 September, 1995 in Berlin, Germany. Feldfing: Deusche Stiftung für internatinale Entwicklung. pp.324-329.

Mariner, J.C. (1996): Participatory Epidemiology: Methods for the Collection of Action Oriented Epidemiological Intelligence. FAO Animal Health Manual 10. Rome: Food and Agriculture Organisation

Maxwell, J. A. (1992): Understanding and validity in quantitative Research. *Harvard Educational Review* **62** (3), 279-300.

McCracken, J.A. Pretty, J.N. Conway, G.R. (1988): An Introduction to Rapid Rural Appraisal for Agricultural Development. London: International Institute for Environment and Development.

Mlangwa, J.E.D., Kisauzi, D.N. (1994a): System approaches to animal health services delivery in sub-Saharan Africa: Concept development. *Rev. Sci. Tech. Off. Int. Epiz.***13** (3), 665–672.

Mlangwa, J.E.D., Kisauzi, D.N. (1994b): System approaches to animal health services delivery in sub-Saharan Africa: The case of privatising veterinary services in Africa. *Rev. Sci. Tech. Off. Int. Epiz.***13**: (3), 673-685.

Ministry of Agriculture, (1996): Development of Veterinary services in Ethiopia. Addis Ababa Ministry of Agriculture, (Unpublished).

Mogga, W. (1986): The livestock and poultry farm systems in southern Sudan. In: Zahlan.A.B (ed): The Agriculture Sector of the Sudan. Policy and Systems Studies, London: A.B Ithaca press. pp 239-263.

Mogga, W. (1998): Profile on animal health delivery system in southern Sudan. In: Dabora, C., Njau, P., Wood, S., Martin, M. (eds): Delivery of Animal Health Services in Eastern Africa. Proceedings of a Workshop held at MS Danish Centre, Arusha, Tanzania. http://www.vetaid.org/publications/arusha98/index.htm

Moorhouse, P., Ayalew, T. (1997): PARC Ethiopia Report on Cost Recovery Study. Addis Ababa: PARC Ethiopia (Unpublished).

Moris, J.R. (1970): Multi-subject farm surveys reconsidered: Some methodological lessons. Paper presented at the East African Agricultural and Economics Society Conference, March 31st to April 4th, Dar es Salaam (Unpublished).

Munyua, S.J.M. (2000): Evaluation of Field Management of the Supporting Community Animal Health Workers (CAHWs) and the possible future role of a middle management structure Animal Health Auxiliaries (AHA) or variation of this concept (CAHWs) within the Livestock project UNICEF/Tufts Northern Sector Khartoum: UNICEF (Unpublished).

Njau, P.Z. (1998): Country report In: Dabora, C., Njau, P., Wood, S., Martin, M. (eds): Delivery of Animal Health Services in Eastern Africa. Proceedings of a Workshop held at MS Danish Centre, Arusha, Tanzania.
http://www.vetaid.org/publications/arusha98/index.htm

O'Barr, W.M., Spain, D.H., Tessler, M.A. (1973): Survey Research in Africa: Its applications and limits. Evanston: Northwestern University Press.

Obel-Lawson, E. (1992): The paravets of Loumbol. Arid lands Information Network, Dakar.

Odeyemi, I.A.O., Lillwall, N.B., Wilson, R.L. (1998): Socio-economic characterisation of the livestock production systems in Africa: An animal health delivery perspective. In: Proceedings of the 9th International Conference of the Association of Tropical Veterinary Medicine (AITVM) 14-18 September 1998. Harare Zambia.

Odhiambo, O., Holden, S., Ackello-Ogutu, C. (1998): Oxfam Wajir Pastoral Development Project. An economic impact assessment Nairobi. Oxfam UK/Irland.

Peck, E. (1973): Somaliland Protectorate 1924-1960. In: West, G.P. (ed): A History of the Overseas Veterinary Services, Part Two. London: British Veterinary Association pp. 255-265

Pretty, J. N. (1994): Alternative systems of inquiry for a sustainable agriculture. *IDS Bulletin*, 25(2), 37-47.

Promed (2000): Report of Anthrax outbreak in Afar (http://www.promedmail.org).

Roeder, P. (2000): Emergency Strengthening of Rinderpest Surveillance and Control in Western Sudan A workshop on Rinderpest Disease Surveillance and Epidemiology in Khartoum (http://www.fao.org/ag/AGA/AGAH/EMPRES/inf/rinderp/rindarch.htm

Romero, J.R., Oakeley, R., Villamill, L.C. (2000): An appraisal of cattle production service utilisation in Columbia using the stake holder analysis approach. In: Salmon, M.D., Morley, P.S., Ruch-Gallie, R. (eds): Proceedings of the 9th Symposium of the International Society for Veterinary Epidemiology and Economics (ISVEE), Breckenridge, USA, August 6-11th 2000 http://www.cvmbs.colostate.edu/cveadss/isvee/ isvee.htm.

Rushton, J., Thornton, P.K. and Otte, M.J. (1999): Methods of economic impact asssessment *Rev. Sci. Tech. Off. Int. Epiz.* **18** (2), 315-342.

Sandford, R. H. D. (1981): Pastoralists as Animal Health Workers: The Range Development Project in Ethiopia. *Pastoral Development Network Paper* 12c, London: Overseas Development Institute.

Schwabe, C.W., Kuojok, I.M. (1981): Practices and beliefs of the traditional Dinka healer in relation to provision of modern medical and veterinary services for southern Sudan. *Human Organization* **40** (3), 231-238.

Sollod, A.E., Stem, C. (1991): Appropriate animal health information systems for nomadic and transhumant livestock populations in Africa. *Rev. Sci. Tech. Off. Int.Epiz.* **10** (1), 89-101.

Trend, M.G. (1978): On the reconciliation of qualitative and quantitative analysis. A case study. *Human Organisation.* **37** (4), 345-354.

Turk, J..M. (1995): An assessment of animal health projects: U.S. Agency for International Development, 1960-93 *Agriculture and Human Values*, 12: **2**, 81-89

Turkson, P. K., Slenning, B.D., Brownei, C.F. (1999): Perceptions of veterinarians regarding privatization of veterinary service delivery in Ghana and Jamaica. *Prev. Vet. Med.* **40** (3-4), 221-232.

United Nation Development Programme (1983): Programme Advisory Note. Primary Health Care, with special reference to Human Resources Development. Bureau for Programme Policy and Evaluation Technical Advisory Division.

Vaillancourt, J.P., Martineau, G., Morrow, M., Marsh, W., Robinson, A. (1991): Construction of questionnaires and their use in veterinary medicine. In: Thrusfield, M.V. (ed.). Proceedings of the Society for Veterinary Epidemiology and Preventive Medicine, London.

VETAID (2001): Community Animal health Projects in Mozambique.
http://www.vetaid.org/contents/mozabique.htm

Waters-Bayer A. and Bayer, W. (1994): Planning with Pastoralists: PRA and more. A review of methods focused on Africa. Eschborn: GTZ.

WHO. (2000): Primary health care
http://www.who.int/aboutwho/ensuring/primary.htm.

Young, J., Stoufer, K., Ojha, N., Dijkema, H.P. (1994): Animal health training; Nepal's animal health care improvement. *RRA Notes* **20**, 58-64.

Zarkovich, S. S. (1966): Quality of Statistical data. Rome: Food and Agricultural Organisation.

Zeller, R. A., Carmines, E.G. (1980): Measurement in the Social Science: the Link between Theory and Data. New York: Cambridge University Press.

Zessin, K.H., Carpenter, T.E. (1985): Benefit–cost analysis of an epidemiological approach to provision of veterinary services in the southern Sudan. *Prev. Vet. Med.* **3**, 323-337.

Zessin, K.H. (1996): Constraints and Required Improvements of Animal Health systems: Privatisation of Government Services. In: Zimmermann, W., Pfeiffer, D.U., Zessin, K.H. (eds): Primary Animal Health Care Activities in Southern Africa, Proceedings of an international Seminar held in Mzuzu, Malawi, February 26-March 8 1996. Feldefing: Deushe Stiftung für internationale Entwicklung. pp. 324-331

Zinsstag, J., Daoud, S., Schelling, E., Diguimbaye, C., Wyss, K., Wiese, M., Kronke, F., Daugla, D. M., Bidjeh, K., Ndoutamia, G. A., Tanner, M. (2000): Towards improved health services for nomadic people in Chad: the challenge of "the one medicine". In: Salmon, M.D., Morley, P. S., Ruch-Gallie, R. (eds): Proceedings of the 9th Symposium of the International Society for Veterinary Epidemiology and Economics (ISVEE), Breckenridge, USA, August 6-11th 2000 http:/www.cvmbs.colostate.edu/cveadss/isvee/ isvee.htm

7. ANNEXES

Annex 1 Questionnaire for Primary Animal Health Care Worker

Date : _____

Name of PAHWs : _____ 2- Address : _____

3- Age: _____
4- Ethnic group : _____
5- Educational Level:

No school attendance ☐

Primary school ☐
Intermediate school

With certificate ☐

Without certificate ☐

Secondary school

With certificate ☐

Without certificate ☐
6- Livestock keeping system:

a Sedentary ☐

b Pastoral ☐

7- Do you own camels?

Yes ☐

No ☐

8- If yes

Less than 10 camels ☐

10 to 20 camels ☐

Over 20 to less than 50 camels ☐

More than 50 to less than 100 camels ☐

Over 100 camels ☐

9- Do you own cattle?

Yes ☐

No ☐

If yes:

Less than 10 cattle ☐

10 to 20 cattle ☐

Over 20 to less than 50 cattle ☐

More than 50 to less than 100 cattle ☐

Over 100 cattle ☐

10- Do you own sheep and goats

Yes ☐

No ☐

If yes:

Less than 10 sheep and goats ☐

10 to 20 sheep and goats ☐

Over 20 to 30 sheep and goats ☐

Over 30 to less than 50 ☐

11- Which organization/s implements community animal health care project in your area: _____

12- Category of interviewee:

Community vaccinator ☐

Community animal health worker ☐

Animal health assistant ☐

13- When and where did you receive your training? _____

14- Who did train you? _____

15- What means of transport do you use when carrying out your primary animal health care work?

By car ☐

Bicycle ☐

On Donkey ☐

Motor cycle ☐

On foot ☐

16- Are you married?

Yes ☐

No ☐

17- In what any other activities to sustain your family are you engaged?_____

18- What any other role/position do you hold in the community you belong?_____

19- What are the main problems affecting of livestock keeping in your area?

Diseases ☐

Theft ☐

Raiding ☐

Water ☐

Grazing land ☐

Others (please specify) : _____

20- What are the most common livestock diseases in your area? (Please rank them)

1_____

2_____

3_____

4_____

5_____

21- What problems do you face when treating or vaccinating livestock in your area of work (by what is your working capacity limited?). Please rank them

Lack of drugs and vaccines ☐

Lack of transport ☐

Lack of recognition from community ☐

Lack of cooperation from livestock owners ☐

Others (please specify): _____

22- What is the average number of animals you treat per week

Number of Cattle _____

Number of sheep and goats_____

Others please specify_____

in how many herds? _____

in how many villages? _____
in how many cattle camps_____

23- For how many days in the week does this keep you busy? _____

24- How far do you move on average to treat or vaccinate livestock? _____

25- Which is the longest distance in your working area? _____

26- What livestock treatment services are used in your area by livestock owners (please rank them according to preference by the livestock owners)

(i) Government vet clinics ☐

(ii) Private vet Clinics and traders ☐

(iii) Traditional healers ☐

(iv) Community Animal Health Workers ☐

(v) Other (please specify): _____

27- From how far do livestock owners come seeking treatment from you?
_____

28- What do cattle owners pay for your service?_____

29- How many more

Animals_____
Herds_____
Villages_____
Cattle camps_____

Could you serve if
Sufficient drugs are available?
You would have a riding bicycle/mule?

30- Do you do report writing?

Yes ☐

No ☐

Do you do it regularly?

Yes ☐

No ☐

What should be done in order to improve report writing?

_____

31- Did you receive any refresher training?

Yes ☐

No ☐

If yes:
When _____
Where _____
Through whom_____

If no:
Do you need one?

_____

32- Do you have any complaints about your CAHW work?

Annex 2 Questionnaire for government Veterinarians, Veterinary assistants and Animal health technicians.

1 Name of respondent: _____

2 Title of respondent :_____

3- Address of respondent: _____
4-Responsibilities and duties of respondent: _____

5- What are the main problems affecting the keeping of livestock in your area?

Diseases ☐

Theft ☐

Raiding ☐

Water ☐

Grazing land ☐
Others (please specify): _____

6- What are the most common livestock diseases in your area? (Please rank them, most important first)

(i) _____

(ii) _____

(iii) _____

(iv) _____

(v) _____

7- What problems do you face in treatment of livestock in your place of work?(Please rank them)

(i) Lack of drugs and vaccine ☐

(ii) Lack of transport ☐

(iii) No good roads to the cattle area ☐

(iv) Lack of cooperation from cattle owners ☐

(v) Lack of incentives ☐

(vi) Others (please specify)_____

8- Which type of treatment services do most cattle owners prefer to use in your area? (Please rank them)

(i) Government vet clinics ☐

(ii) Private vet Clinics and traders ☐

(iii) Traditional healer ☐

(iv) Community Animal Health Workers ☐

(v) Other (please specify): _____

9- Are there any community based animal health care projects in your area of operation?

Yes ☐

No ☐

10- If yes:

(a) How do you evaluate their work in terms of vaccination and treatment of livestock?

Good ☐

Moderately good ☐

Bad ☐

(b) What is the level participation of livestock owners in implementation of community based animal health programmes

Strong ☐

Weak ☐

No participation ☐

(c)Which organization/s are implementing the CAHWs activities in your area?

_____

_____

12- What average distance do livestock owners come from in search of vaccines and treatments for their animals in your station?

More than 10 km ☐

5-10 km ☐

Less than 5 km ☐

13- Do you go out of your station to treat and vaccinate livestock?

Yes ☐

No ☐

If yes how many times in a week do you go out of your station to treat cases?

Daily

Only once in the week ☐

Two-three times in the week ☐

Four-six times in the week ☐

Do not go at all ☐

14- What means of transport do you use to reach the livestock owners in their areas?

By car ☐

Bicycle ☐

On donkey ☐

Motor cycle ☐

On foot ☐

15- What suggestions do you give for improvement of community based animal health care activities in your area

Annex 3 Participatory Appraisal Checklist Forms

Form 1:
Benefits obtained from healthy animals

Date_____
Group_____
Area_____
Number of participants_____
PAHC establishment date_____

Method: Before and after proportional piling

Stated benefit	Before/after score	Comment from participants
1		
2		
3		
4		
5		

Checklist questions:

Think of five benefits, which can be obtained from healthy animals, If this pile of stones/seeds represents the benefits before PAHC project was established in the area, divide this pile according to the mentioned benefits.
Why this one has the smallest or why is that one has bigger pile?
Why has this benefit bigger pile than this one?
Now with the presence of PAHC in the area is there increase, decrease or remains the same of the benefits, increase, decrease or let the pile remain same and make the scoring again on the same mentioned benefits.
Observations/comments_____

Remarks_____

Form 2:
Milk usage

Date_____
Group_____
Area_____
Number of participants_____
Date of establishment of PAHC in the area _____

Method: before and after proportional piling

Uses for milk in the area	Before and after score	Comment from participants
1		
2		
3		
4		
5		

Checklist questions:
-What are the different uses of milk in this area?
-If 100 seeds represent the daily quantity of milk produced in the herd, divide this seeds/stones to the mentioned uses.
Has this increased, decreased or remained the same after the establishment of the PAHC. Reduce increase or leave the heap, as it is then score the uses.

Observations/comments._____
Remark_____

Form 3:
Important animal diseases

Date_____
Group_____
Area_____
Number of participants_____
Date of establishment of PAHC in the area _____

Method: Before and after proportional piling

Disease	Before/after score	Comments from participants
1		
2		
3		
4		
5		
6		

Checklist questions:

1 Think of six diseases that kill livestock in your area. If 100 stones/seeds are the animals that died from these diseases, which disease killed what number of animals before the establishment of PAHC in the area?
2- Why do you put more stones/seeds on this disease than that?
3- why do you choose this as the most important disease and that the least?
4- Has the deaths increased, decreased or it remained the same, add to the heap or decrease or remains the same and score for the situation after the establishment of CAHW.

Observations/comments_____
Remarks_____

Form 4:
Treatment services (preference)

Date_____
Group_____
Area_____
Number of participants_____
Date of establishment of PAHC in the area _____

Method: preference proportional piling

Service	score	Comments from participants
1		
2		
3		
4		
5		
6		

Checklist questions:

1-What are the common treatment services used in the area?
2- Distribute the pile of seeds/stones to these services putting biggest pile to service most liked by the people in the area and the smallest to that used least
3- why do you think that this is the most liked service than that?

(To clarify between Government, PAHC and private services you have to ask where and the names of people involved in the delivery of vet. Services).

Observations/comments_____

Remarks_____

Form 5:
Level of participation at project cycle

Date_____
Group_____
Area_____
Number of participants_____
Date of establishment of PAHC in the area _____

Method: stages of project cycle

Checklist questions:
What roles were played by the beneficiaries, project staff and donors?
Who identifies, prioritises, and analyses problems of and whose methods are used during this process?
Who makes decisions about the project? Is it the local people, project staff or donors?
Who identifies priorities analyses project indicators (measures of implementation and impact and impact), whose methods are used during this process and who controls the flow and ownership of information?

Stage of project cycle	Roles played by the community	comments
Needs assessment		
Design and planning		
Implementation		
Monitoring		
Impact assessment		

Observations/comments_____

Remarks_____

Form 6:
Participation in need assessment leadership, resources mobilisation and management

Date_____
Group_____
Area_____
Number of participants_____
Date of establishment of PAHC in the area _____

Method: Five factor method

Checklist questions:

Who was doing what during project implementation?
How is the leadership in the PAHC project distributed and organised?
How are the project resources drugs, (revolving fund) controlled?
Who makes decisions on what in the project?

Factor	Comments from the participants	Remark
Needs assessment		
Leadership		
Organization		
Resources management		
Management		

Observations/comments_____

Remarks_____

Annex 4 CAHW training curriculum outline

(Source UNICEF/OLS livestock programme, Juba)

What is a normal animal/What is not a normal animal
Organs and system
Functions of each system (circulatory, respiratory, urinary, Digestive, Reproductive, Defence system, skin, Eyes, Nervous system, white blood cells)
Post mortem practical
Listing Describing and ranking of diseases
History taking and clinical Examination of an animal
Restraining of Animals
Causes of disease
Identification of medicines
Administration of medicines (Oral, Injection or external application)
Dose rate of medicines
Limitation of medicines
Care of medicines
Cleaning equipment
Filling in monitoring forms
Field practice of diagnosis
Discussion of the field practice
Revision on dose rate and filling in the monitoring forms
Cost recovery
Practice in talking to Community (dialogue)
Guinea worm control
Vaccination against Rinderpest
Vaccination
Preparation of the Rinderpest vaccine
Ear Notching and punch cards
Cleaning of Equipment
Serosurveilence
Other vaccines
How to organise a vaccination campaign
Practical vaccination
Discussion of the practical
Cost recovery, prices, payments in kind
Roles and responsibilities
Action plan

A manual for Community Animal Health Workers Trainer

(Source **Berhanu Admussu)**

GUIDELINES FOR TRAINERS
Introduction
Creating conditions for learning
OUTLINE OF THE TRAINING PROGRAM
UNIT 1. Introduction
UNIT 2. The healthy animal
UNIT 3.Basic Clinical Examination
UNIT 4.Organ systems, their role in disease naming and assigns of diseases
UNIT 5. Causes of disease and principles of disease transmission
UNIT 6.Description of major diseases in Shinille ecosystem
UNIT 7. Selecting the correct drug on the basis of symptoms
UNIT 8.Description of different veterinary techniques
UNIT 9.Practical field work on important techniques
Vaccinations
UNIT 10.Points for a sustainable Animal Health programme
UNIT 11. Points for a sustainable Animal Health programme

UNIT 1. INTRODUCTION

UNIT 2.THE HEALTH ANIMAL
2.1. Characteristics and appearance of normal (healthy) animals
2.2. Organ system and function

UNIT 3. BASIC CLININCAL EXAMINATION
3.1. Introduction to restraint and clinical examination
3.2.History taking or the examination of the farmer
3.3.The clinical examination
3.4. Guide for conducting complete physical examination

UNIT 4. ORGAN SYSTEMS, THEIR ROLE IN DISEASE NAMING AND SIGNS OF DISEASES
UNIT 5. CAUSES OF DISEASE AND PRINCIPLES OF DISEASE TRANSMISSION
5.1. Causes of diseases
5.2.Principles of livestock disease transmission

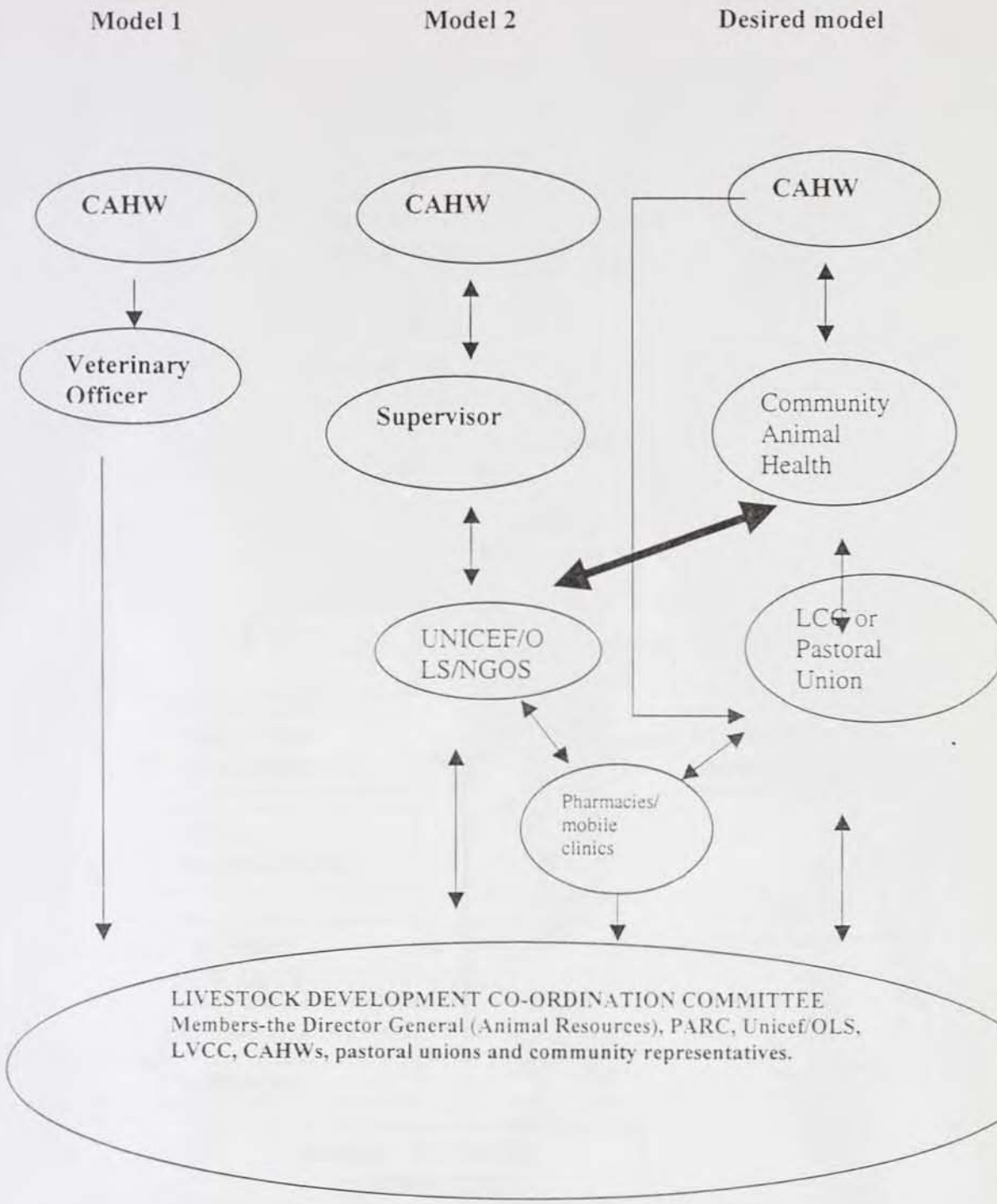
UNIT 6. DESCRIPTION OF MAJOR DISEASE IN SHINILLE ECOSYSTEM
6.1. Ranking disease problems per species
6.2.The most common infectious diseases in shinille zone
6.3. The most common parasitic diseases in shinille zone
6.3.1. Internal parasitic (worm) diseases
6.3.2.External parasitic diseases

UNIT 7. DESCRIPTION OF DIFFERENT KIND OF DRUGS, THEIR USE AND DOSAGE
UNIT 8. CLINICAL EXAMINATION AND SELECTING THE CORRECT DRUG ON THE BASIS OF SYMPTOMS
8.1.Carry out clinical examinations
8.2. Treatment procedures on the basis of signs
8.3. Disease Control and Prevention
8.4. Notifiable diseases
UNIT 9. DESCRIPTION OF DIFFERENT VETERINARY TECHNIQUES
9.1. Castration
9.2. Debudding (Dehorning)

9.3. Hoof cutting
9.4. Treatment of Bloat
9.5. Wound Treatment
9.6. Care of utensils and Medicines

UNIT 10. PRACTICAL FIELD WORK ON IMPORTANT VETERINARY TECHNIQUES
10.1. Administration of drugs
10.1.1.Oral Administration
10.1.2.Giving Injections
10.1.3.External application
UNIT 11. POINTS FOR A SUSTAINABLE ANIMAL HEALTH PROGRAMME
UNIT 12.
UNIT
UNIT
UNIT

Annex 5 The current and proposed organisational structures of the CAHW veterinary service delivery (Source: Munyua, 2000)



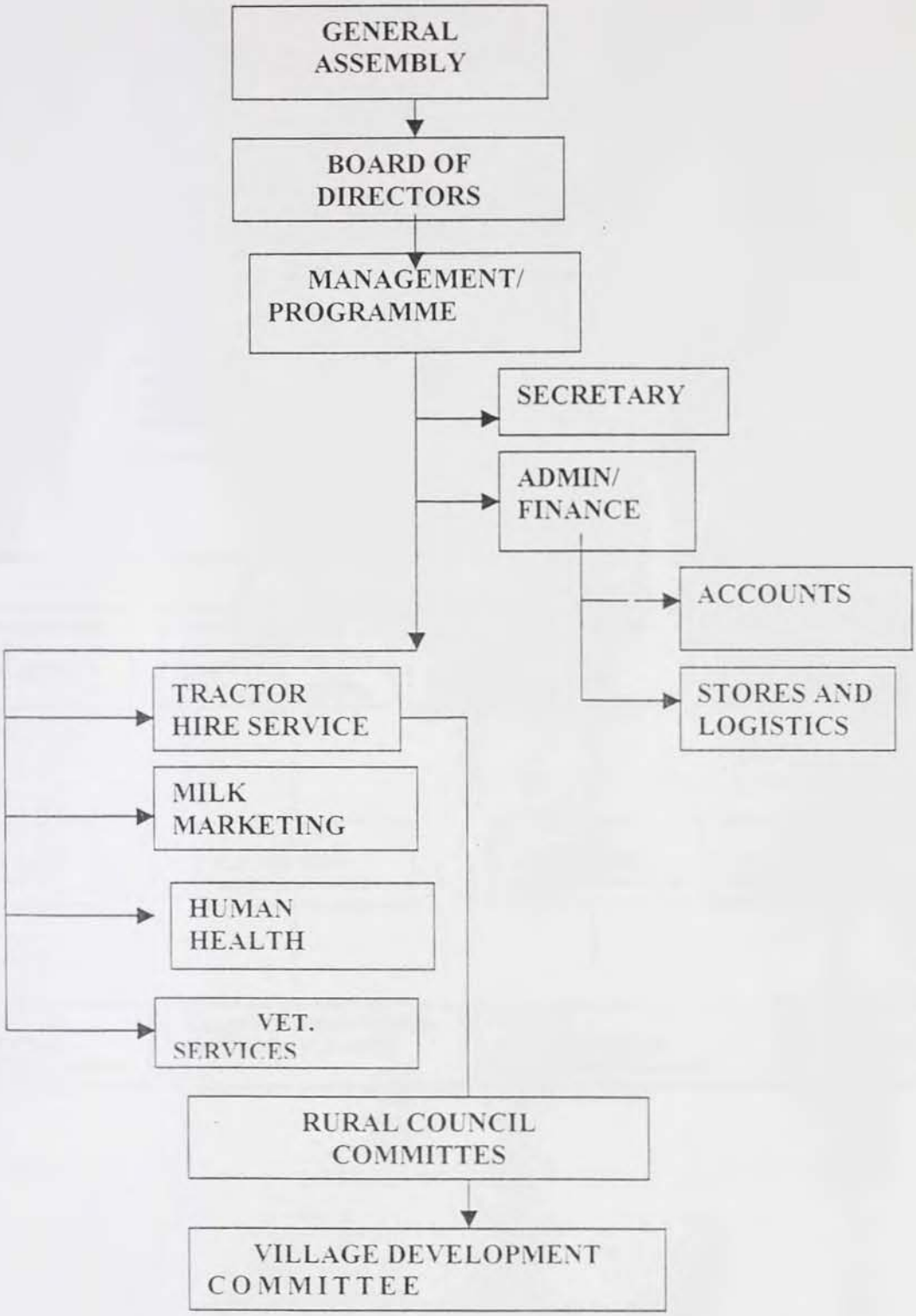
Key:

i. In light blue lines are alternative apporaches that can be put in place as the training agency withdraws to retain a supervisory and monitoring role.

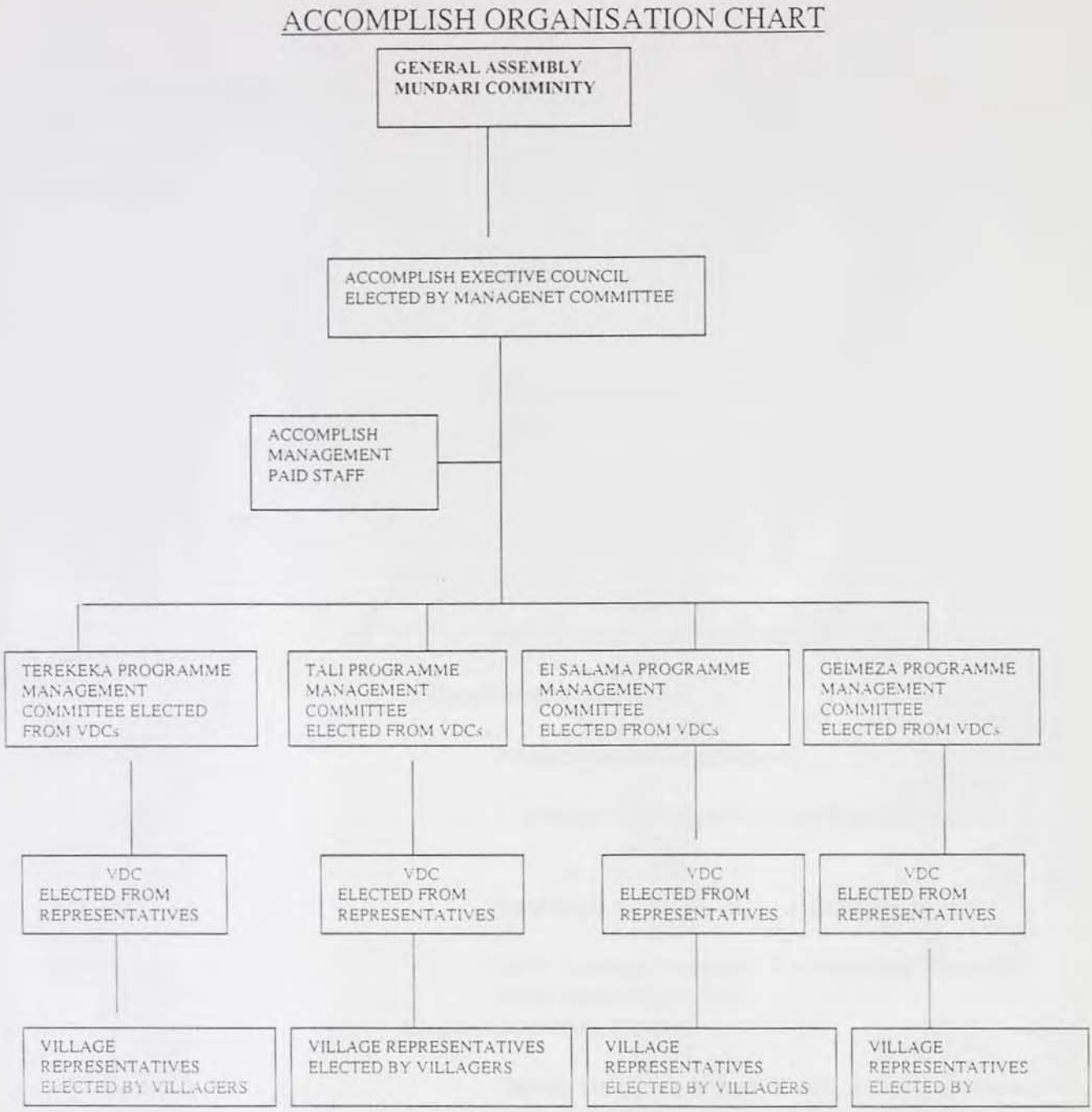
ii. In bold blue line is the technical assistance that may be provided to the CAHWs/CAHA by the UNICEF/OLS/NGO.

Annex 6 Nile Community Development Organisation chart (NICODO)

NILE COMMUNITY DEVELOPMENT ORGANIZATION CHART



Annex 7 ACCOMPLISH organisational chart



8. CURRICULUM VITAE

Name	Nimaya Kenyi Mogga
Nationality	Sudanese
Date and Place of Birth	01/01/1959
Tribe	Kuku
Profession	Veterinarian
Martial Status	Married

Address

Official

Directorate of animal wealth
Ministry of Agriculture
P.O. Box 115
Bahr el Jebel state
Juba
Tel 249 811 26026
Private

Email: mogga_nimaya@hotmail.com

Educational background

1967-1974	Primary education in Uganda
1975 –1980	Secondary Education-KajoKeji/Rumbek Sudan
1983 –1987	Veterinary medicine Zagazig university Egypt
2000 to date	MSC Tropical Veterinary Epidemiology Freie and Addis ababa Universities

Employment back ground

1997–To date	Deputy Director , Animal Health and disease control Directorate of Animal wealth Bahr el Jebel state
1993-1997	Livestock officer, ACCOMPLISH organisation
1992-1993	Sudanese Red Crescent Relief Administrator/volunteer
1989-1992	District Veterinary Officer Juba
1987-1989	Veterinary Officer Juba

Training background

1991 (two months)	Meat hygiene Regional Training Centre for meat Inspection/hygien and Grading (RTCMHG)
1994- 1998	Various Trainings and Work shops on Management, Monitoring and Evaluation, Training Management PRA and Information gethering methods
Pofessional associations	Sudan Veterinary Association
Other Associations	Sudanese Red Crescent Society (SRC)
Publications	Introduction to community based Animal health workers approaches edited by PARC communication unit Nairobi Kenya (contributer).
	ECF survey in and around Juba, Mogga N.K. Okeleng J. K., Paul. A.A.,Kamillo J. (1999).

Professional work experience and skills:

Veterinary Clinical works including vaccination campaign, meat inspection. Training and supervision of CAHW activities.

Other experiences

Planning and assessment community projects.
Relief aid management
Participatory training management for the rural communities.
Computer literate in word processing and other data analysis packages.

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Declaration sheet

I, the undersigned, declare that the thesis is my original work and has not been presented for degree in any University.

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Signature

Date of submission 21.12.2001

This thesis has been submitted for examination with our approval as University advisors

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Nimay Kenyi

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