

Uganda
Network for
Animal
Traction and
Conservation
Agriculture

A
T
N
E
S
A



Workshop Report

International Workshop

On

Modernising Agriculture

Visions and Technologies for

Animal Traction and Conservation Agriculture

Held at

Sunset Hotel & Conference Centre

Jinja, Uganda

19th - 25th May 2002

WORKSHOP REPORT

International Workshop

Modernising Agriculture

Visions and Technologies for

Animal Traction

and

Conservation Agriculture

Report prepared and edited by

Dr John E. Ashburner (*FAO, Ghana*)

Martin Bwalya (*ACT, Zimbabwe*)

Engr. Wilfred Odogola (*AEATRI, Uganda*)

Jinja, Uganda

19th - 25th May 2002

Foreword

The use of animals, particularly cattle and donkeys as a source of farm power is still extensive in Africa and can only be expected to spread further and get more intensive. Over 25% of cultivated land in Africa is worked with animal traction. Farming is still largely smallholder in character with numerous small plots, the majority only achieving a subsistence production.

In the face of the general stagnation or declining agricultural performance in Africa, attributed to degradation in the natural resource base – soil and water, it is imperative that we re-think the way we farm. A radical revolution is now vital and there are considerable efforts being made throughout the continent to promote conservation agriculture as a sustainable means to alleviate poverty whilst conserving the natural resources of the region. Such an approach has already achieved a dramatic impact in the Americas and in Brazil alone, it is estimated that conservation agriculture is now practised on some 17 million hectares.

In most areas using animal power, animal traction remains the lifeline for food security and reduction of poverty. Animal power is also a critical resource in rural and peri-urban transport with marked social and economic benefits. In the application of conservation agriculture, draft animal power will find a new role. The time has now arrived to discard the thinking that animal traction implies use of the plough and the practice of conventional tillage. We are challenged to revolutionise the idea of draft animal use and let it be a valuable input and indeed the source of motivation to apply and adopt widely, the principles of conservation farming.

Various experiences in Africa indicate that tractor and other farm power sources have and will continue to have an important role in the performance and development of agriculture and indeed the economies in most countries. The workshop, hence, also looked into hand and tractor powered tools and equipment appropriate for Conservation Agriculture applications.

Successful introduction and consequent adoption of Conservation Agriculture (CA) depends upon the availability of suitable and appropriate equipment in the country and the financial and physical accessibility of farmers to this equipment. While the theory of CA is quickly advancing even in Africa and a wealth of information is already available, the actual introduction of CA into smallholder farming practices is lagging behind. One important reason for this is the lack or inaccessibility of equipment. For now, major challenges are in equipment for direct-seeding, weeding or herbicide application and cover crop/mulch management.

For the host country, Uganda, consideration of these matters is timely as the country implements its national *Plan for the Modernisation of Agriculture (PMA)* and the *Poverty Eradication Action Plan (PEAP)*. It accordingly welcomed the suggestion to host an international workshop at Jinja from 19 to 25 May, 2002 in order to analyse in depth these matters of both national and international concern.

The joint convenors of the workshop were the *Uganda Network for Animal Traction and Conservation Agriculture (UNATCA)*, the *Animal Traction Network for Eastern and Southern Africa (ATNESA)*, the Food and Agriculture Organization of the United Nations (FAO), the Africa Conservation Tillage Network (ACT) and the Deutsche Gesellschaft für Technische Zusammenarbeit (GTZ).

The workshop was further enhanced by exhibitors of hand-operated, animal drawn and tractor mounted equipment from Brazil, Ghana, Kenya, Malawi, South Africa, Uganda, Zambia, South Africa and Zimbabwe.

It is my pleasure to present below the report covering the activities and results of this workshop, for which the full proceedings containing the complete papers will be published separately.

J.J. Otim

*Presidential Advisor on Agriculture and
Veterinary Services*

Acknowledgements

The organising committee would like to sincerely thank numerous organisations and companies for their contributions to this workshop. These are as follows:

Sponsors

For support concerning the workshop organisation and arrangements:

- the National Agricultural Research Organization (NARO):
- the German Agency for Technical Co-operation (GTZ)
- the Soroti Agricultural Implements and Machinery Manufacturing Company Ltd. (SAIMMCO)

For sponsoring participants to the workshop:

- the Food and Agriculture Organization of the United Nations (FAO),
- the Regional Land Management Unit (RELMA),
- the Danish Agency for Technical Co-operation (DANIDA)
- Trelleborg
- CIRAD
- GTZ

For sponsoring and donating equipment to the event:

- SEMEATO, Brazil
- FITARELLI, Brazil
- IADEL, Brazil
- TRITON, Brazil,
- HÄSTT, Zimbabwe,
- Micron, South Africa
- ZAMWIPE/CFU, Zambia.

Exhibitors

Following companies or organisations participated in the equipment exhibition:

Brazil

- SEMEATO: Tractor-mounted direct planter

- FITARELLI: Hand and Animal Traction direct planters (demonstrated equipment)
- IADEL: Ripper/weeder, direct planter, boom sprayer, knife roller for manual and animal traction (demonstrated equipment)
- TRITON: Direct planters, boom sprayers for manual and animal traction (demonstrated equipment)
- KNAPIK: Direct planter, wheelbarrow-boom and shielded sprayer

Ghana

- Kaddai Engineering: Manual planters

Kenya

- Triple W Engineering: Animal draft planter and cultivator
- KENDAT: Harnesses and panniers for donkey, animal mulch planter

Malawi

- Chitedze Research Station: Wooden cart

South Africa

- Micron Sprayers: Rotary nozzle sprayers

Uganda

- Design Centre YWAM: Manual planter, donkey cart, harness, cultivators
- SAIMMCO: Animal drawn plow, cultivator, cart, scoop

Zambia

- CFU: ZAMWIPE: Weed wiper

Zimbabwe

- HÄSTT: Animal traction cultivators

Commercial Manufacturers Present

The following commercial equipment manufacturers were present at the workshop:

Brazil

- SEMEATO: André Verardi
- FITARELLI: Ataides Fitarelli

- IADEL: Elias Beltrame
- TRITON: Fausto Centofante
- ZENITH: Tiago Bombasaro

Ghana

- Kaddai Engineering: Appiah Kwame

Kenya

- Triple W Engineering: Thomas B. Muckle

South Africa

- Micron Spayers: Mike Burgess

Uganda

- SAIMMCO: M.B. Asubo

Zambia

- ZAMWIPE: Dutch Gibson

Zimbabwe

- HÄSTT: Ivan K. Savala
- ZIMFLOW: Vimal Naik and Tony Rowland
- SRP Marketing - BAIN New Holland: Peter Hickman

List of abbreviations

ACT	Africa Conservation Tillage Network
AT	Animal Traction
ATNESA	Animal Traction Network for East and Southern Africa
BASED	Broadening Agricultural Services for Extension and Development Programme
CA	Conservation Agriculture
CIRAD	Centre Internationale en Recherche Agronomique pour le Développement
FAO	Food and Agriculture Organization of the United Nations
GTZ	Deutsche Gesellschaft für Technische Zusammenarbeit
MOLG	Ministry of Local Government (Uganda)
NAADS	National Agricultural Advisory Service (Uganda)
NARO	National Agricultural Research Organisation (Uganda)
NEPAD	New Partnership for Africa's Development
PACODEF	Poverty Alleviation and Community Development Forum (Uganda)
PEAP	Poverty Eradication Action Plan (Uganda)
PMA	Plan for the Modernisation of Agriculture (Uganda)
RELMA	Regional Land Management Unit of SIDA
SAIMMCO	Soroti Agricultural Implements and Machinery Manufacturing Company Ltd.
SG2000	Sasakawa Global 2000
SIDA	Swedish International Development Agency
UNATCA	Uganda Network for Animal Traction and Conservation Agriculture

Table of Contents

**OVERVIEW,
OPENING CEREMONY,
INTRODUCTION
and KEYNOTE PAPERS**

Paste a scanned photo here

of Plenary or Opening Sessions

Overview of the Workshop

This was the first international workshop to link themes concerning both animal traction and conservation agriculture. It was organised jointly by ATNESA, FAO-ACT and the Ugandan National Agricultural Research Organisation (Ministry of Agriculture, Animal Industry and Fisheries). The workshop combined ATNESA's plan for a thematic workshop and plans by FAO-ACT to organise an international workshop on conservation agriculture equipment.

The main theme of the workshop was "*Modernising agriculture: Visions and Technologies for Animal Traction and Conservation Agriculture*".

The sub-themes were:

- i. Work animal nutrition, health and welfare management
- ii. Socio-cultural and Gender issues in Animal Traction and Conservation Agriculture
- iii. Animal powered transport in rural and peri-urban areas
- iv. The role of Animal Traction in the context of Conservation Agriculture
- v. Equipment for Conservation Agriculture
- vi. Organisation of machinery use and other farm services.
- vii. Entrepreneurship development in manufacturing, marketing and service provision.
- viii. Micro-finance in Animal Traction and Conservation Agriculture development
- ix. Policy issues on Animal Traction and Conservation Agriculture

The workshop addressed the themes focusing on animal traction use in conservation agriculture and rural transport and also considered the needs for conservation agriculture equipment in all the main power source categories. The workshop reviewed experiences and lessons on the themes from the over 120 participants who attended the workshop. A special selection of conservation agriculture equipment from Brazil and from a number of countries within Africa, were exhibited at the workshop. Some of the equipment was also demonstrated.

Participants included practitioners, regional and international specialists involved in research, rural development, training and extension for Animal Traction (AT) and Conservation Agriculture (CA). Also present were private small and large scale farm equipment manufacturers from Brazil, Uganda, Zimbabwe and Ghana.

Workshop Objectives

The workshop's main objectives was to "*Develop Animal Traction and Conservation Agriculture Strategies for Modernizing Agriculture through Multi-Sectoral Interaction and Experience Sharing*". The specific objectives were:

- i. Identify, analyse and consolidate information and experiences on AT and CA for the region
- ii. Facilitate contacts between African and Brazilian CA implement manufacturers and suppliers
- iii. Elaborate on issues and elements on the roles of AT and CA in the modernization of Agriculture in the Region and Uganda
- iv. Propose appropriate strategies and activities on AT and CA

Workshop Procedure

Interactive discussions, facilitated by a specialized moderator, characterized the process adopted in addressing the set workshop objectives. The process involved plenary presentation of three keynote papers and a number of thematic papers, a poster and implement exhibition, field visits, group discussions, field demonstration of some of the equipment and intensive group discussions. The workshop also facilitated numerous informal contacts and discussions and evening programmes where participants exchanged information. The workshop ended with the development of strategic plans and recommendations in the general context of the sub-region and other also specifically focused on Uganda.

Problem analysis and intensive discussions were undertaken in small, multi-disciplinary groups while specialised output-oriented teams tackled the key emerging issues. The workshop identified issues and practical actions for

strategic interventions in AT and CA advancement.

Official Opening and Keynote paper presentations

Three keynote papers were presented. The three, respectively, addressed animal traction, conservation agriculture equipment and the Ugandan animal traction and conservation agriculture status and issues. The keynote papers highlighted key concerns and issues in the development and promotion/application of animal traction and conservation agriculture – contributing to the modernization of agriculture in the region. Additionally, eighteen thematic papers were presented in five sessions, each focused on one element in the workshop theme.

The workshop was arranged in a total of seven sessions. The first and second sessions were devoted to the official opening ceremony and presentation of the keynote papers.

Three other sessions involved field visits, implement demonstration and the implement-poster exhibition. Following are some briefs on the sessions:

Thematic Session One: Equipment for Conservation Agriculture

Focusing on conservation agriculture equipment, four papers were presented during this session. These covered general status and trends in farm mechanisation in general and specifically conservation agriculture mechanisation in Africa. The papers also addressed specifically CA equipment in smallholder and in largescale farming systems. A paper was also presented on manufacturing, marketing and provision of back-up services in an African scenario.

Thematic Session Two: Machinery Demonstration

A selected number of animal and hand powered CA equipment was demonstrated during this session. Those demonstrated included the Fitarelli animal drawn direct-planter, the IADEL knife-roller, the triton pull and animal drawn sprayers. The demonstrations were undertaken at the Source of the River Nile agricultural showground.

Thematic Session Three: Animal traction in the context of conservation agriculture

The session addressed animal issues in animal power use and management. The papers presented also addressed issues on integration of livestock in CA cropping systems and also the use of animal power in rural and peri-urban transport.

Thematic Session Four: Policy Issues on Animal Traction and Conservation Agriculture

The three papers presented in this session addressed policy experiences and issues in sustained input (farm equipment) supply systems; the benefits of a liberalised and decentralised development model in enhancing farmers' accessibility to farm equipment.

Thematic Session Five: Entrepreneurship Development in Manufacturing, Marketing and Service Provision

The session covered issues on entrepreneurship and micro-enterprise, including the role and empowerment of rural and peri-urban artisan in the development and supply of animal traction and conservation agriculture technologies (hardware). A special paper which highlighted elements for conducive environment for internationally operating implement manufacturers and suppliers was also presented.

Thematic Session Six: Organisation of Machinery Use and Services

Two papers highlighting farm level experiences and applications of private multi-farm use as a way of enhancing farmers' accessibility to machinery services were presented. The papers were presented in the context of two case studies; one from the Limpopo province (formally Northern Province) of South Africa and the other from northern Ghana.

Thematic Session Seven: Micro-finance in animal traction and conservation agriculture development

In this session a paper on experiences of a World Bank supported project on micro-financing in Uganda was presented. The paper highlighted issues and concerns relevant to applications of animal traction and conservation agriculture in smallholder farming systems and, in particular, the role and related factors that would enable micro-finance play its role in enhancing farmers' financial

accessibility to farm inputs including draft animals and equipment.

Thematic Session Eight: Equipment and Poster Exhibition

This involved an exhibition of farm implements, ranging from hand jab-planters to tractor drawn high-tech no-till planters. These came from Brazil and also others from a number of countries in the region. Most of the equipment related to conservation agriculture. There were, however, also a number of rural transport carts and other conventional farm equipment.

On the other side, over fifteen attractive and informative posters were exhibited. Various institutions and organisations present also distributed an assortment of information sheets, books, flyers and posters.

Workshop Discussion Sessions

Brief plenary discussions were held at the end of each thematic session to both clarify issues raised in the presentation and beginning to identify and focus the emerging concerns.

Additional to these, the workshop had three main plenary discussion sessions, which followed small group work discussion. Three sessions of small group work discussions were held.

After the presentation and some discussion in the first one and half days, the participants went into smaller groups to identify emerging issues along the workshop's themes and in relation to what policies, strategies and actions would be required to enhance farm level application (adoption) of animal traction and conservation agriculture.

In the second session of group work, the participants went further to analyse specific identified issues. This involved identification of constraints and opportunities in relation to specific circumstances in the region.

The third and final session of group work came on the last day of the workshop. In this session, the following issues were noted as having emerged in the proceedings of the workshop:

- animal powered transport in rural and peri-urban areas
- the role of animal traction in the context of conservation agriculture

- equipment for conservation agriculture – awareness in Uganda and beyond
- organisation of machinery use and other farm services – multi-farm use
- entrepreneurship development in manufacturing, marketing and service provision – policy issues
- micro-finance in animal traction and conservation agriculture development.

Participants were divided into smaller groups along these six issues. Using a flowchart framework provided, the groups further analysed the six issues (each group dealing with one issue), identified at most three priority areas and made recommendations both for general application by the various partners in the regions and some specific to Uganda.

Field visits

This was a whole day event designed to expose participants to real-life scenarios and experiences (case studies) so as to ensure feet-on-the-ground analysis and also to provide learning experiences. Three visits were arranged and participants selected one of their interest. These were:

- i. a visit to Kawanda Agriculture Research Institute (KARI) and the Agriculture Engineering and Appropriate Technology Research Institute (AEATRI – Namalele) and Makerere University all located in Kampala.
- ii. a visit to eastern Uganda (Tororo) where the group was able to see farmer fields and farming operations. This also included a visit to the one-stop-centre in Iganga.
- iii. to Soroti and Kumi where the group visited SAIMMCO – the sole largescale manufacturer of animal drawn implements in Uganda. The group also visited a local blacksmith involved in fabrication of various steel tools and farm implement parts. After see a farmer group using draft animals in ploughing, the group proceeded to the Steel Rolling Mills Company on the outskirts of Jinja.

Details of the field visits are presented later in this report.

Special participant-organised sessions

Special interest talks, videos etc. brought by participants were presented in near-informal evening sessions. A number of special interest or thematic groups meetings also took place, which are also listed later in this report.

Launch of UNATCA

As part of the closing ceremony, the Ugandan Network for Animal Traction and Conservation Agriculture (UNATCA), was launched. The present members (over 40) who had met earlier, selected Mr. Wilfred Odogola as its chairperson. The launching speech presented by the Chairperson of ATNESA challenged the new Network to go full thrust in implementing collaborative work to effect farm level development and application of AT and CA in Uganda.

Opening remarks by the Director General of the National Agricultural Research Organisation, Uganda.

Prof. Joseph K. Mukiibi

Honourable Minister of State for Agriculture,
Animal Industry and Fisheries,
Presidential Advisor on Agricultural and
Veterinary Services,
FAO Representative in Uganda,
Distinguished Delegates,
Dear Colleagues,
Ladies and Gentlemen.

The message conveyed by agricultural and rural livelihood statistics in Africa does not paint a good picture. In this respect per capita income for sub-Saharan Africa is very low and so are the earnings from agriculture. Tools used in agriculture are still largely primitive resulting in poor labour productivity. Similarly most smallholder farmers still utilise home saved planting materials with low production potential. There are weak strategies for conservation of the environment and natural resource base. All these factors aggregate into causing the high level of poverty that prevails in most rural areas in sub-Saharan Africa.

For purposes of this conference however the issues of labour productivity coupled with the environmental impacts of engineering technologies should form the major focus. As regards the former, it is worth noting that there

is still predominant use of the hand hoe, machete and axe in most parts of sub-Saharan Africa. According to available statistics, Uganda annually imports nearly three million hand hoes explaining why over 90% of the production in the country is hand-tool based. Animal traction for tillage accounts for only 8% of the production while tractor use is rather insignificant in most districts of the country.

The main challenge to scientists and workers in AT and CA is making farm tools and implements more efficient, comfortable to use yet affordable by the majority of our farmers. We must also cause a significant shift by farmers away from rudimentary technologies to better and more productive tools and implements.

From your program I note that the conference will also focus on conservation farming which advocates minimal or no tillage of the land and no mechanical weeding. This also poses a challenge, probably in the actual concept. All along, agricultural workers have advised farmers to properly till the soil prior to planting and that the field must be ideally weeded to achieve optimal yield. This time round we have to turn completely through 180° and begin advising the same farmers not to till and not to mechanically weed. This is a challenge! Still on CA, throughout Africa there are cases of notorious weeds that have challenged farmers over many centuries and new ones keep on emerging. Your meeting should also discuss ways and means of handling such weeds. Last but not least with

the introduction of the relatively new CA tools and implements, both research and extension workers must ensure a strategy for integrated introduction of the technology so that all major constraints in the CA production processes are simultaneously addressed.

In conclusion, please allow me Mr. Chairman to convey NARO's warm welcome to all delegates to this conference and in particular to those coming from outside Uganda. NARO is proud to be associated with the hosting of this important conference and wishes you all fruitful deliberations and a pleasant stay in Uganda. I THANK YOU.

**Opening remarks by the FAO
Representative in Uganda
Delivered by Mr. Charles Owach, National
Professional Officer, FAO**

Honourable Minister of State for Agriculture,
Animal Industry and Fisheries,
Presidential Advisor on Agricultural and
Veterinary Services,
Director General, NARO,
Distinguished Participants,
Ladies and Gentlemen.

Allow me Honourable Minister to welcome you to this important conference and to recognise the strong leadership your ministry has during the recent years provided to the agricultural sector in Uganda in general and to the Plan for Modernisation of Agriculture in particular. It is also a great pleasure for me to welcome all participants to this international conference on *"Modernising Agriculture – Visions and Technologies for Animal Traction and Conservation Agriculture"*.

I notice you are all well qualified personalities from a wide range of countries, and with a wealth of knowledge and experience ready to be shared at this forum. This is an important element which, coupled with the organised exhibition of technologies, makes this workshop unique.

Mr. Chairman, one of FAO's original mandates was the fight against hunger. This mandate is still not accomplished. The upcoming World Food Summit in Rome (10-13 June 2002) offers yet further evidence of this. Within the strategic goals to improve food security and at the same time preserve our

natural resource base, FAO considers Conservation Agriculture probably the most promising approach to sustainable agricultural development.

Some people consider Conservation Agriculture already as a new agricultural revolution. This time it is not a green one, but a blue one, as the better use of water is the secret behind it. I am sure we all know why it is a blue one. If not never mind, we shall all know by the end of the workshop. Water is the resource, which probably causes most problems in Africa. The theme of this Conference suggests therefore talking about Conservation Agriculture. I am reliably informed that the workshop will also show that Animal Traction can become an important factor for modernising agriculture in Africa and that it need not at all be a contradiction to modern technology, especially within the concept of Conservation Agriculture.

FAO is proud for having found at the very early stage of planning for this workshop, organisations active in Africa, which shared the same concerns and interests and which then joined into the preparations. In this way the workshop, more than being an FAO event, can be considered a true participatory partnership between the Uganda Network for Animal Traction and Conservation Agriculture (UNATCA), the Animal Traction Network for Eastern and Southern Africa (ATNESA), the African Conservation Tillage Network (ACT), the German Agency for Technical Co-operation (GTZ) and last but not least the Food and Agriculture Organisation of the United Nations (FAO).

I am reliably informed that during the workshop a number of presentations will be given to improve the understanding and knowledge of how to realise the contributions of Conservation Agriculture and Animal Traction in modernising agricultural visions and technologies. Software and hardware as well as tools and the socio-economic environment requires to do Conservation Agriculture will be addressed. I am confident that during the working groups' discussions, conclusions and recommendations will be developed which will hopefully lead to strategies and policies to accelerate the adoption of Conservation Agriculture in Africa.

An important element of the workshop will be CA equipment, visible in the exhibition and field demonstration, but also in the presence of manufacturers, representing the private commercial sector. The full integration of all stakeholders, from the farming, public and private sectors is the key for successful agricultural development. We are therefore proud that in this workshop we can welcome equipment manufacturers for the desired modernisation of agriculture, not only from Uganda, but also from abroad, namely from Brazil and several African countries, reflecting the South-to-South co-operation in a very visible way.

Honourable Minister, on behalf of FAO, I am happy to officially announce that much of the equipment being exhibited during this conference will actually remain in Uganda and will undergo adaptive testing in various agro-ecological zones of the country. It is a challenge to all those scientists that will be handling the equipment to be able to generate useful information that will directly feed into research, extension and manufacturing institutions and collaborators in Uganda and beyond. In this context the collaboration of the present manufacturers who have made a special effort to get their equipment in time to Jinja and who have even donated part of the equipment shown to the workshop, merits special mentioning as it is an important part of the commitment to the success of this event.

FAO hopes that the workshop will lead to fruitful discussions and produce the expected results to improve the rural livelihoods in Africa. With those few words, I wish you all successful deliberations and a happy stay in this fascinating country.

Opening Speech by the Guest of Honour

**The Honourable Fabias Byaruhanga,
Minister of State for Agriculture,
(Representing the Honourable Minister of
Agriculture, Animal Industry and Fisheries)**

Distinguished Delegates,
Workshop Convenors,
Dear Participants,
Ladies and Gentlemen.

I am greatly honoured to officiate in the opening of this very important International workshop on Modernising Agriculture with particular emphasis on visions and technologies for Animal Traction and Conservation Agriculture.

Allow me Mr. Chairman to welcome all of you distinguished delegates to Uganda and to Jinja Town –the source of the Great River Nile. You are assured of peace and tranquillity while you are deliberating in this workshop. Please, you are cordially invited to visit our rich traditional tourist sites during your stay in this country.

Ladies and gentlemen, Uganda Agriculture, just like in many other developing Africa countries, was invariably affected by political and economic instability that characterised post independent Africa. In the 1960s the agricultural sector in Uganda grew by 10% per year. However, the sector declined dramatically during 1970s and 1980s as a consequence of gross economic mismanagement, political and social disturbances, price and marketing disincentives, and shortage of farm inputs. Agricultural sector annual growth thus averaged minus 2%.

When the present Government came to power in 1986, we launched the Economic Recovery Programme with the aim of rehabilitating the dilapidated infrastructure and production sector. Furthermore, Government implemented the Agricultural Sector Adjustment Programme (1991-1995) to support financial stabilisation and to promote agricultural growth and diversification. These interventions resulted into agricultural growth of above 3.7% per annum. Currently the sector contributes about 42% of GDP; however, it still registers low farm yields, which are 30%, compared to the potentials demonstrated by research. This is due to low levels of technologies, lack of skills, inadequate extension services and low farm gate prices. Consequently 40% of Ugandans are poor with 26% living below the lower poverty line of US\$ 15 per month, as compared to the national per capita of about US\$ 330.

Government of Uganda recognises that agricultural sector is still the main source of household livelihood for 85% of the population. Like in most countries in Africa, the economy needs a vibrant agricultural sector

that provides for food security, raw materials for industries, poverty eradication through cash earnings to rural people and ready markets for industrial goods such as fertiliser, herbicides, pesticides and farm equipment including those for animal traction and conservation agriculture. In order to address the abject poverty in rural areas Government has designed Poverty Eradication Action Plan (PEAP). Modernisation of Agriculture, Primary Health Care, Universal Primary Education and infra-structural development are key pillars in the plan to eradicate poverty.

The Plan for the Modernisation of Agriculture (PMA) has broad strategies and principles designed to transform agriculture from subsistence to commercial farming. The plan has identified priority areas for intervention. They include, among others, Research and Development, private extension services delivery through the National Agricultural Advisory Services (NAADS) and sustainable use of national resources.

The International workshop on Animal Traction and Conservation Agriculture has, therefore, comes at a time when Uganda is implementing the Plan for Modernisation of Agriculture. We are also deepening and consolidating the implementation of the principles of decentralisation and devolution of powers to the people at appropriate levels where they can best manage and direct their own affairs

National Agricultural Research Organisation (NARO) which was solely mandated to spearhead agricultural research is being reviewed together with other Agricultural Research systems. The review exercise aims to formulate a decentralised, farmer-owned and demand-driven National Agricultural Research System (NARS). It is hoped that all research concerns on Animal Traction and conservation Agriculture will be farmer owned and demand driven and will address poverty eradication while protecting the environment.

As regards linkages and networking in animal traction, Uganda has followed the developments of Animal Traction Network for East and Southern Africa (ATNESA) since its inception in 1990. ATNESA has advocated for improved exchange of information and regional co-operation pertaining to animal draft power. This has provided a platform for

researchers, manufacturers, development workers, institutions, donors, NGO's and users of animal traction.

Today's workshop has attracted wider participation including advocates for conservation agriculture. This is a very important event in the context of the New Partnership for Africa's Development (NEPAD). Africa Leaders advocate for Africa's advancement in which all our people can fulfil their potential with effective participation in the global economy as equal partners.

Our colonial masters came and found us with our crude farm implements. However, the situation has not significantly improved since independence. Out of 17 million ha. of arable land in Uganda, only about 5 million ha. is under cultivation. The main reason is lack of accessibility and capacity to utilise appropriate farm mechanisation technologies. Consequently about 90% of farm power requirements are derived from human muscle using the hand hoe, 8% from animal traction and 2% from tractors.

Government strategic objective therefore is to target the provision of labour saving technologies to women, youths, individuals and farmer groups so as to bring more land under cultivation both for major food and cash crops. Conservation farming technologies will have a vital role in this respect.

Conservation Agriculture is not completely in new the African context. Before the on set of modern machinery, farmers used to plant crops, especially field peas, maize, cassava, bananas, in uncultivated land but followed by early weeding. Further more, conservation Agriculture is in line with the current urge by African Governments to promote sustainable development and public awareness of the need to manage land, air and water resources in a balanced and sustainable manner for the present and future generations.

Mr. Chairman, before I conclude, I would like to point out real challenges in the promotion of animal traction and conservation agriculture that this workshop must address:

- (a) Availability of animal traction and conservation equipment at affordable prices to end-users.

- (b) Integration of indigenous and exotic cover crops into existing farming systems
- (c) The menace posed by weeds especially in light of declining soil fertility and water holding capacity.
- (d) Negative cultural norms and beliefs that constrain promotion of animal traction and conservation agriculture.
- (e) The need for gender mainstreaming and empowering farmers through micro finance and capacity development

In conclusion, I must observe that many African countries will still continue to depend on the agricultural sector for sometime before

industrialisation takes off. The entry point for the eradication of poverty must therefore be through the modernisation of agriculture. The redress of the above challenges will lead to transformation of our agricultural systems. We are therefore looking forward to receiving concrete and practical recommendation from this workshop to modernise agriculture for poverty eradication.

I thank you for your attention.

I now have the honour and privilege to declare the workshop on Animal Traction and Conservation Agriculture open.

FOR GOD AND MY COUNTRY.

Abstracts of the keynote papers

Development of animal traction, conservation agriculture and rural transport in the context of modernising agriculture in Uganda: policy and strategy

J.O.Y. Omoding (MAAIF, Uganda) and Wilfred R. Odogola (NARO, Uganda)

Agriculture is the engine of Uganda's economic growth, contributing 42% of GDP, 85% of export earnings and providing employment to 80% of the current population of about 22 million. The country has an estimated three million households each with about 2.5 ha of land. These produce 94% of agricultural output. There is inadequate and inefficient utilisation of farm power countrywide: a major reason for the country cultivating only 27% of the agricultural land.

Animal traction technology was introduced into Uganda in 1909. A year later a farmer training school in ox cultivation was opened in Kumi and in 1920 the current Serere Agricultural and Animal Production Research Institute (SAARI) was established, among others, as a centre for research, testing, demonstration and training of farmers in ox-cultivation techniques. Through the extension efforts of the Ministry of Agriculture as well as of the relevant institutions including NGO's, the use of work animals rapidly spread throughout the Eastern and North-eastern parts of the country where ecological and cultural conditions favoured its development. In these areas the technology created remarkable impact in increasing the acreage under cultivation. Currently more than 10 districts in the country intensively utilise DAP with another 12 districts moderately using the technology. The rest of the districts do not use work animals on the farm.

This paper outlines the processes of introducing and extending draft animal power and conservation agriculture technologies into the country as well as the research efforts to develop new equipment both for animal traction and conservation agriculture. The paper also discusses the initiation of DAP equipment manufacture in 1967 by a privately owned farm equipment manufacturing and repair workshop in Soroti. These efforts

culminated in the establishment of the current Soroti Agricultural Implements and Machinery Manufacturing Company (SAIMMCO), a privately owned venture with capacity to meet farmer needs for improved animal drawn agricultural implements, post harvest implements, and other machinery and equipment with excess for export to the neighbouring countries.

As positive developments that point at sustainability, training in Animal traction technology that used to be undertaken by the Ministry of Agriculture at its colleges, district farmer training institutes and by extension staff and private sector in various districts, has now been strengthened through inclusion of draft animal power and conservation agriculture courses in curricula at primary, secondary, tertiary and university levels.

The paper proposes a policy strategy aimed at addressing some of the major constraints that have hindered promotion of draft animal power in the country. These include cultural, political, economic, environmental, land tenure aspects as well as training and care of work animals and maintenance and repair of draught animal implements. Strategies for sustainable introduction and promotion of the relatively new conservation tillage concepts into farming systems in Uganda are also discussed.

Overview of animal traction and rural transport in development: The case of Africa

P H Starkey (Animal Traction Development, UK) and P G Kaumbutho (KENDAT, Kenya)

Animal traction remains an important and sustainable source of farm power. An overview of animal traction (AT) in development and uses around the world was presented by Paul Starkey. Pascal Kaumbutho then highlighted the case of Africa region as a reflection on the new uses for conservation agriculture (CA) was brought forward. The place for animal traction in a world of discriminative modernity and the associated urbanisation processes remains an issue. The presenters focused on how the problems remain the same, even as a new approaches or newly found uses towards enhancing animal

traction utilisation for conservation agriculture take root. They suggested that even as CA development progresses, technology transfer problems remain the same and these will remain a hindrance, unless addressed anew.

The region is only now getting word across to farmers, that ploughs can be adjusted, animals can plant, ridge and weed. The entry of CA has to be carefully introduced to be sure that resource farmers do not get discouraged and even confused. Issues of economic, social, technical and environmental nature, whether in tillage, transport or other uses such as logging need a new consideration. The region has only recently started using animal drawn rippers and direct seeders. This is building on a decade of experimental work in Zimbabwe and Zambia. The Africa Conservation tillage Network (ACT) has been formed and national networks such as the Kenya Conservation Tillage Initiative (KCTI) with support from the Regional Land Management Unit (RELMA) are taking on the challenge.

Advances to CA need a system-wide view and intervention, where for example, links between CA and other components like rural transport and marketing are made real. The general absence but necessity of an AT and CA policy scenario among other development needs or tendencies will remain challenges.

The presentation captured the case of Africa and development hick-ups, centring around misplaced or under-rated development priorities. Recommendations centred on ways of meeting the new challenges to rural development and the renewed comparative advantages of animal traction technologies. This is important and the region has a new conducive environment as the region focuses on poverty reduction. Challenges are such as the eminent globalisation trends, which are likely to lead to a grossly disadvantaged consumer society in Africa.

The presenters recommended that the current shortcomings to exploitation potentials for animal traction, be met with combined national and regional efforts, be they promotional, industrial, institutional, financial or policy linked, in orientation.

More intensive and wider support at the centre, be it for farmer organisation and training or credit provision for access to inputs will remain mandatory. For sustained support regionally, organisations like Southern Africa Development Cooperation (SADC), Common Market for Eastern and Southern Africa (COMESA), East Africa Community and now the New Partnership for African Development (NEPAD) need to become part of the support network.

Conservation Agriculture in Development: The Case of Africa

Martin Bwalya (ACT, Zimbabwe) and Theodor Friedrich (FAO, Italy)

As the world population rises, pressure increases for agriculture to produce more food. This is more so for the African continent, where it not only food supply, but also economic development, poverty alleviation and improved living standards are vital factors. But agricultural production is one of the factors contributing to the degradation of natural resources in Africa. Conservation Agriculture (CA) however, offers proven agricultural production options, which combine production with sustainability.

CA can be characterised superficially by three main principles:

- Permanent maintenance of a soil cover of live or dead vegetal material on the soil surface. No burning of residues is allowed.
- Permanent no-tillage and direct seeding or planting of crops through the cover using special equipment.
- Planning of crop rotations over several seasons to minimise the build-up of pests or diseases and to optimise plant nutrient use by synergy between different crop types and by alternating crops with different rooting characteristics.

These three principles bring about the full benefits of CA while minimising the need for farm inputs, particularly agro-chemicals. Non observance of only one of these principles, for example crop rotation, makes CA more difficult to manage, less sustainable and increases the need for chemical inputs.

In the context of CA the case of Brazil is often quoted. Here particularly, there is a long history of farmers who practice no-till farming. They have managed to create a mass movement; indeed they have developed out of no-till farming, a farming concept which can be considered a real revolution in agriculture.

Obviously Africa is not Brazil; agro-ecological conditions are usually different. The socio-cultural framework is also different. However, CA in Brazil has allowed the solution of many problems, which are also very common in Africa. These include:

- *Soil degradation,*
- *Lack of water,*
- *Drought and unreliable rainfall,*
- *Labour shortage,*
- *AIDS pandemic,*
- *Lack of farm power and appropriate implements*

CA as a concept should be able to solve similar problems in Africa but the practical solutions, the actual field practices, have to be developed locally by farmers and researchers, as was the case in Brazil.

The terms Conservation Agriculture or conservation tillage are not entirely new to African agriculture. In Africa's agricultural development, the 1960s and 1970s could be described as the mechanisation era when many countries embarked on extensive agricultural mechanisation to increase agricultural output from increased area under cultivation. In the 1980s, as limitations to sustain these interventions become apparent, efforts moved to embrace other technologies, various of which relate to CA.

However, with the current rising demand for food in particular and agricultural productivity in general, coupled with less predictable rainfall, it is increasingly being realised that much more needs to be done.

While experience through a number of initiatives has shown that the principles of CA are feasible in the African environment, one must be aware that apart from technical aspects, success in their application and adoption must conform to the specific local socio-economic and cultural factors.

One critical benchmark in the development and promotion of CA is that the concept and principles have to be "internalised" into the African situation. The paper discusses a number of such key factors:

- *Awareness and appreciation of the problem,*
- *Awareness on possible options and technologies to address the problem,*
- *Compatibility or conflicts with existing cultural habits and traditions,*
- *Farmers' accessibility to necessary inputs,*
- *Public good and public sector commitment,*
- *Current state of the soils and Weeds.*

Although interpretations understandably vary, the term "Conservation Agriculture" is now a household name across the continent. Additional to numerous localised initiatives on Conservation Agriculture, there are some national, regional and international programmes addressing issues of Conservation Agriculture in Africa.

Whereas adoption of no-till based conservation farming practices is significant among commercial farmers in most countries, the extent of sustained adoption among smallholder communal farmers is minimum. Even with increasing focus on CA in smallholder agricultural programmes, it is still not uncommon to find heavily supported programmes focusing on conventional farming practices.

Abstracts of the invited papers

**SESSION 3: EQUIPMENT FOR
CONSERVATION AGRICULTURE**

**3.1 Equipment for Conservation
Agriculture: general status and trends**

Isaiah Nyagumbo (University of Zimbabwe)

This paper highlights current issues and trends in the development of conservation agriculture equipment in sub-Saharan Africa and analyses the factors that have been dominant in governing their developments. Prominent in agricultural development measures undertaken by most governments in the first three decades of post-independence era support to mechanisation interventions – initially focused on tractor powered systems and getting to embrace animal drawn systems as from the late 1970s. A large number of tractors and tractor equipment were imported into the region and supplied to farmers often at highly subsidised prices or used in government machinery hire-schemes.

Very little of development/adaptation of the imported farm machinery has done in Africa. Mechanisation in this period was targeted on conventional tillage systems based on the disc or mouldboard plough. Tillage equipment marketed during this period was therefore mainly for deep ploughing and mechanical weeding. Farm equipment in hand and animal smallholder systems has remained largely undeveloped and limited in both scope and variety – the hoe and the single mouldboard plough.

Increasing concerns about land degradation and the high cost of fuels from the 1980s has led to shift in attention towards conservation agricultural practices and particularly reduced or no-tillage practices. This has placed new demands for farm equipment adapted to this kind of farming system, i.e. equipment for planting and fertiliser placement through mulch, herbicide sprayers, sub-soiling and ripping, etc.

A large range of tractor drawn no-till/conservation agriculture equipment is now available. However, hand and animal drawn CA equipment is largely unavailable or where it can be found the range is very limited – essentially animal drawn minimum tillage rippers, slowly getting popular in Central and

Southern Africa. The paper presents available CA equipment in all farm power ranges, but more in hand and animal power systems. Research and equipment development interventions and on-farm adaptation processes and challenges are discussed. A range of some equipment developed so far and their main features is provided. By highlighting the critical role appropriate mechanisation and farm equipment would play in widespread adoption of conservation agriculture, the paper concludes suggesting possible strategies for development and promotion of CA equipment and mechanisation systems and ensuring farmers have access to such equipment.

**3.2 Smallholder equipment for
conservation agriculture**

Fatima Ribeiro (DMC/CIRAD, France)

The development of animal-drawn no-tillage equipment started in South Brazil in 1985 when IAPAR (the Agricultural Research Institute of the State of Parana), designed prototypes of a no-tillage planter and knife-roller for cover crop management.

With the increasing adoption of no-tillage by small-scale farmers, the private sector took over the role of designing and providing a wide range of hand-operated and animal-drawn equipment. This can be divided into three main groups: soil improvement, cover crop management combined with weed control, and planters.

For soil improvement, an animal-drawn long box gravity applicator is used. Metering device is comprised of an axle with agitators, driven by a land wheel.

Cover crops can be managed mechanically, chemically or both. Knife-rollers bend over and crush the plants. They consist of a roller with knives, a support, a traction bar and a protection structure. For chemical management and weed control, chassis-mounted knapsack sprayers are available. Land wheels drive the pump and the herbicide is applied through nozzles attached to a height-adjustable horizontal boom.

A wide range of options have been developed for direct planting, including hand-jab planters (“*matracas*”) and animal-drawn planters for different soil and seed types. In addition, there

are 2-3 row planters suitable for smaller tractors (15-25 Hp).

The performance and suitability of this equipment has been assessed according to different socio-economic and agro-ecological conditions.

3.3 Equipment for large scale conservation agriculture: Status and Trends

Peter Hickman (SRP Marketing, Zimbabwe)

Conservation tillage, in its various formats, has been practised commercially in Zimbabwe for the past two decades. The agricultural machinery manufacturers, a well established industry within Zimbabwe, have developed machinery to suit the various concepts in order to provide farmers with a choice of machinery that suits his particular systems and management style. The paper covers a broad spectrum of both local and imported equipment and systems ranging from zero till through to controlled traffic and conservation farming.

The agricultural trades' parameters have generally followed the line of avoiding making recommendations to farmers on specific systems but rather providing the farming industry with a choice of equipment to suit their needs and choices. During the course of development, considerable experience has been gained in the preparation required to introduce new land preparation systems. Issues such as wet and dry land preparation, soil compaction, fertility levels, PH values, etc., will be discussed. In addition, subjects such as soil erosion, compaction, usage of herbicides, disease control, crop rotation, economics and comparative costs will be included.

Machinery specifically designed to maximise moisture conservation, water retention and distribution, reduction of erosion and monitoring equipment will also be included.

The paper will provide participants with a comprehensive background of the development, adaptation and usage of a broad spectrum of conservation tillage with a particular emphasis on handling systems in sub-Saharan Africa with their unique rainfall patterns and soil structures.

3.4 Manufacturing farm equipment, marketing and provision of backup services

*Tony Rowland, Vimal Naik and Greg Garnie
(Zimplot, Zimbabwe)*

Zimplot Limited was established as a manufacturer of animal drawn farm implements at Bulawayo in 1939. It is the largest producer of animal drawn implements on the continent with extensive regional markets. Zimplot is the home of the Mealie Brand®™ range of farm implements. It is an ISO 9002 certified company and takes pride in the knowledge that its operating systems are of world class standard.

Besides the normal operational activities, Zimplot also has a research and development office to continually seek product improvement and develop new products. One result of this research is the single furrow plough whereby the original mass of 39 kg has now been reduced to 35 kg. An even lighter plough of 29 kg has also been developed specifically for use with donkeys. Besides these developments we also have a range of cultivators and planters suitable for oxen and donkeys.

One of the challenges facing Zimplot Limited is the question of standardisation and the paper describes how this is being faced.

The new challenge to established manufacturers is that of conservation agriculture. We are aware of the potential benefits and we have defined our research and development to include this aspect. We are working in collaboration with various agricultural research institutes in this regard and we are now in a position to produce the Pelabana/ILI ripper-planter attachment that fits directly behind the standard single furrow plough beam.

SESSION 5: ANIMAL TRACTION IN THE CONTEXT OF CONSERVATION AGRICULTURE

5.1 Animal as source of power (Husbandry issues)

*Tammi Krecek (University of Pretoria, South
Africa) and Anne Pearson (CTVM, UK)*

A healthy, well-fed, well-managed draught animal is essential when providing animal power for agriculture. Previous reviews at

ATNESA meetings have identified the challenges faced, and issues and opportunities available to improve management of working animals (Pearson et al., 1999, 2002). In this paper the ways in which delivery of extension messages have been and can be presented in order to help people maintain health well-fed animals that are well managed are identified. Factors which need to be considered in developing disease control and prevention programmes for working oxen and equids including vector borne diseases, helminth disease, and vaccination programmes are discussed. Experiences in improving management of working animals including nutrition, footcare, harness related injuries and working practices worm control, in rural and peri-urban environments are reported.

Most draught animals are owned and used by smallholder farmers and transport operators, who very often lack the financial means to pay for or access the information needed on nutritional supplements, vaccinations and drug treatments. Smallholder farms are often remote from veterinary services, placing the emphasis on preventative measures and local remedies when working animals do get sick. In many areas NGO's are increasingly operating to assist farmers and transport operators care for their animals, acting as a back-up to government extension services, which are sometimes constrained in their areas of operation by a shortage of running costs. Equine charities operate in peri-urban areas in some parts of Africa. They have traditionally provided static and mobile treatment teams for equines and training courses for farriers and harness makers. The effectiveness and sustainability of these services and ways in which delivery of health care and husbandry messages could be delivered to improve impact are discussed.

5.2 Integration of livestock in conservation agriculture

Cyprian Ebong (NARO, Uganda) and David G Smith (CTVMV, UK)

The population of Uganda of estimated at 22 million people and it is projected to be increasing at a rate of 2.5% pa. The increasing population demands increasing acreage of crops to meet the increasing demand for food, fibre and wood. Analysis of available data indicates that acreage has been increasing by

approximately 94 thousand ha per annum. Over seventy percent of the land cultivated to the annual crops is in the north and eastern parts of Uganda, where animal traction technologies are very vital to food security and household cash income. A survey was conducted in 14 districts of Uganda. Estimates of draught power supply potential from the national herd were estimated. Land area cultivated to annual crops was used to estimate the demand for animal draught power. The gap between supply and demand was computed over the next 30 years. Results indicated Uganda would not be able to meet demand for animal draught power by the 2030. It is concluded that, much as animal draught power was the most appropriate technology for increasing production and labour productivity in Uganda, there is need to increase the efficiency of sustainable tractive effort derived from oxen. Available options including minimum tillage technologies were proposed.

5.3 Animal power use in rural and peri-urban transport

T E Simalenga (University of Venda, South Africa) and P G Kaumbutho (KENDAT, Kenya)

Transport is a major aspect of rural life and urban communities. Efficient transport, apart from ferrying agricultural inputs and produce, can also facilitate other income-generating activities and lessen the women's burden of carrying firewood and water. The modes of transport in Eastern and Southern Africa range from head-loading, usually by women, on farm and village paths, to pick-up trucks on metalled roads. The other common mode is the intermediate means of transport (IMT) such as wheel barrows, hand carts, bicycles, animal panniers and animal drawn carts.

The paper discusses the recent developments in the rural transport sector and the role of animal powered transport in meeting on-farm needs, improving peoples mobility, marketing and employment opportunities.

Key issues such as entrepreneurship in animal power transport, gender issues and alleviation of burden to women farmers have been highlighted and possible interventions proposed. The paper concludes that industrial as well as equipment support services is required to enable the transport sector to thrive in rural and peri-urban areas.

**SESSION 6: POLICY ISSUES ON ANIMAL
TRACTION AND CONSERVATION
AGRICULTURE**

6.1 Sustainable input supply services for animal traction and conservation agriculture - policy issues

John E. Ashburner (FAO, Ghana)

A review of the agricultural machinery and equipment industry in Sub-Saharan Africa (SSA) reveals significant differences between countries. In the cotton production areas, a number of medium and large-scale workshops have been established for the production of animal drawn equipment, many of the units having eventually diversified production into agro-processing equipment and supplies for rural and urban needs (fencing, furniture and other lines) so as to attempt to achieve improved profitability. Other medium and even large-scale manufacturers are located in the more humid tropical areas and in the highlands, producing in particular, handtools.

International research organisations, NGO's, technology training and development centres, some agricultural mechanisation centres and many universities have been active in many countries producing prototype equipment but bottlenecks have occurred in many cases in bringing this equipment into local production. Some of the many emergency situations in the region, together with a number of heavily financed investment projects have seen massive importations of both handtools and some animal traction equipment, on occasion to the detriment of the local fabrication industry and distribution networks.

The industry and support infrastructure will be of paramount importance as efforts continue to broaden the adoption of conservation agriculture practices throughout Africa. This paper describes the present situation and attempts to draw some pertinent observations and conclusions.

6.2 The Benefits of a liberalised and decentralised development model: experiences from Uganda

F X K Wagaba (MOLG, Uganda)

During the last fifteen years Uganda has implemented a number of reforms which were intended to strength and improve the

performance of the economy; improve public sector management and delivery of services as well as promoting good governance. The institutional reforms focused on reducing Government control and regulation of development activities in the country; promoting of private sector initiative and involvement in development activities as well as creating an enabling environment for attracting both local and foreign capital investments. The expected outputs were achievement of rapid economic development through improved macro economic performance, delivery of services, public sector management as well good governance and public accountability.

6.3 Approaches for building farmers' management skills in animal traction and conservation agriculture use

Joseph Oryokot (NAADS, Uganda) and Michael Foster (SG2000, Uganda)

The Government of Uganda has adopted, amongst others, two important policies: the Poverty Eradication Action Plan (PEAP) and the Plan for the Modernisation of Agriculture (PMA). In these, the role of both the promotion of the use of animal traction and the adoption of conservation agriculture is accommodated. The role of the National Agricultural Advisory Services (NAADS) will be vital.

The vision of NAADS is a decentralised, farmer-owned and private sector serviced extension delivery system. Its mission is to increase farmer access to information, knowledge and technology for profitable agricultural production. The paper outlines the guiding principles of NAADS and the strategy for farmer capacity development for animal traction and conservation agriculture.

The institutional framework for agricultural service delivery is based upon farmer groups, Sub-County farmer's fora, District farmer's fora and a national farmer's forum. Service providers depend upon the expertise and support of the private sector, NGO's, universities and training institutions, research organisations such as NARO, UCDA and CDO, together with other governmental organisations. Linkages between these stakeholders are described, as also are the achievements to date.

**SESSION 8: ENTREPRENEURSHIP
DEVELOPMENT IN MANUFACTURING,
MARKETING AND SERVICE PROVISION**

8.1 Entrepreneurship and micro-enterprise development for animal traction and conservation agriculture

Isaac Sakala (Africare, Zambia) and Piet Stevens (IMAG, Zambia)

Micro and small businesses are crucial for developing countries: generating up to 40 percent of rural and half or more of urban employment. Between 500 million and one billion of the world's economically active poor people run such businesses, ranging from trading and service activities to small-scale production.

Micro-enterprises assist to meet basic human needs; provide skill and entrepreneurial training; and act as a vital link with formal sector businesses. More important, they are very close to their clients, flexible in their services and main players for sustainable poverty alleviation. Yet, fewer than two percent of micro and small businesses have access to credit - other than moneylenders in the informal sector.

IMAG and Africare through the Smallholder Agriculture Mechanization Promotions Project (SAMeP) in Zambia have since 1996 been working to assist small enterprises that are involved in the supply, distribution and maintenance of animal drawn conservation tillage implements. The entrepreneurs involved include private retailers and metal workshops in rural and peri-urban areas. Since the government of Zambia liberalised the agricultural sector scope for the development of such businesses largely increased. However, bottlenecks are the seasonal nature of the businesses, a widely scattered demand, low purchase power of the farmers, high lending interest rates and high costs of inputs.

This paper discusses IMAG and Africare's experience in supporting the development of a private sector based manufacturing and distribution network for conservation tillage implements and spares. It highlights the strategies used by IMAG and Africare, as well as successes obtained and lessons learned.

8.2 Empowering rural and peri-urban artisans: Uganda case study

J K Byaruhanga (Gatsby Trust, Uganda)

Uganda has recently launched the Plan for the Modernisation of Agriculture (PMA) as a key element for poverty eradication. Among the major strategies for PMA is the development and adoption of technologies for irrigation, increasing farm power and agro-processing.

Considering that most farmers are small scale (small holders), there is a role for appropriate manually operated or semi-automated technologies which will enhance mechanisation of production and agro-processing at or near the farm. Since these are usually small machines, one can see a role for rural and peri-urban artisans who can be assisted to manufacture and maintain these technologies.

UGT works with entrepreneurs in the small scale sector of whom artisans are part. Artisans especially those in the rural area usually lack tools, technical skills, design skills, work sheds, access to credit and to electricity.

These are the problems addressed by entrepreneurs who join Gatsby Club membership and are therefore able to access services from the Trust.

8.3 Elements for a conducive environment for internationally operating implement manufacturers and suppliers

Andre Verardi (SEMEATO, Brazil)

The paper describes the organisation of the company SEMEATO S/A in Brazil and in particular, their involvement in the supply of agricultural equipment for conservation agriculture. The adoption of direct drilling techniques in Brazil was brought about to a large extent by a mixture of public pressure and financial incentives. The farmers organising themselves into associations, encouraged the movement and there has been a growing interest by FAO, World Bank, GTZ and CIRAD.

The commercial attractions for locally producing the equipment include the ability to reduce costs. There are close links with the research organisations and the distributors

have gained sufficient technical knowledge and entrepreneurial skills to assist and train farmers.

There have however, been difficulties amongst which it is noted that there has been limited government support to manufacturers, there is considerable bureaucracy and goods destined for export are subject to considerable taxation. Logistics are also complicated.

The paper notes various aspects of importance for leading export companies such as SEMEATO. High quality products are essential with continuous updating of designs. Adoption of trade marks is necessary to protect the brands and the export business must form part of the strategic plans of the company. Export now constitutes the core business of SEMEATO.

SESSION 9: ORGANISATION OF MACHINERY USE AND SERVICES

9.1 Multi-farm use options for enhanced farmer accessibility to machinery and services

H.Loos (GTZ, Ghana)

In line with the Poverty Reduction Strategy of Ghana, the development of the agricultural sector is a key element. In Ghana, agriculture contributes 60% to domestic product, 65% to employment and 50% to exports. Increase in agricultural production and productivity, and the subsequent introduction of agro based industries are seen as the motor for economic growth, of generation income and creation of job opportunities.

However, the majority of Ghanaian farmers still work at a very low level of mechanisation, tilling the land with hand tools and transporting their produce by head load. These labour intensive production methods limit the area under cultivation and are responsible for severe yield losses due to untimely-performed operations. Furthermore, the tedious fieldwork and low returns to labour make agriculture increasingly unattractive for the Youth, resulting in migration from the rural areas.

A concept is needed that is agronomically sustainable and economically affordable, that produces sufficient quantities and quality of produce, and that provides for efficient post harvest services. Therefore, the concept of conservation farming should be promoted for

most conditions in Ghana in order to arrest soil erosion, sustain soil fertility, reduce production costs and make services affordable to small-scale farmers. A systems model for conservation farming is being presented.

Different organisational models are being discussed to assure efficient services. The establishment of Private Mechanisation Service Centres (Model of the German Maschinenring) that receive some support through Government is being favoured as an option, because it involves the private and the public sector, but maintains private entrepreneurship and assures organised service delivery.

9.2 Multi-Farm Use: The case of tractor and machinery hire-service in the Vhembe District of the Limpopo Province - South Africa

*Khathu Nedavhe-Muthala (BASED, South Africa),
Martin Bwalya (ACT, Zimbabwe) and
Edward Chuma (University of Zimbabwe, Harare)*

The Broadening Agricultural Services for Extension and Development (BASED) programme, jointly with the African Conservation Tillage Network, is working on community based development and promotion of sustainable soil and water management practices amongst smallholder farmers in the Limpopo Province (formally Northern Province) of South Africa.

In pursuing the objectives of the programme, private tractor owners operating farm machinery hire schemes, have been engaged to provide the needed power and machinery input in the operations. The paper discusses detailed experiences of about 30 private tractor owners in Limpopo province, their operators and the farmers using the service.

The paper highlights technical, socio-economic and cultural issues that influence successful management of a private farm machinery-hiring scheme, basing on the BASED project case. The paper discusses the role of multi-farm use and privately owned tractor-machinery hire schemes in increased smallholder farmers' accessibility to farm machinery in general and conservation farming equipment in particular.

9.3 Manufacturing of farm equipment, marketing and back-up services

Asubo Makarios(SAIMMCO, Uganda)

The role of agriculture in the economic development of Africa is fundamental. Agriculture must be transformed to produce adequate food for the rapidly growing population. We must also increase production of export crops in an increasingly competitive world. In order to maximise yields, appropriate implements have to be used and the various field operations have to be timed well according to the crop needs and environmental requirements.

Technology involves systematic knowledge of industrial art including concerning production by machines. For any technology to be useful in a community, it should be oriented to the needs of the majority. It should also be readily available and reliable, utilising available resources, capital and labour as much as possible so as to ensure its sustainability.

Implement development programmes aim at designing implements that can realise field operations to the satisfaction of farmers. With information gleaned from implement demonstrations, an assessment of their performance and effectiveness is used to develop them according to their shortcomings.

Sales Agent, supplemented by our own Depots are aimed at facilitating the provision of the necessary hardware. They also deal with the provision of information to different target groups such as farmers, artisans and extension staff. Small traders are being supported in areas where on-farm promotions of AT have been conducted to involve them in marketing of our implements and spares. SAIMMCO, like other manufactures and importers of agricultural implements, is struggling with distribution.

SESSION 10: MICRO-FINANCE IN ANIMAL TRACTION AND CONSERVATION AGRICULTURE DEVELOPMENT

10.1 Experiences with micro-finance in promoting animal traction and conservation agriculture: opportunities and bottlenecks

Basil Wanzira (PACODEV, Uganda), Wilfred R. Odogola (FARMESA, Uganda) and W. Nalyongo (PACODEV, Uganda)

In sub-Saharan Africa, typical goals of rural development include food production and poverty alleviation. Despite varying views on the best ways of achieving these goals, production intensification, exploitation of marginal lands and expansion of trade are among the options often sited. At smallholder level, accelerated adaptation and adoption of improved agricultural technologies and practices is one of the driving forces for sustainable rural development. Intensification of farming must be part and parcel of the strategy for ensuring livelihood security for most countries in sub-Saharan Africa, where per capita agricultural land is continuously decreasing.

This paper focuses on a number of issues related to financial service delivery for food production and poverty alleviation aimed at enhancement of rural development. The introduction outlines the needs for micro-finance in AT and CA, defines micro-finance and characterises micro-finance both formal and informal institutions that address needs of different levels of recipients.

Step-by-step procedures for preparing a borrower or group of borrowers towards timely loan repayment is given. The process includes a rapid appraisal survey to identify and catalogue borrower characteristics and their requirements in respect of AT and CA. Sensitisation of individuals, groups or associations are organised to respond to topics such as: What is credit? Why the credit? How does credit work? Who accesses it and how?

Other activities include rigorous training in business analysis and planning, registration of individuals, groups or associations, preparation and submission of business plans, lodging of loan requests and eventually, loan approval and disbursement.

In conclusion the paper outlines the case of micro-finance, which has very successfully operated under the Farmesa Project in Uganda.

REPORTS ON WORKSHOP ACTIVITIES



FIELD VISITS

Visit for Group #1: Selected Research Institute

27 participants enlisted for the field trip to two NARO research institutes: Kawanda Agricultural Research Institute (KARI) and the Agricultural Engineering and Applied Technology Research Institute (AEATRI) and later to Makerere University Research Institute, Kabanyolo (MUARIK).

KARI

At KARI, the Director of the Institute, Dr Magunda, met the team and provided an overview of the institute. The team then visited three of the four research programs at the institute:

- Postharvest
- Horticulture
- Soils & soil management
- Banana

At the Banana Research Program, the team visited demonstration plots depicting various management practices on banana which emphasise aspects related to CA. Methods of banana multiplication through tissue culture vs. suckers were also demonstrated.

At the Soils Management Department, the group saw cover crop management with generation of much discussion. At the Horticulture Program, the team visited the tree nursery where they were briefed through the different stages of preparing seedlings, including grafting and tissue culture techniques and the materials required. They toured the different shades, housing various plantlets including coffee, bananas, citrus and mangoes.

AEATRI

At the Agricultural Engineering and Applied Technology Research Institute (AEATRI) the group was given an overview of the institute: its establishment, mandate, objectives, programmes, activities and technologies developed. These included light model plough, planters, CT equipment, weeders, grass choppers, roots and tuber slicers, and maize shellers. In the water area the group was demonstrated a treadle pump, windmill, bio-gas digesters and other appliances.

Areas of concern included linkage to private sector manufacturers to multiply the technologies more so when they are interested in only those with a sure market. Widening source base for promising technologies (another model of the motorised maize Sheller available in Eritrea and willing to pass on

blue prints). There was definite interest in the relevance of the equipment to smallholder agricultural sector and enterprise. Some participants, particularly those from Ethiopia and Eritrea wanted to purchase some of the equipment like manual maize shellers but they were afraid of encountering export complications on departure to their home countries. They went on to enquire about having blue-prints for the same equipment but these were not readily available.

Kabanyolo University Farm

The team visited the Agricultural Engineering Department at this farm of the Makerere University Research Institute, holding discussions with various of the staff.

Visit for Groups # 2 & 3 : Farmer Training in Iganga & Tororo Districts

Two different groups, each of 25-30 participants were organised for this field visit, both groups visiting field sites in Iganga and Tororo districts.

Tillage demonstration, Mukulu

The sub-group that started at the Tororo end, started with a demonstration of ploughing by Sasakawa Global 2000 farmers at Mukuju Village, 8-10 km along the Tororo-Mbale road. The demonstration consisted of a two-to-three pass ploughing operation followed by a harrowing operation using a cultivator attachment to a Rumpstad multipurpose toolbar. The farmers including a 13-year old boy, demonstrated how to open a furrow for a plough-planting operation which needed two men while two women followed behind placing seed. The next demonstration was on weeding with an ox-drawn cultivator. The farmers were very good at what they did though were completely unaware of conservation tillage concepts. Farmers described the equipment in use as heavy and they needed lighter ploughs for smaller people and particularly for women.

Discussion with Tororo farmers

Africa 2000 farmers in Tororo were the next to be visited. These gave a tour of their gardens with cover-crop use in an agro-forestry and soil conserving system demonstrated. Cover crops in use were such as *Crotalaria* and *Gliricidia*. Tree crops like *Lucerne* were also observed to be in use. Use of pits to harvest rain-water around banana trees was a practice receiving intensive use among farmers. It was not clear why water collection pits were necessary in an area with relatively high

rainfall rates. Risk of flooding was considered to be eminent.

Visit to the SG 2000 One-Stop-Centre

The One-Stop-Centre is a Sasakawa Global 2000 (SG 2000) outfit where farmers obtain all aspects of farming and community development all at one stop site. It is a centre established with participation of enterprise women groups currently involved with the following activities:

- ◆ Processing cassava to *Gari* and other by-products,
- ◆ Making donuts and other snacks for sale to all,
- ◆ Stocking an assortment of agricultural inputs including farm equipment, seed, fertiliser and pesticides for sale to members and to all interested farmers within and outside the area.
- ◆ The group also conducts training on various aspect of agriculture including micro-finance.

The *One Stop Centre* is run by one of several SG 2000 projects as a means of providing a long term and sustained input and service support for women while building on their entrepreneurial capacity. SG 2000 role is to encourage women and empower them through training in business operation. This involving assistance and team and capacity building centre has the expected signs of growing to self-sustenance. After this is achieved, SG 2000 will cautiously pull out. The group initiative was a clear example of how rural people and particularly women can take control of their own development. Stockist supply systems are already being considered as some of the important ways of advancing conservation agriculture.

Ikulwe District Farmer Trining Institute, Iganga District

At this centre participants were demonstrated on-station as well as on-farm research work by NARO and its collaborators. This covered soil fertility enhancement aspects. The work also included integration of several cover crops into the farming system in this district. Farmers visited were very enthusiastic to receive the visiting team and could ably explain the trials in their fields.

Visit for Group #4 : Fabricators in Eastern Uganda

Visits were made by some 40 participants to manufacturers at different levels in Soroti and Jinja Districts, as indicated below.

SAIMMCO The Soroti Agricultural Machinery and Implements Manufacturing Company (SAIMMCO) started as an engineering plant established by Asian entrepreneurs in 1967.

It was established to manufacture farm implements and replacement parts for ginneries and other

general engineering items. Nationalised in 1972 after the expulsion of the Asian community, it was then rehabilitated and re-capitalised under a UNIDO/UNCDF/UNDP supported project, which started in 1987. It was then that the name SAIMMCO was established.

The company was privatised in 1999 and acquired by the current owners – the Alam Group of Companies. SAIMMCO is the sole large-scale manufacturer of farm implements, mainly animal drawn, in the country. The product range includes ox-ploughs, ox-carts, potato slicer, potato grader, groundnut shellers and lifters, dam-scoops, harrows, brick moulds, hammer mills, oil-press and bicycle parts.

The workshop is well equipped with versatile production machines allowing low production runs to be accommodated within its capacity.

It present, the company does not produce any CA related equipment the management expressed willingness to learn about this equipment and possibly take them on board in their product range.



Uganda Veterans Association Group – Kanapa Parish, Ongiino Sub-county, Kumi District

The team visited the Uganda Veterans Association Group at their base at Kanapa Parish in Ongiino Sub-county, Kumi District. These farmers use animal power and single mouldboard plough for land preparation. The Group held lengthy discussions and some also tried out the plough with the draft animals made available for the demonstration.

A local blacksmith in Ongiino Sub-county, Kumi District

The area is also known to have a number of local blacksmiths involved in the fabrication of an assortment of household and farm tools and replacement parts, including bicycle parts. The team visited Mr. Dividison Oelger who is one of the long standing and experienced blacksmiths in the area.

At now 75 years old, Mr. Olelger is still a full-time blacksmith, a practice he started at the age of 26 in 1953 learning on-the-job from his father. He indicated that he has managed to “feed” and educate his children all these years from his earnings in blacksmith.

He indicated that his major problem was sourcing of raw materials (scrap metal) for which sometimes he has to go long distances (to urban centres).

His range of regularly made tools and parts include:

- s/mouldboard plough shares
- s/mouldboard plough landsides
- s/mouldboard plough mouldboards
- kitchen knives
- axes and hoes
- bicycle saddle frame.



Jinja Steel Rolling Mills

The company, located in Jinja, is a large-scale foundry manufacturing an assortment of steel profiles, mainly from scrape steel. It manufactures a wide range of steel profiles – sizes and shapes. This includes deformed bars, flat and angle-iron profiles other made to specific user requirements. It supplies most of Uganda’s steel requirements and exports mainly to Kenya, Rwanda and Congo DR.

The Company is also part of the Alam Group of Companies. The company also makes the I-steel profiles, which are cut and bent to plough beam specifications and supplied to SAIMMCO.

Equipment exhibition and poster presentations

EQUIPMENT EXHIBITION

(with a contribution from Fredrick Ochieng)

There were numerous items of agricultural equipment and accessories on display designed for both farm and transport tasks. A total of 14 companies and organisations were represented, with five from Brazil, two from Uganda and Kenya,

and others from Ghana, Malawi, Zambia, South Africa and Zimbabwe. The equipment displayed is briefly described below.

Fitarelli (contact zenith@st.com.br)

This Brazilian company specialises in hand operated and animal drawn CA equipment. The display included:

- Hand operated jab planter for seed only
- Hand operated jab planter for seed and fertiliser
- Long beam AT direct planter
- Long beam AT minimum tillage planter
- Ride-on AT direct planter (illustrated)



Direct drill for seed & fertiliser

Iadel (contact iadel@cadl.com.br)

This is another Brazilian Company manufacturing hand operated and animal drawn CA equipment.

- Long beam AT direct planter
- AT ripper/weeder
- AT sprayer with accessories
- AT Knife roller



Pamphlets (written in Portuguese) showing equipment by both IADEL and KNAPIK.

A number of products by the two Brazilian companies were on display.



Knapik (contact : knpk@net-uniao.com.br)

This Brazilian Company specialises in manufacturing sprayers for small farmers:

- Hand operated wheel-barrow boom sprayer with accessories
- AT sprayer with accessories

Triton (contact : triton@tritonmaquinas.com.br)

Also from Brazil, manufacturing planting and spraying equipment for small farmers. It displayed:

- Long beam AT direct planter
- AT direct planter with press wheels
- Long beam AT minimum tillage planter
- Hand pulled boom sprayer
- AT ride-on boom sprayer

SEMEATO

(contact semeato1@pro.via-rs.com.br)

This is a Brazilian company established in 1965 and has since expanded to incorporate research and development, as well as a training school for people who work in the industry. The high technology machine they displayed was a multi-crop planter:

- Tractor mounted direct drill/planter

Micron Sprayers (contact micron@micron.co.uk)

Two of their sprayers were on display:

- The Handy (hand-held herbicide sprayer) This can apply either formulations or traditional water based products.
- The Ulva . This is a hand-held sprayer for insecticide and fungicide application, designed for low and ultra low volumes. It can apply both oil and water-based sprays.

SAIMMCO LTD (contact alamgroup@hotmail.com)

SAIMMCO is a private company run by ALAM Group of Companies in Soroti and manufactures farm implements. Some of the equipment they displayed plough, ridger, dam scoop (see photo), ox-cart with metallic wheels and Diamond spike tooth harrow.



Triple W Engineering (contact muckleb@africaonline.co.ke)

This is a private manufacturing company based in Kenya and producing a range of equipment. On display included donkey and ox-drawn equipment: donkey plough with weeder attachment, ox-drawn weeder, ridger attachment, single-row planter with harnessing as well as puncture-free tyres and manual weeder.



Mr. Muckle of Triple W

KENDAT (contact kendat@africaonline.co.ke)

Kenya Network for Draught Animal Technology (KENDAT) is a local non-governmental organisation that empowers resource-poor communities by advancing animal traction technologies. Current programmes focus on improving donkey welfare and utilization, promoting conservation agriculture for increased production and environmental preservation, and enhancing provisions for rural and peri-urban transport services in Kenya

A variety of harnesses and equipment were on display. They included:

- Collar harness and saddle for carting
- Saddles (locally modified and by Donkey Sanctuary)
- Pannier
- Mulch planter
- Ridgers (Victory brand)



Malawi Handcart Project

Malawi cart is quite versatile. It can carry grain to the maize mill, bricks carrying grass, water in polythene drums as well as being used as an ambulance.

The cart is made using bicycle wheels, and can easily be fabricated by a carpenter in about four days. The chassis consists of two frames, each of two planks, having a bicycle wheel sandwiched between them. These frames are held together by the wheel axles in their middle and spaced by wooden blocks.



Hastt, Zimbabwe (contact hastto@africaonline.co.zw)

Hastt Zimbabwe manufactures various tractor- and animal-drawn equipment and implements. The animal-drawn implements are manufactured under the brand name “Haka”, and the following products were on display:

- Haka plough
- Spike harrow
- Cultivator



Hastt stand

The Jab Planter Project in Ghana (contact ebobabee@yahoo.com)

The project focuses on the production of Jab planter, which was on display, using locally available materials (wood, sheet steels and mild

steel) and techniques. The production involves planning, steel rolling and drilling.

The project is part of conservation tillage research in Ghana and seeks to incorporate the introduction of Jab planter not just as a planting tool but also as an economic venture for local artisans.

Youth with a mission (YWAM) (contact work@ywam.or.ug)

This is an organisation based in Katakwi region of Uganda. Their goal is to attack poverty in this region and hold out hope to neighbours in Karamoja. The organisation has a design centre in Katakwi which trains farmers and artisans on manufacture of low-cost equipment. These include weeders, seeders, harrows, ridging ploughs, carts and donkey harnesses. The organisation displayed a weeder and a cart with double-rimmed bicycle wheels (see photo).



POSTER PRESENTATIONS

There were 15 poster presentations as indicated below:

1. Conservation tillage in Zambia: constraints and possibilities

by GART/IMAG (S. Muliokeba, W. Hoogmoed, P. Stevens, J. Simuyemba, D. Moono and D. Samazaka)

2. Conservation tillage for soil –water management under smallholder farming condition in Eastern Cape in S. Africa

by Universities of Venda and Fort –Hare (T.E. Simalenga, M. Mabi and O.J. Mandiringara)

3. Traction and Conservation Agriculture in Eritrea

4. AGROMISA (Knowledge Centre for Small-scale and Sustainable Agriculture in the tropics)

**5. Worms/ Africa Horse-sickness/
Community Tick Control/ Lumpy skin
disease/ Lung sickness (Contagious
bovine pleuropneumonia)**

by Department of Tropical Veterinary
Medicine, University of Pretoria

6. Namibia: Land of the brave

7. ACT services in conservation farming

by *GTZ/ ACT*

8. Marketing by women

- by Technology for Rural Animal Power Trap (D.
Wekesa)

**9. The impact of ox-weeding on labour use,
labour costs and returns in the Teso
farming system**

by *NRI (D. Barton, A. Okumi, F. Agob and L.
Kokoi)*

10. Training in Animal Traction

by *ARRADO/UVAB*

**11. Management of vertisols and luvisols of
semi-arid Eastern Kenya using animal
traction**

by *Kenya Agricultural Research Institute
(KARI)*

**12. Helping communities with their own
development**

by *Maasai Pastoralist Development
Organisation (L. Sakita and D. Conroy)*

**13. Animal traction in action in Tororo
District**

by *Farm Hands*

**14. The potential for conservation tillage
practices to improve smallholder maize
production in Zimbabwe**

**15. The development of reduced tillage
systems suited to the requirements of
resource poor farmers in Kwa-Zulu
Natal, South Africa**

by *ARC LNR (R.M. Fowler, P. Hlatshwayo and
J. Arathoon)*

**REPORT ON FIELD
DEMONSTRATIONS**



During the afternoon of Day 1, workshop participants, together with a number of farmers invited from the neighbouring districts of Jinja and Iganga, converged at the Agricultural Show Ground in Jinja for a demonstration of a range of CA equipment received from various Brazilian manufacturers. This was as follows:

- FITARELLI: several models of hand and animal drawn direct planters,
- IADEL: animal drawn ripper/weeder, direct planter, boom sprayer, knife roller
- TRITON: direct animal drawn planters, boom sprayers manual and animal drawn,
- KNAPIK: direct planter, wheelbarrow-boom and shielded sprayer.

Prior to demonstrating each of the equipment, its purpose and operational features were explained to participants. Manually operated direct jab-planters, wheelbarrow-boom and shielded sprayer were demonstrated one at a time. Both male and female participants took part in the actual operation of the equipment. For the animal drawn equipment, a pair of well-trained animals was used. One item of equipment after the other was demonstrated as the participants closely observed. Questions were asked and clarifications made. The Brazilian manufacturers took direct charge of these field demonstrations.

Workshop recommendations

Two days of discussions took place with six different Working Groups concerning the following topics:

Closing Ceremony

CLOSING SPEECH BY THE GUEST OF HONOUR

Dr Olaho Mukani
Director of Animal Resources, MAAIF
Representing the Permanent Secretary of Agriculture

Distinguished delegates
Workshop conveners
Dear Participants
Ladies and Gentlemen,

1. I am greatly honoured to officiate at the closing of this very important International Workshop on Animal Traction and Conservation Agriculture with emphasis on their contribution to the Modernisation of Agriculture. As I am made to understand, this is the first workshop combining the initiatives of both Animal Traction Network for Eastern and Southern Africa (ATNESA) as well as those of Africa Conservation Tillage network (ACT).
2. I am happy to note that the participants to this workshop have been drawn from no less than 16 countries of the world covering the five continents. The participants do not only come from different countries but also from many different institutions and disciplines with strong participation from the private sector. This multi-disciplinary participation is most welcome because it has provided wider base for sharing experience and knowledge that will contribute to government efforts to modernize agriculture.
3. To our visitors from outside Uganda, it is my sincere hope that the field tour you had on Wednesday exposed you to Uganda countryside and our efforts to promote animal traction and conservation agriculture technologies. The contacts you have established should now lay the foundation for future collaboration and networking.
4. The quality papers presented and discussions that followed have given a deeper understanding on the new concepts of conservation agriculture and broaden our knowledge and diversified uses of animal traction technologies. In this context I wish to thank the Brazilians, south Africans, Zimbabweans, Ghanaians, Kenyans, Ugandans, NGOs and SAIMMCO who brought equipment for demonstration and exposure. Special thanks goes to FAO, GTZ, UNIDO, ATNESA and ACT for facilitating of the workshop and enabling the equipment to be brought to Uganda. I am particularly happy to note that some equipment will remain in Uganda and will provide “engineering germplasm” for conservation agriculture in Uganda.
5. Finally, I am happy that Uganda Network for Animal Traction and Conservation Agriculture (UNATCA) has been formed and I am going to launch it today. The establishment of UNATCA is the product of the long collaboration with ATNESA. I am convinced that the existence of UNATCA will now promote networking with similar associations within Africa and beyond for mutual benefit.
6. In conclusion I must thank FAO, GTZ, ACT, NGOS, ATNESA, all participants and the National Organising Committee for the job well done.

I now have great pleasure in declaring UNATCA **LAUNCHED** and the International Workshop **CLOSED**. I wish all the participants and invited guests a safe journey back to their countries and institutions.

APPENDICES

Workshop Programme

TIME	ACTIVITY/PRESENTATIONS	CHAIR PERSONS
Saturday/Sunday 18th – 19th May 2002		
	Setting up posters and exhibits (continues all day)	
12:00	Registration desk opens and continues till 18:30	
DAY 1: Monday 20th May, 2002		
SESSION 1	WORKSHOP INTRODUCTION	MACBETH JAMES
08:30	Registration of participants continues	
09:00	Outline of workshop objectives and introduction of participants, by W. Odogola, Workshop Co-ordinator.	
09:15	Development of Animal Traction, Conservation Agriculture and Rural Transport in the Context of Modernizing Agriculture in Uganda; Strategy and Policy, by J.O.Y Omoding and W. R. Odogola	
09:30	<i>Tea break</i>	
SESSION 2	KEY NOTE PAPERS/ OFFICIAL OPENING	J J OTIM
10:00	Guest of Honour, Hon. Minister of State for Agriculture Animal Industry and Fisheries arrives F Byaruhanga	
10:05	Guest of Honour tours exhibits/Poster viewing	
10:45	Welcome remarks by Chairman of the Organizing Committee.	
11:00	<i>Key note paper:</i> Overview of Animal Traction & Rural Transport in Development: The Case of Africa by P. Starkey and P. Kaumbutho	
11:30	<i>Key note paper:</i> Overview of Conservation Agriculture in Development: The Case of Africa, M. Bwalya and T.Friedrich	
12:00	Official remarks by the Director General, NARO	
12:10	Official remarks by the FAOR	
12:20	Official Opening of the Workshop by Guest of Honour, Minister of State for Agriculture Animal Industry and Fisheries	F. BYARUHANGA
13:00	<i>Lunch Break</i>	
SESSION 3	EQUIPMENT FOR CONSERVATION AGRICULTURE	RICHARD SHETTO
14:00	Equipment for conservation agriculture: General status and trends, by Isaih. Nyagunbo	
14:20	Small-holder equipment for conservation agriculture, by Fatima Ribeiro	
14:40	Equipment for large scale conservation agriculture: status and trends, by Peter Hickman.	
15:00	Manufacturing of farm equipment, marketing and provision of back-up services by V. Naik and T. Rowland.	
15:10	DISCUSSION	
SESSION 4	MACHINERY EXHIBITION	T FRIEDRICH
15:30	Introduction to Exhibition and field demonstration/Refreshment at the Show ground.	
	Visits Exhibition/demonstration/	
18:00	<i>Workshop Cocktail</i> (Source of the Nile)	
DAY 2: Tuesday 21st May 2002		
SESSION 5	ANIMAL TRACTION IN THE CONTEXT OF CONSERVATION AGRICULTURE	ALUMA JOHN
08:30	Animal a source of power (Husbandry issues), by A. Pearson and T Krecek.	
08:50	Integration of livestock in conservation agriculture by C Ebong and D Smith	
09:10	Animal power use in rural and peri urban transport, by T Simalenga and P Kaumbutho	
09:30	DISCUSSION	
10:30	Tea Break	
SESSION 6	POLICY ISSUES ON ANIMAL TRACTION AND CONSERVATION AGRICULTURE	JOY OMODING
11:00	Sustainable input supply services for animal traction and conservation agriculture - policy issues by J. Ashburner	
11:20	The benefits of a liberalized and decentralized development model: Experiences from Uganda by Wagaba	

Workshop Evaluation

11:40	Approaches for building farmers' management skills in animal traction and conservation agriculture use J. Oryokot and A Foster	
12:00	DISCUSSION	
13:00	Lunch Break	
SESSION 7	EMERGING ISSUES	MODERATOR
14:00	PLENARY DISCUSSION AND INTRODUCTION TO GROUP WORK	
14:30	GROUP DISCUSSION ON EMERGING ISSUES	
16:15	Tea break	
16:45	GROUP PRESENTATIONS	
17:45	Field day guidelines	
Evening	<i>Informal presentations (videos, etc....)</i>	
DAY 3: Wednesday 22nd May 2002		
8:00	Field Visits	
Evening	<i>Workshop Dinner</i>	
DAY 4: Thursday 23rd May 2002		
SESSION 8	ENTREPRENEURSHIP DEVELOPMENT IN MANUFACTURING, MARKETING AND SERVICE PROVISION	T. SIMALENGA
08:30	Entrepreneurship and micro-enterprise development for animal traction and conservation agriculture by I Sakala and P Stevens	
08:50	Empowering rural and peri-urban artisans, Ugandan case study by J. K. Byaruhanga.	
09:10	Elements for conducive environment for internationally operating implement manufacturers and suppliers by Andre Verardi	
09:30	Discussion	
09:50	Posters and exhibition	
10:10	<i>Tea break</i>	
SESSION 9	ORGANISATION OF MACHINERY USE AND SERVICES and MICRO-FINANCE	T SIMALENGA
11:00	Multi-farm use options for enhanced farmer accessibility to machinery and services by H Loos	
11:20	Multi-farm use South African experience Kathu	
11:40	Manufacture of farm equipment, marketing and provision of backup services, by Asubo Makarious	
12:00	Experiences with micro-finance in promoting AT and CA: opportunities and bottlenecks B Wanzira	
12:20	DISCUSSION	
13:00	Lunch Break	
14:00	Group Discussion	
15:30	Break	
16:00	Presentation of group work	
17:00	Synthesis of issues from Tuesday to Thursday	
Evening	<i>Informal presentations (videos, etc....)</i>	
DAY 5: Friday 24th May 2002		
SESSION 10	WORKSHOP SYNTHESIS AND ACTION PLANS	JAMES MACBETH
08:30	Propose elements that contribute to modernising agriculture in the region using AT and CA	MODERATOR
10:30	Tea break	
11:00	Apply the proposed elements to the specific case of Uganda	
13:00	Workshop Synthesis	
13:30	Workshop evaluation; Launching of UNATCA and official closing of Workshop	
14:00	Lunch	
	Departure of participants Editorial Committee commences Report and Proceedings	

List of participants to the Workshop

Australia

Dr Des McGarry

Queensland Government
Block B NRTM, 80 Meiers Road,
Indooroopilly, Queensland 4066
61 7 38969566

McGarry@nrm.gld.gov.au

Austria

Jenane Chakib

VIC, UNIDO, D1sol Vienna
P O Box 300
+43 1260263876

c.jenane@unido.org

Brazil

A.L. Fitarelli

Rua Luiz loezer, 420
Cep. 99770 FITARELLI
ARATIBA/RS/BRASIL
55 54 376 1198

zenith@st.com.br

Andre Verardi

Semeato S/A
Rua Camilo RIBEIRO 190
99060-000 Passo fundo RS Brazil
55 54 315-1933
Fax 55 54 315-1451

andreverardi@semeato.com.br

Fausto Centofante

Triton, RUA Dois Lrmaos 163
Luzerno S.C Brasil
CEP 89609000
55 49 523 1144
Fax 55 495 231874

triton@tritonmoquinos.com.br

Mr. Beltrame

IIADEL, Rua Dono AUA 883
89155-000 DONAEMMA
Tel/Fax; 55 4736 40112

iadel@cadl.com.br

T. Bombassaro

Av. Comandante Kraemer, 339
CEP 99700-000 Room 201
Erechim/RS/Brasil
55 321 9690

Fax: 55 54 321 9503

zenith@st.com.br

Eritrea

Bahta Tedros

Head of Ministry of Agric ,
Southern Region, Eritrea

Zeru Gebremichael

Ministry of Agriculture
P O Box 4627 ASMARA
ERITREA
291 1 124864

semere@eol.com.er

Ethiopia

Abebe Belayneh

Agricultural Engineer, P O Box 62347
Addis Ababa, Ethiopia
00251 01 460 119
Fax; 460 423

empreseth.fao@telecom.net.et

Tolesa Shagi

Engineering Geologist, Ministry of
Agriculture, Addis Ababa
290 732 / 00250 760 119

Empruscth.fao@telecom.net.et

France

Fatima Ribeiro

DMC Global Network, CIRAD
32 RUE Lovis Figuier
34000 Montpellier, France

ribeiro@cirad.fr

Germany

Konrad Vielhauer

Research Fellow, Centre for Dev.,
Research University of Bonn
Walter Flex Street 3, 53113 Bonn
49 228 734634

kvielhau@uni-bonn.de

Kurt Steiner

Senior Technical Advisor
GTZ P O Box 5180, D-65726
Eschborn, Germany
49 6196 791081

Kurt.Steiner@gtz.de

Ghana

John Ashburner

Senior Agricultural Engineer
FAO Regional Office for Africa
P O Box 1628, ACCRA Ghana
233 21 7010 930
Ext 3135

Fax 7010 943

john.ashburner@fao.org

Appiah Kwame

Director, Kaddai Engineering Ent.
P O Box 2268 Kumasi Ghana
233 51 20492

Mob: 027 608 431

kaddai2000@yahoo.com

Dr Heinz Loos

GTZ Team leader
GTZ-SFSP P O Box 473 Sunyani
233 61 27376
Mob: 024 327847

gtzsun@ncs.com.gh

Emmanuel Bobobee

Agric Eng. Dept,
Kwame Nkrumah University of
Science and Technology (KNUST),
Kumasi, Ghana
233 51 60242

Mob; 233 20 8160184

ebobobee@yahoo.com

P. Osei-Bonsu

Research Officer (Agronomist)
Crops Research Institute,
P O Box 3785, Kumasi, Ghana
233 51 60282 / 60142 / 60389

pobonsu@forig.org

Joseph K. Boamah

Director, Agric. Engineering Services
Directorate,
Ministry of Food & Agriculture
P O Box MB82, ACCRA, GHANA
233 21 777789

233 21 701062

Mob: 233 27 565693

rtiu@ghana.com or

joeboamah@yahoo.com

Italy

Theodor Friedrich

Senior Agric Engineer
FAO – AGSE
Viale delle Term di Caracalla
00125 Rome, Italy
39 06 5705 5694

Fax: 3906 5705 6798

Theodor.friedrich@fao.org

Kenya

Fredrick Ochieng

Extension Liaison Officer
Kenya Network for Draught Animal
Tech (KENDAT)
P O Box 2859
00200 City Square, Nairobi
254 2 766 939

Mob: 254 722 336 883

kendat@africaonline.co.ke

Wamuongo Jane W.

Asst. Director
Soil & Water Mgt – KARI – Kenya
P O Box 57811, Nairobi
254 2 583301 – 20

jwwamuongo@kari.org

Pascal G. Kaumbutho

Chairman ATNESA
P O Box 61441 Nairobi
254 2 766 939

Fax: same

Mob; 254 722 308 331

kendat@africaonline.co.ke

Valentine Miheso

Smallholder Dev. Lead – Kenya
Monsanto
P O Box 47686
Nairobi – 00100

254 2 719567/719252-4

Mob: 254 722 527552

Valentine.miheso@monsanto.com

Caroline Sikuku

Livestock Production Officer
OAU/FITCA (K)
P O Box 261 BUSIA (K) – Kenya
254 336 22533/4
Mob: 254 733 960 980

Mwamzali Shiribwa

Head Agric Mechanisation Branch
Ministry of Agriculture
P O Box 30028 Nainobi, Kenya
254 2 721266

mwamzali@insightkenya.com

Charles Okello Mwanda

Coordinator Technology Design & Dev., Ministry of Agriculture Land Dev. Division P O Box 30028 Nairobi, 00100 Kenya
254 2 729535
Mob: 254 722 851 919
comwanda@yahoo.com

Soren Damgaard – Larsen

Advisor
P O Box 63403, Nairobi
254 2 524408
s.damgaard-larsen@cgiar.org

J.N. Maina

Agric Engineering Researcher
KARI NDFRC – KATUMANI P O
BOX 340 Machakos, Kenya
254 145 20422
kariikat@kari.org

Thomas B. Muckle

Company Director – Consultant
Triple W Engineering Ltd
Box 176 NARO MORU 10105 Kenya
254 176 62255
Fax: 254 176 62272
muckletb@africaonline.co.ke

Malawi**Kumwenda F. Wells**

National Research Co-ordinator
Ministry of Agric. & Irrigation
Chitedze Research Station Box 158
Lilongwe – Malawi
265 707 090/ 707 222
Mob: 265 937 624
farmesamalawi@sdnpp.org.mw

Mexico**Patrick Wall**

Conservation Agriculture Specialist
CIMMYT APDO Postal 6-641
06600 Mexico D.F., Mexico
52 55 5804 2004
p.wall@cgiar.org

Namibia**Mulanda John.**

Lecturer, University of
Namibia/Ministry of Agric
Private BAG 13188, Windhoek
264 61 2064095
Mob: 264 812587105
jmulanda@unam.na

Tyapa Martin

SAET – DEES
P/Bag 5556, Oshakati – Namibia
266 631/263 015

Namalambo Enny

National In-service Training
Coordinator, Ministry of Agriculture,
Water and Rural Development
P/Bag 13184 Windhoek, Namibia
264 61 2087006
Mob: 264 811296431
namalambo@mawrd.gov.no

Frans S. Itepu

Senior Agric Extension Technician
Ministry of Agric., P O Box 523,
Namibia
066 255666
Mob: 081 2587529

Mwemba David S.

Senior Agric. Extension Technician
Ministry of Agric Water and Rural
Dev., P O box 336
Katima Muliko Namibia
066 254457

South Africa**Njani Victor**

Ntlambe Farm
P O Box 687 Butterworth – 4960
Mob: 027 83 470 3521

Prof. Simalenga

Dpt of Agric. & Rural Engineering
University of Venda for Science &
Tech., P/Bag X5050;
Thohoyadou 0950, South Africa
tsimalenga@univac.za

Richard Fowler

Agricultural Research Council of South
Africa
P / Bag X9059 Pietermaritz burg 3200
27 33 3559410
Fax: 27 33 343 4281
Mob: 27 82 7776868
rmfowler@iafrica.com

Khathu Nedavhe-Muthala

Trainer GTZ – BASED
P O Box 17171 THOHOYANDOU
0950, South Africa
027 159 632004/7
Mob: 027 72 4164102
Nedavheks@norpov.agribo.gov.com
Base.gtz@pixie.co.za

J.R.L. Kotsokoane

Chairperson, National Research
Foundation, Faculty of Agriculture,
University of Fort Hare, P/B X1314
Alice, 5700, South Africa
27 40 6022 085
Mob: 082 659 8148
jomberta@ufh.co.za
transwld@adelfang.co.za

Mdledle L.N.

Chief Agricultural Technician,
Department of Agriculture & Land
Affairs, University of FortHare, Dept of
Agronomy, P/Bag X1314 Faculty of
Agric, Alice 5700, Eastern Cape
Mob: 072 475 6600

Mike Burgess

Micron Sprayers Ltd
14 Kruiin Crescent, Durban North
4051, South Africa
27 31 564 9874
juneb@iafrica.com

Prof Tammi Krecek

University of Pretoria, Dpt of Vet
Tropical Diseases, Faculty of Vet
Science Private Bag X04 Onders
Export 0110, South Africa
27 012 529 8022
Mob: 27 082 779 1402
tkrecek@op.up.ac.za

Tanzania**Gorge Sempheo****Richard Shetto**

Head Mechanization Unit,
Ministry of Agriculture and Food
Security
P O Box 9071 Dar es Salaam
255 22 2866351
Mob: 255 74 4373395
sclupu@raha.com

Lobulu Sakita

Zonal Coordinator
Inyuat Maa
254 4444
Mob: 0744 578263
lobulu@yahoo.gm

Elly Simon Mbise

Mechanisation Officer
Babati District
255 27 253 1260
isobabati@yahoo.habari.co.tz or
embise@yahoo.co.tz

Ngowi Linus

Agromechanisation Officer
Ministry of Agriculture – TZ
P O Box 9071 Dar-es-Salaam
Mob: 0741 213102
sclupu@raha.com

Mbise Elly Simon

District Mechanisation Officer
Min. of Agriculture & Food Security, P
O Box 537 BABATI – ARUSHA
027 2531259
027 2531260
embise@babati.co.tz
Iso.babate@gall.haban.co.tz

The Netherlands**Luurt Oudman**

Consultant Representing AGROMISA
Stoevenweg 10A
2141 MP 8 Heino, The Netherlands
31 572 391159

Uganda**Bazarabusa Jesse**

Chairperson District Farmers Fora,
Kabale, Box 7, Kaguguza

Magezi Joseph

Expert Farmer (Trainer)
Uganda Land Management Project
Box 1893, Mbarara
256 0485 21301

Etongu Geoffrey
Project Coordinator
Draught Animal Power Community
Welfare Initiative
DACWI Project, P O Box 187 Soroti
Etongu.Geoffrey@yahoo.com

Basil Wabugoya Wanzira
Programme Director
Poverty Alleviation (PACODEF)
AEATRI/FARMESA
Box 1375 Mbale
256 77 487 938

Waata Fiona
Project Coordinator
Box 7184 Kampala
256 41 543 407
Mob: 256 77 448 785
Funata@yahoo.com

Kasangaki C.B
District Coordinator
Hoima District Farmers Association
P O Box 240 Hoima
256 465 40450
Mob: 265 77 608050
kasangaki@hotmail.com

Oliao Simon
Manufacturer
YWAM Dept of Design Centre
Box 50 Katakwi
256 45 73070
work@ywam.or.ug

Loumo Ayolo Teddy
Project Engineer
Karamoja Projects Implementation
Unit EU, P O Box 61 MOROTO
256 45 35077
Mob: 256 77 540306
omuolte@yahoo.com

Cyprian Ebong
Namulonge Agricultural Research
Institute,
PO Box ??, Kampala
077 200 342
Cyprian.ebong@narodanida.org

Omoding J.O.Y
Ag. Director Crop Resources
MAAIF Box 102 Entebbe
256 320187
Mob: 256 77 518884

Wilfred R. Odogola
Agric. Engineering Research Inst.,
PO Box 7144, Kampala
256 41 566 161
Mob. 077 220010
Aeatri@starcom.co.ug

Alphonse Candia
Agric. Engineering Research Inst.,
PO Box 7144, Kampala
256 41 566 161
Aeatri@starcom.co.ug

Florence Kiyimba
Agric. Engineering Research Inst.,
PO Box 7144, Kampala
256 41 566 161
Aeatri@starcom.co.ug

Samuel Okurut
Agric. Engineering Research Inst.,
PO Box 7144, Kampala
256 41 566 161
Aeatri@starcom.co.ug

Flemming Eriksen
DANIDA, Kampala

Macbeth James
Project Officer
GTZ
Mob: 256 77 765 958
jamesmacbeth@yahoo.co.uk

Joseph Mugagga
Tutor Kulika C. Trust Uganda
P O Box 11330 Kampala
256 41 266 260
Mob: 256 77 609 515
Uganda@kulika.org

Dramadri Ceasar
Sub-county NAADS Coordinator
Arua District Local Govt
Kijomoro Sub-county
P O Box 35 ARUA
256 77 581 537

Mr. Olinga Silver
District NAADS Chairman
P O Box 100 Tororo Uganda

Auta Deo
Chairman Soroti District NAADS
Fora, Box 489, Soroti

Beinenganda Joseph
NAADS Kabale District Core Team
Member, Directorate of Production &
Marketing, Kabale District Local
Govt., P O Box 5 Kabale

Dr Oryokot Joseph
Technical services Manager
NAADS P O Box 25235,
Kampala
256 345440
Mob: 256 77 200261
naads@utonline.co.ug/

Draadro Ceasar

Draguma Patrick
Chairman District Farmers For a,
National Agricultural Advisory
Services, Office of Production and
Marketing, P O Box 1 ARUA
Mob: 256 77 364 196

Kyambadde Maurice
Subcounty NAADS Coordinator
National Agricultural Advisory
Services, P O Box 1530 Jinja
Mob: 256 77 436035
mauricioug@yahoo.com

Kirunda Sam
Chairman Farmers Forum – Mukono
District P O Box Wakisi
256 71 864 010

Kwehangana C Rutaro
Farmer (District Chairman)
Farmer Forum NAADS
P O Box 5 Kabale
Mob: 256 77 368 238

Kwehangana R.

Sr. Veronica Oyela
Chairperson, Forum for Kalongo
Parish Women's Association
(FOKAPAWA),
P O Box 7038, Kampala
256 41 221566 / 347291-3

Dr John J. Otim
Interim President, Agricultural Council
of Uganda (ACU)
1st Floor Bauman House
Parliamentary Avenue
Box 7038, Kampala
256 41 235784
Fax 256 41 346560
Mob 77 430978
jjotim@hotmail.com

Onangole John
Agricultural Officer
MAAIF – NAADS
P O Box 61 Soroti (u)
Mob: 256 77 557 686

Opendi Geoffrey Ochwo
NAADS Coordinator
MAAIF,
Box 100 TORORO
256 41 45005\Mob; 256 77 362 650

Bosabosa Anthony

Alacho O. Francis
Senior Research Officer Adaptive
Research,
P O Box 295, Entebbe
256 41 320178
Mob: 256 77 693 806
onape@infocom.co.ug

Balitta Paul
Principal Technician
NARO/FORRI Box 1752 Kampala
256 77 731611/ 255 163-4
kifu@afrikaonline.co.ug

Mubiru Drake
Research Officer, National Agricultural
Research Organisation
P O Box 7065, Kampala
256 41 567 696
Mob: 077 534 247
Mubiru70@hotmail.com

Otai John Francis
Engineer, Ministry of Agriculture,
Animal Industry and Fisheries
P O Box 102, Entebbe
256 41 320 130
Mob: 256 41 77 467 874

Nathan Nangoti
Research Officer
NARO/DFID Project
P O Soroti Uganda
256 77 221351
Mob: 256 77 677 152
corso@infocom.co.ug

Pius Elobu
Research Officer
NARO/DFID
P O Soroti
256 77702553
Mob: 256 77 668 592; 77 389 814
corso@infocom.co.ug

John B. KaluleSewali
Commissioner Farm Development
MAAIF P O Box 102 Entebbe 256 41 320 985
Mob: 256 77 592 157
agrebbe@infocom.co.ug

Kisala Kaira Charles
Project Coordinator, Transport Forum
Group (Uganda), National Resources
International (UK)
P O Box 20 Kyambogo
256 41 286 218
Fax: 256 41 286 218
ckkaira@africaonline.co.ug

Anthony Nyakuni

Dan Miiro
Eragu Paul
Quality Controller
SAIMMCO Ltd
P O Box 280 Soroti
256 45 61363
srm@infocom.co.ug

Sam Arubu Eladu
ATRADO
P O Box 682 Kampala
256 77 471 933
arubusam@hotmail.com

Macarius Bonse Asubo
Marketing Executive
SAIMMCO P O Box 4641
Kampala
256 41 234000/1
Mob: 256 71/77 493 171
Asubo.lalargroup@hotmail.com

Alan Chadborn
Leader Design Centre, YWAM
P O Box 50, Katakwi
256 45 73070
work@ywam.or.ug

Wekesa David
Director, Technology for Rural Animal
Power
P O Box 1441 Kamwenge
256 77 603669 / 77 603 905
forud@yahoo.com

B.R.E. Kayaayo
Programme Coordinator, SG2000,
Ruth Towers, PO Box 6987, Kampala
256-41-345497
077-684767
Sguganda@starcom.co.ug

Kazungu D.H.S.
District Coordinator SG 2000,
Kampala
256 71 922 719

Kabanyoro M.V.
Assistant Agricultural Officer
MAAIF Uganda Box 38 Fort Portal
256 77 610 948

Alice Tibazalika

Apiko Francis
Integration Programme Manager
Uganda Veterans Asst. Board
P O Box 12527 Kampala
256 41 251816
256 77 425 877
fapiku@yahoo.co.ug

Mondo Emilio
Executive Secretary
Uganda Veterans Asst. Board
P O Box 19527 – Kampala
256 41 250 193
fapiku@yahoo.co.ug

Consoli Giuliano
Coordinator
SVI Service Voluntary International
Box 3872 Kampala
Mob. 256 75 657 265
apaa@oyelelalihero.lt

Severino. Fendu E.V.
AO/District ULAMP Coordinator
Box 1 ARUA
Mob: 256 75 657 265

Christopher Kaptekin

Joseph Magenzi

F X K Wagaba
Decentralisation Unit,
Ministry of Local Government,
Kampala
256 41 342 864

Oyet Obuja
Agricultural Council of Uganda (ACU)
P O Box 7038, Kampala
256 41 236 473-4
Mob: 256 75 615 269

Dr. J K Byaruhanga
GATSBY Trust Foundation
gatsby@tech.mak.ac.ug and
jbyaruhanga@yahoo.com

Basil Wanzira
Poverty Alleviation and Community
Development Forum (PACODEF),
Mbale
077 487 938

U.K.
David Smith
Centre for Tropical Veterinary
Medicine,
Easter Bush Roslin Midlothian
Scotland EH25 9RE – UK
44 131 650 7969
Mob: 44 0774
dsmith4@staffmail.ed.ac.uk

Anne Pearson
Senior Research Fellow, Centre for
Tropical Veterinary Medicine
Easter Bush Veterinary Centre
University of Edinburgh Roslin
Midlothian EH25 9RG – UK
44 131 450 6217
Fax: 44 131 445 5099
Anne.pearson@ed.ac.uk

David O'Neill
Silsoe Research Institute
Wrest Park Bedford UK
dave.oneill@bbsrc.ac.uk

Ulrich Kleih
Natural Resources Institute DFID
Chatham Maritime, Kent ME4 4TB
44 1634 883 065
U.k.kleih@gre.ac.uk

David Barton
NRI DFID, University of Greenwich
Central Avenue
Chatham Maritime ME4 4TB – UK
44 747 840 893
Mob: 44 7740 511528
cpi_ltd@compuserve.com

Prof. Paul Starkey
Animal Traction Dev & University of
Reading, Oxgate 64 Northcourt Ave.,
Reading RG2 7HQ, UK
44 118 987 2152
paulstarkey@animaltraction.com

J.B. Odoki
Lecturer I Civil Engineering.
University of Birmingham
44 121 414 5053
Fax: 44121 4143675
j.b.odoki@bham.ac.uk

U.S.A.

Drew Conroy
Associate Professor, University of New
Hampshire, 22 Little River Road
Berwick ME 03901 – USA
207 698 4651
oxwoodfarm@aol.com

Arnold Wendroff
Research Associate,
Malawi Handcart Project,
544 Eighth Street, Brooklyn, New
York 11215 4201 USA
001 718 499 8336
Mercurywendroff@mindspring.com

Zambia

Isaac Sakala
Project Coordinator
Africare SAMEP
P O Box 33921, Lusaka
260 0126 4406
Fax 260 0126 2377
Mob: 260 96 436 728
isaacsakala@hotmail.com or
samep@zamnet.zm

Piet Stevens
IMAG P O Box 31905 Lusaka
260 1 264560/97 781 464
pstevens@zamnet.zm

Samazaka David K.
Agronomist, Golden Valley
Agricultural Research Trust (GART)
P O Box 670577 Mazabuka, Zambia
260 32 30722
gartmgv@zamtel.zm

Moono Douglas
Agronomist, Golden Valley
Agricultural Research Trust (GART)
P O Box 50834 – LUSAKA
260 01 233 739
gartmgv@zamtel.zm

Chelemu Kenneth
Technical Assistant, SASWAR
P O Box 51376/35301
LUSAKA
260 1 243 394
Mob. 260 97 851 445
gartmgv@zamtel.zm

Chiti M. Roy
Land Husbandry Advisor
Orgut Consulting AB
BOX 510091 CHIPATA – ZAMBIA
260 062 21284; 21379
scafeast@zamnet.zm

Shula Reynolds
National Coordinator
Land Management & Conservation
Farming Programme, Dpt of Field
Services, P O Box 50291 Lusaka
097 774 744
scafe@zamnet.zm

Dutch Gibson
Conservation Farming Unit of Zambia
National Farmers Union
P O Box 30295 LUSAKA
260 1 265488
Gibcoll@zamnet.zm

Zimbabwe
Edward Chuma
Lecturer/Chairman ACT
University of Zimbabwe, Dept of Soil
Science, P O Box MP 167, Mount
Pleasant, Harare, Zimbabwe
263 4 339191
Mob: 263 91 235 047
chuma@africaonline.co.zw

Martin Bwalya
African Conservation Tillage Network,
P O Box MP167 Harare
263-4-334395
Fax: 263-4-332853
actsecre@africaonline.co.zw

Allan Norton
Kingsway Community Church,
PO Box 181, Bindura
263-717149
Fax 263-11-625221
Anorton@mango.zw

Isaiah Nyagumbo
University of Zimbabwe, Dpt of Soil
Science & Agric Eng Faculty of Agric
Box MP 167 Mt Pleasant, Harare
303 211 Ext 1879 302240
Mob: 091 238284
inyagumbo@agric.uz.ac.zw

P.D. Hickman
SRP Marketing,
Bain New Holland
P O Box 1180, HARARE
263 4 621 081 – 8
Mob: 263 4 403 765
hickmang@bain.co.zw

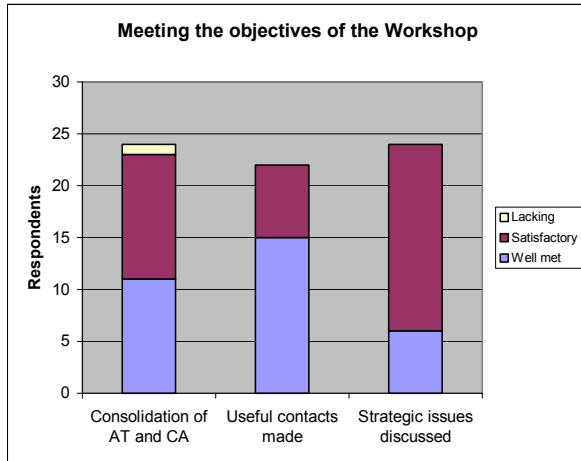
Savala Ivan
Managing Director
HASTT Zimbabwe
P O Box 2356
HARARE
263 62 3355
Mob: 263 11 407414
isavala@hastt.co.zw

Tony Rowland
Managing Director, Zimplot Ltd,
PO Box 1059, Bulawayo
263-9-71363/4
011 230863
Trowland@zimplot.co.zw

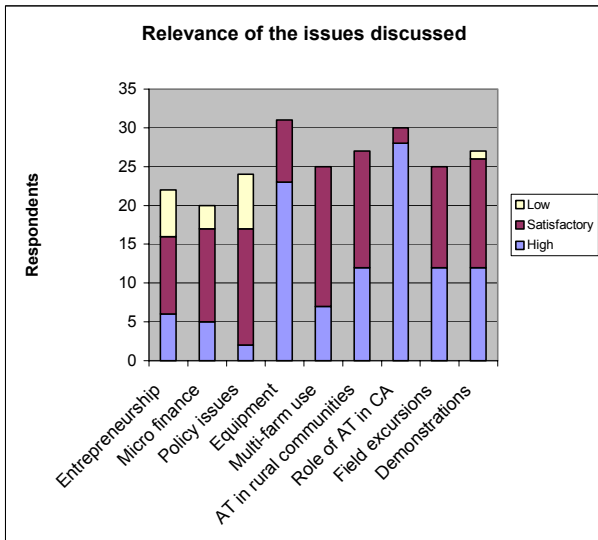
Vimal Naik
Marketing Director, Zimplot Ltd,
PO Box 1059, Bulawayo
263-9-71363/4
011 604 148
vnaik@zimplot.co.zw

Workshop Evaluation

An evaluation of the Workshop was undertaken on the last day, the participants being requested to mark their evaluation on flip-chart sheets. The results referring to meeting the objectives of the Workshop are indicated below.

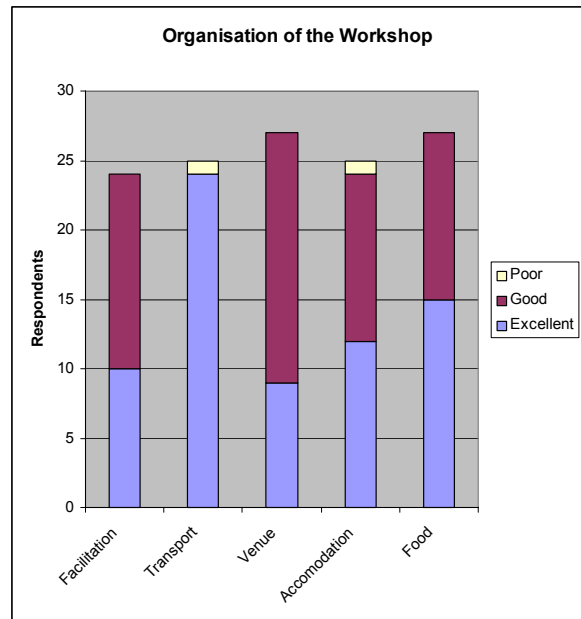


The relevance of the 9 different issues discussed during the Workshop were judged as indicated below. It is seen that the central themes of the workshop “Equipment” and “The Role of AT in CA” were deemed highly relevant.



Overall organisation of the Workshop was also evaluated, with very satisfactory results. The

transport arrangements in particular were well appreciated.



There then followed an in-depth questionnaire including 30 questions regarding the individual papers, the group discussions, field trips and again an overall view of the workshop and its organisation. The following chart illustrates the replies, all aspects being judged either useful or very useful.

