



PROCEEDINGS OF AN INTERNATIONAL SCIENTIFIC SYMPOSIUM

“AFRICAN CAVY CULTURE: YESTERDAY, TODAY AND TOMORROW”

By the project
Harnessing husbandry of domestic cavy for alternative and rapid access to food
and income in Cameroon and the eastern Democratic Republic of the Congo

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Foreword

Cavy (*Cavia porcellus*, commonly also called Guinea pig or *cobaye*, *cochond'Inde* in French and *dende* in the Swahili of Sud-Kivu) is an animal that can multiply easily because of its undemanding management by smallholder farmers. A question arises: how to ensure that this animal brings more profits to farmers and contributes to eliminate food insecurity? In an attempt to find answers to this question, the Cavy project, titled "Harnessing husbandry of domestic cavy for alternative and rapid access to food and income in Cameroon and the eastern Democratic Republic of the Congo" had as main objectives to (i) analyze livelihood and strategy development, (ii) genetic diversity and animal improvement, (iii) improved forages for higher productivity and soil fertility, and (iv) capacity building and information gathering and dissemination. These activities were carried out over a period of two years (2012 and 2013). The project received financial support by the Australian Agency for International Development (AusAID) under the Africa Food Security Initiative and through the partnership between the Commonwealth Science and Industrial Research Organisation (CSIRO) and the Biosciences eastern and central Africa (BecA) Hub at the International Livestock Research Institute (ILRI). Its partners are the University of Dschang in Cameroon, the International Center for Tropical Agriculture (CIAT) and the Université Evangélique en Afrique in Bukavu, DRC. Further information on the project is available on WikiCavy (<http://wikicavy.wikispaces.com/>).

This symposium aimed to share results obtained from the project's research during its first phase and prepare for a new phase. For the symposium we followed our model of integrated agricultural research for development (IAR4D) and its innovation platform (IP) as the approach to address the cavy value chain by listening to findings and lessons from IP members first. The subsequent presentation of results followed the project's objectives and, therefore, concerned the role of cavies for livelihood improvements, diversity of production systems and genetics, and feeds and feeding of cavies – presentations from both Cameroon and DRC for each theme. Thereafter, discussion groups were held on research of cavy culture – from the scientific perspective and the role of cavies in livelihood improvement – from the development perspective. Finally, a plenary discussion was performed to recommend the way forward for a new project phase. The majority of presentations were made in English, while those given in French or Swahili have been translated.

The symposium attracted a variety of participants, representing researchers and students trained through the project; representatives from NGOs and communities who played key roles in the implementation of the project; as well as from the local government and media, among others. The overall 63 participants came from Cameroon, Kenya, Rwanda, Tanzania and DRC.

The symposium, as these proceedings show, has helped us all to gain more clarity as to how enhancing cavy culture may impact on improving livelihoods. The project teams both in Cameroon and eastern DRC have been excited to see how much creativity, innovation and engagement the project has stimulated especially by innovation platform participants. However, the symposium has also helped to raise numerous new research questions that ought to be tackled by a successor project.

Project responsables

Project function	Name and institution
Overall project leader	Appolinaire Djikeng (BecA) / Felix Meutchieye (Univ. Dschang)
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Output 3 – Forages and feeding	Brigitte L. Maass (CIAT) and Aziwo T. Niba (Univ. Dschang)
Output 4 – Capacity building and information dissemination	Felix Meutchieye (Univ. Dschang) and Brigitte L. Maass (CIAT)

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1. The unreserved engagement of our teams as well as the logistical and technical support offered by them:
 - Cameroon: University of Dschang and AEAC
 - Democratic Republic of Congo: Université Evangélique en Afrique (UEA) and Institut National d'Etude et de Recherche en Agronomie (INERA)
 - Kenya and Rwanda: The Biosciences eastern and central Africa (BecA)-ILRI Hub and the International Center for Tropical Agriculture (CIAT)
2. The cavy farmers and all our partners in the Innovation Platforms for their kind collaboration and openness in sharing their views and experiences;
3. The Africa Biosciences Challenge Fund (ABCF) for fellowships;
4. The BecA/ILRI-CSIRO partnership of the African Food Security Initiative;
5. AusAID for funding our research.

1. PRELIMINARIES

1.1. General overview

“Harnessing husbandry of domestic cavy for alternative and rapid access to food and income in Cameroon and the Eastern Democratic Republic of Congo” also called the ‘Cavy project’ was launched at the University of Dschang, Cameroon in November 2011. In Cameroon, the project has been implemented by the University of Dschang, while in Sud-Kivu, eastern Democratic Republic of Congo (DRC) by the *Université Evangélique en Afrique* (UEA) together with the International Center for Tropical Agriculture (CIAT). In both countries several partners were key, such as the *Institut de Recherche Agronomique pour le Développement* (IRAD) in Cameroon and the *Institut National d’Etude et de Recherche en Agronomie* (INERA) in DRC. To close the first phase of this project, an international scientific symposium was held at Hotel Horizon in Bukavu on 10 December 2013 and these proceedings compile summaries and abstracts of presentations as well as most important outcomes from group work during the symposium.

1.1. Welcome remarks

Prof. Dr. Katcho Karume, the Dean of the Faculty of Agriculture and Environmental Sciences of the *Université Evangélique en Afrique*, opened the symposium on behalf of the university’s vice chancellor, Prof. Dr. Mushagalusa Nachigera Gustave, who was prevented. Prof. Katcho stressed the importance of the symposium’s theme “African cavy culture: yesterday, today and tomorrow” as the key to bridging the gap between cavy producers, traders and consumers. He then noted the importance of this project for the cavy farmers in improving income and protein intake as well as for all consumers, but also on scholarships that young students have benefited from for postgraduate studies (MSc). Subsequently, he presented the project objectives, content, expected outputs, and approaches, as well as the program of this symposium; finally he briefly introduced the resource persons and guests.

2. SESSION ONE: BRIEF CONTRIBUTIONS BY REPRESENTATIVES FROM THE SUB-INNOVATION PLATFORMS

Representatives of sub-innovation platforms stepped in to give their explicit impressions of the project's evolution in their respective sites from the beginning to its current culmination: impact and prospects. The contributors from Kabare Sub-Innovation Platform, Kalehe S-I.P., Kamanyola S-I.P. and Tubimbi S-I.P. followed one another. The contributions presented to the audience in French or Swahili have been translated by Samy Bacigale.

2.1. Contribution by Kabare Sub-Innovation Platform

In the presentation, previous and current consideration of cavy was highlighted in the frame of the cavy project implementation. Previously, cavy was considered as adequate to be raised by small children and women, but with farmers' training and awareness from the project facilitators, they understood cavy's potential that should be exploited to increase income and meat to cover nutritional needs of households. Thus cavy is now accepted by many farmers, and the number of members under the sub-platform increased from 28 to 53. In Kabare, cavy is already used to cover school fees and primary health care. Thanks to forage technologies received, some forage species are currently used in erosion control.

Apart from these observed benefits, some issues remain to be pointed out in this particular site:

- The space to hold a large number of cavies in residential homes is limited;
- Land to grow enough forage to meet cavies' (and other animals') requirements is limited;
- Presence of cavy predators such as cats and dogs.

2.2. Contribution by Kalehe Sub-Innovation Platform

In the sub-platform Kalehe, innovations to consider since the start of this project are the following:

- Establishment of two demo-plots of forages of 40m x 40m each;
- Establishment of a collective cavy-pilot farm, currently containing 35 cavies;
- Provision of microcredit to members of the sub-platform.

And for the coming days they expect to:

- House cavies in respective cages: by January 2014;
- Implement forage fields for each member of the sub- I.P.;
- Create a restaurant where cavy meat will be availed to the public;
- Grant a significant amount of money as loans to members;
- Reforest with fodder trees and shrubs.

The following issues were encountered when driving their various activities:

- Lack of an office for their sub-I.P.,
- Difficulty to move across households' and members' fields for follow-up, due to the sloped topography of the region.

Suggestions are sent to facilitators to continue supporting the sub-I.P. members with sensitization and capacity building in order to reach a large segment of the population and to make cavy a real source of income.

2.3. Contribution by Kamanyola Sub-Innovation Platform

In past days, in the Kamanyola 'groupement' cavy was considered by most people as an animal that is supposed to be kept only by children and elderly people, especially coming from neighboring 'groupements'. However, after several trainings and sensitization received in the frame of the cavy project, this animal is now integrated into the agro-pastoral system and the eating habits of the population because people have understood its importance in treating anemia and as protein intake.

Among many other achievements in the framework of this project, the Kamanyola sub-I.P. managed to build a house that will serve as a pilot farm of cavies in this area, something the committee members intend to extend to all 14 localities that form part of this groupement. Cavy meat is now consumed by men, women and youth.

2.4. Contribution by Tubimbi Sub-Innovation Platform

The platform began with only nine members having 15 common cavies but today the number of members has increased to 35 with 50 common cavies. Sensitization and training from facilitators helped these cavy keepers to build proper cages for cavies at home and to sex the animals for reproductive management. Currently the impact of cavy culture is seen on household incomes by covering school fees, medical care, buying clothes and also as a good diet for children. The price of an adult cavy rose from 1000Fc to 2000 Fc. This is the fruit of capacity building on:

- How to build cages for cavies;
- How to separate animals to avoid inbreeding;
- How to wean animals timely; and
- How to establish and manage forages, which also serve to feed of cattle and goats.

The difficulty: mortality of cavies continues

Perspective: build a house to contain cavies of the group collectively.

3. SESSION TWO: RESEARCH FOR DEVELOPMENT RESULTS

3.1. Cavy culture in Africa – current status and introduction to the project

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Cavies are original from South America. It is not known, when, where and how often they have been introduced into Africa. Domestication started several 1000s of years ago. Today the largest producers are Peru with a population of 22 million, Ecuador (11 million), Bolivia (6 million) and Colombia (3.5 million). Cavy culture has been improved in South America in the past 4-5 decades and is partially conducted at commercial level; also cavy exportation to the USA and some European countries is increasing due to the preference for cavies by migrant workers from South America. There do not seem to exist taboos to cavy consumption in Africa. In Sud-Kivu they were initially used to combat anemia in children, but have become accepted as meat animal for food and nutrition security since the 1990s. Despite their very wide distribution from Senegal to Tanzania, there is extremely little information available on their contributions to livelihoods in Africa; a total of 67 documents were sourced from Africa of which only 35 are scientific articles.

Take home messages

- There are many countries with cavy culture in Africa but almost no numbers exist of cavy populations available; households keeping cavies; and livelihood impact on households.
- There are highly likely more than 2 million cavies in DRC; therefore, improvements in cavy production concerns between 150,000 and 400,000 households in DRC; especially Nord- and Sud-Kivu provinces keep largest cavy populations; and cavies have been part of 'rehabilitation kits' for displaced families distributed by humanitarian and other NGOs.
- There is extremely limited scientific information available on cavy culture in Africa, but Cameroon and DRC are leading regarding available publications.
- Cavy culture appears to be a very appropriate technology that has widely been adopted, despite the (almost) complete neglect in research and development.

This background information led to design and implement the project "Harnessing Husbandry of Domestic Cavy for Alternative and Rapid Access to Food and Income in Cameroon and the eastern Democratic Republic of the Congo" under the Australian "Africa Food Security Initiative", whose specific objectives are:

1. Livelihood analysis and strategy development for cavy production;
2. Genetic diversity and integration of genetic diversity data with various metadata to design a sustainable cavy production system;
3. Development of improved feeding systems for higher productivity of cavies;
4. Information gathering and dissemination, and capacity building of partners and other stakeholders in cavy Innovation Platforms.

The project initiated with an Inception Meeting in Dschang, Cameroon in Nov. 2011; there was an Engagement Meeting in Bukavu in May 2012, and a Results Symposium in Bukavu in Dec. 2013.

Key words: Cavy distribution, livestock domestication, South America, sub-Saharan Africa

3.2. Real innovations in Cameroonian cavy culture: preliminary results and future perspective

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The guinea pig, as small animal as it is, has managed to gather around him, a large number of actors interested on its farming in Cameroon. The Cameroon cavy innovative platform took place for the first time in November 2013. During the framework, actors coming from different sectors such as farmers, traders, restaurants, NGOs, government and researchers, met to discuss about the cavy project. During the first part of the cavy project, many people we sensitized have shown a lot of interest on been part of it. Participatory exchanges between different actors enabled to share a number of innovations. During training, IP meeting, or during the monitoring, exchanges were made between expert and indigenous knowledge or personal experiment.

Innovations from the side of expert can be related has:

- A cage for cavy transport. Made from separate individual boxes (24 boxes).
- A better method of feeding cavies by supplying every day a package of fresh leaves consisting of legumes, grasses and a supplement of minerals and fresh water.
- Production of three training manuals on cavy husbandry (two are already available)
- Scientific publications
- A cage for cavy husbandry called Combi-Breeder-Post-Weaning cage. It is a cage made of wood and grillage with two levels
- A smoker called the SMOKER –AEAC (*Association des Eleveurs et Agriculteurs du Cameroun*)
- The vacuum-packed smoked cavy

Cavy producers also informed us about their own innovative practices:

- The use of local medicinal plants to treat diseases
- Different types of cages
- Cages built with local materials (raffia, bamboo) without financial support
- Different types of mangers
- Different types of litter (e.g. of scrap wood, dried banana leaves, planks, fence, raffia)
- The use of cavy droppings as fertilizer for food crops (especially in the north-west Cameroon)
- Various recipes for cooking cavy

The following actions will take place in the immediate future:

- The creation of a website that will be online by the end of January 2014
- A recipe book for preparing and cooking cavy
- The development of the label CAVYLAND as cavy market strategy

Key words: Innovation platform, cavy project, cavy farming, indigenous knowledge, Cameroon

[Translated from French by B.L. Maass]

3.3. Cavy contribution to improve livelihoods in eastern Democratic Republic of the Congo

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The Approach. The project has used IAR4D (Integrated Agricultural Research for Development) and its innovation platform (IP) as the approach to address the cavy value chain in the Democratic Republic of Congo (DRC) and Cameroon. IAR4D is designed to overcome the shortcomings of the traditional Research & Development systems. The approach uses demand-driven research and with a multi stakeholder approach which also involves policy makers at different levels through innovation platforms. Innovation platforms facilitate interactions and learning among diverse stakeholders interested. Such forums give room for participatory diagnosis of problems/needs and opportunities, investigations of solutions and generation of innovations.

Role of cavies in Sud-Kivu. Cavies in Sud-Kivu play an important role in households that keep them. They are kept mainly for food and nutrition, incomes, manure and for other minor household requirements. While 65% of the cavy-keeping households keep them primarily for food and nutrition security, 20% keep them as their main source of incomes and about 8% for manure for soil fertility and especially in vegetable production.

Achievements. Since the inception of the project in April 2012, the stakeholders have been able to establish innovation platforms as institutions that will sustain the cavy research and development in Sud-Kivu. Thus there is a functioning Sud-Kivu provincial Cavy innovation platform that meets three times in a year. This Provincial IP is supported by sub-IPs, which are the farmers associations involved in cavy research and development. Each of these sub-IPs has a management committee and 4 commissions responsible for running the association. These include marketing, technology, credit, and monitoring, evaluation and learning commissions. Each of these sub-IPs is registered with the local authorities, has opened up a group bank account with respective micro finance institutions that are found in their localities.

Women empowerment and inclusion in decision making has been one of the main achievements in the institutional organization. Women are well represented in the management committees and in the commission as well as in cavy trade.

Take home messages

- Cavies can improve livelihoods with minimal investments for women, youth and men.
- Cavy IPs offer women space and voice and skills in decision making within local farmers' organizations.
- Consumption is the main purpose of keeping cavies, but they also provide income and manure.
- Forage production for cavies also serves to address soil erosion and soil infertility.
- Cavies offer their keepers an easy asset to be sold and bought. It serves as a good source of petty cash in most households.

What we do not know – areas of further research

- Who eats caviés and how often and in what quantities?
- What are caviés' contributions to food and nutrition security in the families?
- How many households have caviés?
- What is the contribution of caviés to household incomes?
- How are cavy dishes prepared in most homes?
- If children prepare them on their own, how do they do it?
- Since caviés are not in the livestock agenda, where do cavy-keeping households get support from?
- What kind of support do they get? How can we build on such support?
- Why do some adults feel embarrassed to openly accept that cavy is a good source of meat? And that they have eaten them?
- What is the best method to promote cavy consumption in the region? And especially in Bukavu town?

Key words: gender, innovation platform, nutrition security, women empowerment

3.4. Production Systems, diversity and richness of cavy culture in Cameroon

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From April 2012 to July 2013, a pioneer study was done in western highlands and rain forest agro-ecological zones of Cameroon in order to assess existing cavy production systems. The household baseline survey was carried out in a total of 500 households randomly chosen using a snowball approach. It appears that cavy culture is a women (> 60%) and youth (>12%) driven livestock production system for both regions. Rough estimates provide that more than 200,000 and 100,000 households keep cavies in these pilot zones, respectively, and some for more than 40 years. The main motives are consumption (65%), income generation (20%) and manure (8%). The majority of actors are smallholders, more or less organized, with little support from public funds. Flock size varied from 3 to >500, with a mean of 16 per farmer. Average adult cavy live weight was 620g (± 35). The most common production technique was 'kitchen free roaming', with only few caging. To estimate the genetic variability of cavy populations, cavy biodata were collected on 475 samples (blood spot on filter paper, FTA cards; Whatman, UK) from the West, Northwest, Centre and East regions. We used 13 polymorphic SSR markers to evaluate inbreeding levels and population structure. A population diversity test with samples from DRC, Côte d'Ivoire and Colombia was also conducted. In general, phenotypic diversity was large within and among flocks (coat color, ear and head shape, and eye color and hair composition). Genotyping was done under *GenMapper* using ILRI-BecA Hub standard protocols. Inbreeding is a real challenge in the four regions sampled in Cameroon (*Arlequin*Fis = 0.32852). Little to moderate population differentiation was observed within region. Greatest difference was noted between rainforest (Centre and East) and western highlands (West and North West) populations. Population assignment was done under the admixture model MCMC burning 50,000 to 100,000 iterations, K replicates = 5 using *STRUCTURE* software. Cameroon's cavy populations demonstrated four putative subpopulations with a wide range of variation, and very distant to other country groups. Genetic potential and breeding-related constraints were identified in all the zones. Traits of importance from farmers' views were growth, adaptability (survival) and fecundity. There is need for a balanced national breeding program and increased capacity building of farmers to address mortality rates and health issues. Rapid changes could be easily made with great impact on production, namely by improved feeding and reproduction management.

Key words: Cameroon, genetic diversity, inbreeding, smallholder, SSR markers, husbandry, domestic cavy

3.5. Cavy Production, Reproduction and Diversity in eastern DR Congo

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In the eastern part of the Democratic Republic of Congo, especially in the province of Sud-Kivu, domestic cavies are more widely kept than rabbits, though, very little is known about cavy culture and its importance for the livelihoods of cavy keepers.

A baseline survey was conducted in the 'territoires' of Kalehe, Kabare and Walungu, covering 3 agro-ecological zones located in high, mid and low altitude in July 2012, to determine production systems and existing diversity of cavies in Sud-Kivu province. Farmers were interviewed, phenotypic characteristics of selected cavies described and their blood was sampled on filter paper (FTA cards; Whatman,UK) for later analysis by 13 polymorphic SSR markers in the BecA laboratory in Nairobi.

In Sud-Kivu, cavies are kept in extensive production system, leading to low productivity and high mortality. Cavies are predominantly raised in a corner of the house, mainly in the kitchen. Only a few farmers (5%) kept them in separate cages. The majority of cavy keepers (86%) do not record their animals' performance; indiscriminate mating takes place; most cavy keepers (70%) use females from their own farm for replacement leading to inbreeding and negative selection. Two main reasons account for 50% of exit from the cavy herds (other than sale): predators and unexplained death (cavies die more during the rainy season, possibly related to feeding wet forages or suffering from cold or pneumonia). All these findings indicate scope for enhancement by improving husbandry in general, including housing. Farmers highly appreciate cavy manure, but little is known about quantity and quality produced or effectiveness of cavy manure for crop production.

Coat color, eye color and weight are the main phenotypic variables determined. Males generally weigh more than females, and this explains why they are often selected for sales. Genotypic diversity analysis indicated a high level of inbreeding (inbreeding coefficient, $F_{IS} = 0.302$), leading to low productivity and high mortality. But it also indicated two different genetic pools, one in the territoire of Walungu and the other in the territoires of Kabare and Kalehe. This means the two different genetic pools could eventually be used in a possible breeding program as a remedy to prevent the high levels of inbreeding.

Keywords: genetic diversity, inbreeding, production systems, smallholder, SSR markers, Sud-Kivu

3.6. Local forages and feeds for cavies and on station trials for cavy feeding in Cameroon

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Cavy culture is an affordable way out of malnutrition for rural women and their families as well as a sustainable way of income generation for women. In terms of research needs, studies on feeding and nutritional requirement trials, especially with supplements suitable for resource-poor farmers as well as during seasons when conventional forages are hard to get, had been recommended for cavies in the WHC. This paper looks at a survey of feed resources, feeding practices and research capacity building for cavies in Cameroon.

Using a pretested questionnaire, data from primary sources was collected from 250 cavy farmers of the western highlands of Cameroon (175 for northwest region-NW, 75 for the west region-W) during the months of May to early November 2012. Trained field enumerators conducted interviews in the language of the cavy farmer to ease comprehension. The data were presented using simple proportions of percentages using Microsoft Excel software.

Feed resources frequently used by more than half of the cavy farmers surveyed in both regions include kitchen waste, elephant grass (*Pennisetum purpureum*) and plantain/banana leaves. Therefore, research aimed at improving the availability of these feed resources to cavies can be of relevance in the region. All cavy farmers in Cameroon practice zero grazing. Cultivation of forage for Cavies is not practiced. However, cavies benefit from cultivated forages in situations where this is practiced for other livestock. A majority of farmers feed cavies *ad libitum*. Farmers give what is available; and most of them depend on seasonal production of natural forages. There are no practices for forage conservation for cavies. The feeding frequency of cavies by farmers shows that 55.4 and 54.0% of them feed cavies daily, while 34.2 and 24.3 feed three times daily for the NW and W, respectively. Under capacity building for cavy nutrition and physiology, three students have already graduated from the Faculty of Agriculture, University of Dschang with MSc degrees.

Key words: Collected forage, feed, kitchen waste, *Pennisetum purpureum*, zero-grazing

3.7. Feeds and feeding of cavies in Eastern Democratic Republic of Congo

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Current situation of feeding cavies in Sud-Kivu. Inadequate feeding is listed among the reasons leading to low productivity of cavies in Sud-Kivu. A baseline study was conducted with 250 farmers in 3 territoires representing all the agro-ecological zones of Sud-Kivu province, in order to evaluate the existing situation of cavy-keeping. In addition, a specific feed assessment study, applying the FEAST tool, was carried out in 4 sites of the same territoires. Only 37% of farmers cultivated forages on small spaces, without further spread due to lack of seeds and vegetative propagating materials; and cultivated forages contribute only 6% to the diets of all livestock. Cultivated forages occupy from less than 2200 m² (in Muhongoza) to none (in Kamanyola) before the intervention of the cavy-project. Small- (having <0.5 or <1 ha) and medium-size (having between 1 or up to 3 ha) farmers make up about 85% of the respondents; it is this population layer that represents most cavy keepers in the area. In all the 4 sites, feed availability was strongly linked to rainfall pattern with the main shortage during the dry season from May to September. Feeding systems mostly dominated by confined feeding forages and kitchen wastes and confined feeding fresh forages only, not depending on seasonality. Forage species from Poacea (e.g., *Pennisetum purpureum*, *Digitaria vestita*, *Panicum maxum*) and Asteraceae (e.g., *Bidens pilosa*, *Galinsoga ciliata*, *Crassocephalum vitellinum*) families were most abundant for feeding cavies, and occupied 42% and 25%, respectively, of 96 forages species determined. The most important challenges identified among farmers were ranked, in descendant order, as follows: Little knowledge on husbandry techniques; lack of financial resources, poverty; animal health and veterinary services; lack of good quality forages throughout the year; no access to market and insecurity.

Demonstration and participatory selection of forages. Two participatory trials were conducted in the 4 sites with 3 varieties each of legumes (*Canavalia brasiliensis* CIAT17009, *Stylosanthes guianensis* CIAT11995 and *Desmodium uncinatum* ILRI6765) and grasses (*Pennisetum purpureum* French Cameroon, *Pennisetum purpureum* local, *Tripsacum andersonii*). Forage species produced higher biomass in Kamanyola than in the other sites. Among legumes, *C. brasiliensis* and *D. uncinatum* yielded more biomass than *S. guianensis*, while among grasses most herbage was produced by *P. purpureum* French Cameroon.

Farmers selected legumes and grasses separately on a scale (0-3) according to their own criteria, namely biomass yield, preference by cavies, forage leaf size, adaptation and curiosity about the new variety. Differential agro-ecological adaptation of grasses and legumes has been found. The legumes *C. brasiliensis* and *D. uncinatum* and the grass *P. purpureum* French Cameroon may have highest potential for adoption in Sud-Kivu.

Farmer experimentation. A participatory approach was used whereby 20 legume packages and grass cuttings were availed in each Sub-Innovation Platform site (Muhongoza/Kalehe, Cirunga/Kabare, Tubimbi/Walungu and Kamanyola/Walungu). Farmers were allowed to freely choose the planting sites for those materials in their cropping systems. They also agreed to pass on planting materials to others who did not receive.

From preliminary observations, integration of forage cultivation into cropping systems depends on topography, land availability, land tenure system and livestock production system. In high altitude

(Kalehe and Kabare, grasses were more preferred than forage legumes. Most of the farmers planted grasses on field edges and against erosion due to scarcity of fertile land. In low altitude (Kamanyola), forage legumes were the most preferred. They were mostly associated with maize and/or cassava due to land ownership and seasonal rental system as well as animal straying around homesteads; while in Tubimbi (mid altitude), each farmer tended to create a forage plot near the homestead (mostly legumes) to be mixed with local forage species to increase N-availability in the cavy diet.

Take home messages

1. Farmers do not know nutritional requirements of cavies, therefore they do not feed according to physiological requirements;
2. Adequate feeding would also help animals to resist more against diseases;
3. Farmers identified available niches for forage cultivation despite scarcity of land holdings, thus, potential was found to extend forage cultivation.

Key words: Collected forage, demonstration plots, FEAST method, feed, kitchen waste, participatory variety selection

4. SESSION THREE: GROUP DISCUSSIONS

The discussion session focused on research in cavy culture – from the scientific perspective and the role of cavies in livelihood improvement – from the development perspective, under the chairmanship of Dr. Brigitte Maass, from the Tropical Forages Program of CIAT (International Center for Tropical Agriculture). Three questions were discussed by each of the four groups formed:

1. What is your vision of cavy culture for the next 10 years in Sud-Kivu?
2. What are the benefits that we can get from cavies if conditions are improved?
3. What are the main constraints to breeding / exploiting cavies for:
 - a. Farmers
 - b. Traders
 - c. Restaurant owners

Four groups were formed to discuss these questions. Ideally, each group should consist of farmers, traders, consumers, researchers and policy makers. The groups presented their findings to the audience in French; the contributions have been translated by Samy Bacigale.

4.1. Group I presentation

Question 1: What is your vision of cavy culture for the next 10 years in Sud-Kivu, DRC?

- 80% of the population of Sud-Kivu will understand the importance of breeding cavies and it will be integrated in the basic diet of many families;
- Each cavy-keeper will be autonomous;
- Cavy will be accepted by all social ranks; and
- Intensification of cavy production systems.

Question 2: What are the benefits that we can get from cavies if conditions are improved?

Plenty of good quality manure and high quality protein; eradication of different diseases related to consumption of red meats, such as arthritis; ease of paying children's school fees through increased incomes.

Question 3: What are the main constraints to cavy-keeping?

Cavy keepers	Cavy traders	Restaurant owners
- Mortality	- Poor road infrastructure	- Price fluctuations
- Insufficient space	(transportation problem)	- Few consumers
- Ignored production cost	- Price problems	- Acceptability problems
- Theft	- Price fluctuations	
- Traditional rearing systems	- Mortality of animals during	
- Lack/less health checks	transportation	

4.2. Group II presentation

Question 1: What is your vision of cavy culture for the next 10 years in Sud-Kivu, DRC?

- Cavy-keeping will be considered as a business accepted by all stakeholders; the research will focus on the needs of actors in the value chain (producers, processors, and consumers);
- Cavy culture will be considered as a formal field by policy makers.

Question 2: What are the benefits that we can get from cavies if conditions are improved?

- Source of income;
- Good health household;
- Cavy accepted as a white meat in restaurants.

Question 3: What are the main constraints to cavy – keeping?

Cavy keepers	Cavy traders	Restaurant owners
<ul style="list-style-type: none"> - Problem of unimproved feeds for cavies - Ignored diseases hence non-controlled - Predators 	<ul style="list-style-type: none"> - Product and price flow, - Exaggerated taxes 	<ul style="list-style-type: none"> - Taxes - Small-sized animal for a restaurant dish - Price fluctuation

4.3. Group III presentation

Question 1: What is your vision of cavy culture for the next 10 years in Sud-Kivu, DRC?

- Have huge cavies weighing 3-5 kg for instance;
- Have a good outlet (even for export);
- Have enough manure from cavy culture;
- Have sufficient knowledge on cavy diseases and their management;
- Know the real cavy nutritional needs; and
- Increased awareness on:
 - ✓ The cavy housing adapted to our environment
 - ✓ The importance of eating cavy meat
 - ✓ Forage biodiversity and nutritive value

Question 2: What are the benefits that we can get from cavies if conditions are improved?

- A database on cavy culture will be available;
- Balanced diet especially for low-income populations;
- Increased income from the standpoint of these populations; and
- Abundance of high quality organic fertilizer.

Question 3: What are the main constraints to cavy – keeping?

Cavy keepers	Cavy traders	Restaurant owners
<ul style="list-style-type: none"> - No feed diversification - No adequate housing - Presence of unknown diseases - Lack/few veterinary drugs available 	<ul style="list-style-type: none"> - Lack of outlet - Problem of marketing - Problem of rural feeder roads - Price instability (problem of measures to consider: Kg or individual animals) 	<ul style="list-style-type: none"> - Problem of acceptability of cavy meat (by consumers) - No variety of recipes (e.g. make dumplings, minced meat, cavy meat mixed with other meats)

4.4. Group IV Presentation

Question 1: What is your vision of cavy culture for the next 10 years in Sud-Kivu, DRC?

- There will be progress in cavy-keeping because farmers have benefited much training;
- There will be increase in cavy population as farmers already know how to protect these animals against predators, practicing diseases hygiene; and
- There will be few or no people who can overlook cavies.

Question 2: What are the benefits that we can get from cavies if conditions are improved?

- Socio-economic benefits of cavies such as dowry and ceremonies;
- Nutritional advantages;
- Animal to promote in areas of high population pressure;
- Source of money for school fees and medical care;
- Increase the income of small farmers; and
- Source of good quality organic manure.

Question 3: What are the main constraints to cavy – keeping?

Cavy keepers	Cavy traders	Restaurant owners
<ul style="list-style-type: none"> - Predators: dogs, cats, rats/mice - Little knowledge about cavy nutrition - Little capacity building on how to breed cavies 	<ul style="list-style-type: none"> - Inexistence of cavy market - Difficulty in transportation of cavies - In case of rain, mortality 	<ul style="list-style-type: none"> - No demand for cavy meat - Many people do not consume cavy meat, especially older persons

5. SESSION FOUR: VALEDICTORY

Félix Meutchieye and Brigitte Maass presented brief summaries on the project's successes.

Dr. Leah Ndungu, from the BecA-Hub expressed her thanks to the local organizers of the symposium, distinguished participants, delegates, press, representative of the Provincial Ministry of Agriculture, Fisheries and Livestock, and of Environment and Forests, collaboration partners and all committee members for making this Symposium successful.

Prof. Dr. Katcho Karume, Dean of the Faculty of Agriculture and Environmental Sciences at UEA, formally closed the Symposium by thanking all participants and the project partners and stakeholders for their efforts for this good achievement.

APPENDIX

Appendix 1: List of attendees

Names of participants	Gender	Institutions	Contact
ADA BERINE	F	BecA/ILRI	b.ada@cgiar.org
ADRIEN MAOMBI	M	CIRE (Centre Interdisciplinaire de recherche en Ethique)	
Aimé HERI KAZI	M	IITA, Bukavu	
ALFRED MAGERHANO	M	UEA	
ALPHONSE BISUSA	M	CRSN/LWIRO (Centre de Recherche en Sciences Naturelles)	
ANTOINE KANYENGA LUBOBO	M	CIAT/Harvest Plus, Bukavu	a.lubobo@cgiar.org
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BAHATI NTUMWA	M	Faculté d'Economie, UEA	
BALEZI NALUINA	M	ISEAV (Institut Supérieur d'Etudes Agro-Vétérinaires)	
BALUKU BAJOPE	M	CRSN/LWIRO (Centre de Recherche en sciences naturelles)	
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BIRHAKARULA MUGABO	M	S/IP KABARE	
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BRIGITTE MAASS	F	CIAT/Kenya	b.maass@cgiar.org
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CHANTAL MIGABO	F	S/IP KABARE	
CHANTAL MULEGWA	F	S/IP TUBIMBI	
CHRISTELLE SINZA	F	UEA/Student	
CHRISTOPHE AGANZE	M	VS (Vision Shala) Television	
DELPHIN MANENO	M	Ministère de l'Education	
ELISEE MUZALIA	M	Radio Maendeleo	
ELISEE NABINTU	F	S/IP KAMANYOLA	
ERICK BOY	M	IFPRI, Washington, USA	e.boy@cgiar.org
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ISABELLE ZANINGA	F	SAMWAKI (SAUTI YA MWANAMKE KIJIJINI)	
JEAN BERCKMANS MUHIGWA	M	UOB (Université Officiel de Bukavu)	
JOHN MSUYA	M	SUA, Tanzania	jmsuya@suanet.ac.tz
JOSUE ARUNA	M	AASF (Association des agriculteurs sans frontières)	
JUSTIN MWAMBA	M	RTNK (Radio Télévision Ngomaya Kivu)	
KATCHO KARUME	M	UEA/ Faculty of agricultural sciences	
LAZARO CHEBUJONDO	M	S/IP KALEHE	

Names of participants	Gender	Institutions	Contact
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LUCIEN	M	ISDR (Institut Supérieur de Développement Rural)	
LWENJE BISHIAKABALYA	M	UEA/Student	
MAOMBI	M	Centre de Recherche en Ethique, UEA	
MONDO MUBALAMA	M	UEA/Student	
MUHEMEDI BUHENDWA	M	COOPEC/KAWA (bank)	
MURHI MUGOBAYA	M	S/IP KAMANYOLA	
MUSHAGALUSA BALEMIRE	M	UEA/Student	
MWESWA WAKILONGO CHICHINO	M	Group AMKENI (Artist)	
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WILLY NYAMUKERE	M	HORECA (Restaurant)	
ZIHINDULA	M	S/IP TUBIMBI	

Appendix 2: Program of the Symposium

'African cavy culture – yesterday, today and tomorrow'

An international scientific symposium held at Hotel Horizon, Bukavu,
Sud-Kivu, DR Congo – 10 December 2013

Time	Program	Moderator/ Speaker
08:30 – 09:00	Registration	
09:00 – 09:10	Welcome and opening of the workshop	Recteur UEA
09:10 – 09:50	Official opening	Minister of Agriculture Governor of the province
09:50 – 10:10	Messages from the Village Innovation Platforms	4 Village IP presidents
10:10 – 10:30	Cavy culture in Africa – current status and introduction to the cavy project	Brigitte Maass
10:30 – 11:00	Coffee/tea break	
	Cavies for livelihoods	M: KatchoKarume
11:00 – 11:30	Les véritables innovations dans la caviaculture camerounaise: les résultats et l'avenir des plateformes d'innovation	Ursule Claire Mekongo
11:30 – 12:00	Cavies for livelihoods in eastern DRC	Wanjiku Chiuri
	Cavy production system	M: Henry Njako
12:00 – 12:30	Les systèmes de production, diversité et richesse de la caviaculture camerounaise	Felix Meutchieye
12:30 – 13:00	Cavy production systems and diversity in eastern DRC	BertinBisimwa
13:00 – 14:00	Lunch	
	Feeds and feeding	M: Felix Meutchieye
14:00 – 14:30	Inventaire des aliments et pratiques alimentaires, essais préliminaires en station de quelques fourrages communs	AziwoNibaTatanja
14:30 – 15:00	Feed and feeding of cavies in eastern DRC	Samy Bacigale
	Discussions	M: Brigitte Maass
15:00 – 15:45	<ul style="list-style-type: none"> • Research needs in cavy culture – from the scientific perspective • The possible role of cavies in livelihood improvement – from the development perspective 	Parallel discussion groups
15:45 – 16:30	Cavies for the future: Lessons learnt and future partnerships – report from discussion groups & overall discussion	
16:30	Closure	Recteur UEA

Appendix 3: Some impressions from the symposium in Bukavu, December 2013



Photo 1: Group photo



Photo 2: Introduction to the cavy project



Photo 3: Cavy culture dissemination materials



Photo 4: Group discussions



Photo 5: Dr. Leah Ndungu addressing participants

Photos taken by S. Bacigale and B.L. Maass



Photo 6: New perspectives from Cameroon



Photo 7: Felix Meutchieye presenting Cameroon



Photo 8: Presentation of group work



Photo 9: Contribution from Sub-IP Kamanyola



Photo 10: Students from UEA provided support



Photo 11: Wanjiku Chiuri gives a radio interview

Photos taken by B.L. Maass

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