

International Livestock Research Institute

Training course report

Hands-on training on harvesting in the smallholder pig
value chains in Uganda

7-11 April 2014






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Written by Kristina Roesel and Maximilian Baumann

Edited and formatted by Tezira Lore

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Abbreviations and acronyms

ASARECA	Association for Strengthening Agricultural Research in Eastern and Central Africa
BMZ	Federal Ministry for Economic Cooperation and Development
COVAB	College of Veterinary Medicine, Animal Resources and Biosecurity
FAO	Food and Agriculture Organization of the United Nations
FUB	Freie Universität Berlin
GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit
HACCP	Hazard Analysis and Critical Control Point
ILRI	International Livestock Research Institute
KCCA	Kampala City Council Authority
NAADS	National Agricultural Advisory Services
VEDCO	Volunteer Efforts for Development Concerns

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Project background

Safe Food, Fair Food phase 2: From capacity building to implementation

Millions of small-scale farmers efficiently supply the great majority of the meat, milk and fish markets in Africa. Surging demand for livestock products and changing consumer demands (the Livestock Revolution) provide an opportunity to set poor farmers on pathways out of poverty, but also threaten the continued presence of smallholder farmers in increasingly demanding markets. While the presence of food safety hazards (such as microbial pathogens and residues) in informally marketed food is high, the risk to human health is mostly unknown and current food safety management is both ineffective and inequitable. Risk-based approaches for assessing and managing food safety offer a powerful new method for reducing the enormous health burden imposed by foodborne disease, while taking into account other societal goals such as pro-poor agri-food sector development and food and nutritional security.

The ultimate goal of the second phase of the Safe Food, Fair Food project, funded by the Federal Ministry for Economic Cooperation and Development (BMZ)/Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ), is the improvement of livelihoods of poor producers and consumers by reducing the health risks and increasing the livelihood benefits associated with meat, milk and fish value chains. Its purpose is furthering research into the practical application of risk analysis and economic and social methods by food safety stakeholders and value chain actors, improving food safety and market participation of the poor in informal markets for livestock products in sub-Saharan Africa. The project contributes to this with outputs at two scales:

At the level of meat, milk and fish value chains, it will pioneer and test a practical, whole value chain application of risk-based approaches to food safety in selected countries which are the focus of the CGIAR Research Program on Livestock and Fish. It will develop, test and communicate the technologies and methods to improve food safety and enhance smallholder market access.

At regional scale, it will work through the food safety 'champions' supported in the completed phase to better incorporate risk analysis and economic valuation methods into food safety policy, commercial practice and veterinary education.

The project works in four countries (Ethiopia, Senegal, Tanzania and Uganda) and with university and research networks and economic communities in East, West and southern Africa. It builds directly on previous work supported by the Safe Food, Fair Food project that increased capacity and generated evidence for improving food safety in eight African countries, training over 50 food safety stakeholders and supporting 20 postgraduate research projects.

Training summary

Organizers

- Maximilian Baumann, Freie Universität Berlin (FUB)
- Kristina Roesel (ILRI/FUB)
- Francis Ejobi (Makerere University)

Lecturers/presenters

- Reinhard Fries, director, Institute of Meat Hygiene and Technology, Faculty of Veterinary Medicine, FUB, Germany; panel veterinary public health, Food and Agriculture Organization of the United Nations (FAO) reference centre for veterinary public health
- Peter-Henning Clausen, Institute of Parasitology and Tropical Veterinary Medicine, Faculty of Veterinary Medicine, FUB, Germany
- Joseph Erume, ILRI postdoctoral scientist, College of Veterinary Medicine, Animal Resources and Biosecurity (COVAB), Makerere University
- Jolly BK Hoon, principal veterinary officer, veterinary public health, Department of Animal Production and Marketing, Ministry of Agriculture, Animal Industry and Fisheries
- Peter Lule Mulindwa, ILRI Uganda research fellow
- Herbert Musaba Kwizera, Department of Agriculture, Kyambogo University
- Maximilian Baumann, coordinator, International Animal Health FAO reference centre for veterinary public health, Faculty of Veterinary Medicine, FUB, Germany

Facilitators

- Sam Okech, COVAB, Makerere University (7 April 2014, morning session)
- Francis Ejobi, associate professor and chair, Department of Biosecurity, Ecosystems and Veterinary Public Health, COVAB, Makerere University; Safe Food, Fair Food national coordinator (7 April 2014, afternoon session)
- Kristina Roesel, joint appointee ILRI/FUB; Safe Food, Fair Food project coordinator (8–11 April 2014)

The Safe Food, Fair Food project promotes food safety in informal markets through the application of risk-based approaches. In Uganda, the project is aligned with work on smallholder pig value chains which aims to increase productivity of the entire value chain (the Smallholder Pig Value Chain Development project funded by the European Commission – International Fund for Agricultural Development). Until now, the activities and stakeholder engagement were mostly targeted at farmers and focused on increased farm productivity. During the value chain assessments conducted by ILRI and partners in 2012–13 we learned that the piggery industry is largely informal, the knowledge of actors at every node of the value chain is limited and the need for capacity building is high.

Stakeholder workshop

On 7–8 April 2014, we held a one-and-a-half-day stakeholder workshop bringing together participants with an interest in the safety of pork products in Uganda. More than 30 participants represented most of the actors in the pig value chains: farmers, brokers/transporters, slaughterhouse and formal processors as well as representatives from policy, research, capacity building and investment.

The meeting started with a formal opening by ILRI's country representative in Uganda, Danilo Pezo, and an opening speech by Michael Ocaido of Makerere University who was involved in some aspects of ILRI's risk assessment work in 2013 and therefore has a good understanding of ILRI's mandate in Uganda. The opening ceremony was followed by a World Café discussion where participants split into three groups of pig value chain actors: (i) meat inspectors (practitioners), (ii) capacity builders, researchers and policy (enabling environment) and (iii) investment partners and private sector.

The three groups discussed the following questions in a rotating principle:

- What are the hazards of concern to meat safety and quality in Uganda and what are their sources? (chair: Peter-Henning Clausen)
- Which are the most critical points in terms of meat safety management systems? (chair: Reinhard Fries)
- What prevents some of the key control measures from being applied effectively and what can we do to overcome these gaps? (chair: Maximilian Baumann)

The group chairs at each table introduced the topic and made sure that key insights were documented on a large flipchart sheet. The key points were presented in a panel to the entire workshop group (see Annex 1). In the afternoon session, Reinhard Fries introduced the concept of a food supply (or livestock value) chain ('farm-to-fork') in theory followed by the practical example of how the smallholder pig value chains work in Uganda presented by ILRI Uganda research fellow, Peter Lule Mulindwa. Jolly Hoona from the Ministry of Agriculture, Animal Industry and Fisheries presented on laws and regulations that are in place for livestock production and harvesting, a talk which generated a lot of discussion as many livestock regulations neglect pigs, are outdated, not communicated to the relevant actors or, most importantly, not enforced. The day ended with a lively discussion on the potential of marketing premium cuts sparked by Herbert Kwizera's talk, whereby value is mostly added (and profit generated) by cutting the right parts and presenting them well instead of selling randomly chopped cuts only.

During the second morning of the stakeholder workshop and followed by a debrief of key lessons from the first day (Annex 2), different pig diseases with relevance to public health (presented by Peter-Henning Clausen and Kristina Roesel) and practical relevance to meat inspection (presented by Joseph Erume and Maximilian Baumann) were presented and the role of the slaughter hub for detection and management options discussed (presented by Reinhard Fries). In addition, results from the ILRI farm sampling were presented and next steps explained by the ILRI research team.

Hands-on training workshop

The stakeholder meeting was followed by a three-and-a-half-day training workshop involving 18 practitioners: two meat inspectors from each of the Smallholder Pig Value Chains Development project study sites (Kampala, Kamuli, Masaka and Mukono) nominated by their supervisors; two quality assurance officers employed by a formal meat processor; one public health officer at the Kampala central pig slaughterhouse; one meat inspector at Uganda Meat Industry and several participants from capacity building institutions.

All trainees participated in a series of lectures, discussions, field visits to the local slaughterhouse, butcheries and pork joints, demonstrations and practicals on post mortem inspection and the digestion assay for the detection of *Trichinella* larvae.

After setting the stage in the stakeholder workshop by describing the overall concepts and situation in Uganda with regards to pig and pork production, the training workshop emphasized the important role of information on the individual animal and its environment for disease surveillance at the slaughter hubs. Reinhard Fries then presented on ante mortem inspection (practically demonstrated at Wambizzi abattoir) and post mortem techniques (presented at Makerere University).

Consequently, hygiene elements and verification measures such as Good Manufacturing Practice and Good Hygiene Practice along the food chain were presented and the participants also introduced to the Hazard Analysis and Critical Control Point (HACCP) methodology. On the last day of the workshop, Reinhard Fries discussed good hygiene practices in pork marketing while the training group visited different butcheries and supermarkets in Kampala.

The training concluded with a short progress control. All trainees who successfully completed the training received a certificate and a CD-ROM containing all training materials and additional resources. Unfortunately, due to language constraints it was not possible to have stakeholders of the informal markets attend the workshop. Since pig meat inspection is also neglected in the formal market, this training will serve as a starting point. We hope that together with the 'champions' of this training, we can subsequently reach out to the informal butchers and processors in the ILRI study sites.

Curriculum

Unit 1

The given situation: Introducing the pig value chains in Uganda (3 hours)

- The concept of a food chain ('farm-to-fork') (Reinhard Fries)
- Pig value chains in Uganda (Peter Lule)
- Regulatory framework for pork safety in the pig value chain in Uganda (Jolly Hoona)
- Value addition and associated risks: processed pork products (Herbert Kwizera)

Unit 2

The risks along the pig value chain in Uganda (5 hours)

- Pig-borne zoonotic diseases of public health concern including results from the ILRI assessments, detection and management options (Peter-Henning Clausen, Joseph Erume and Kristina Roesel)
- Transboundary diseases in pigs, detection and management options (Maximilian Baumann)
- The role of the slaughter hub in disease surveillance and control (Reinhard Fries)

Unit 3

Elements of inspection: Ante mortem and post mortem (2 days)

- Information from the live animal, its history or the history of the herd or region (Reinhard Fries)
- Individual and/or herd-based clinical examination (Reinhard Fries)
- Field visit/practical followed by group discussions: Kampala central pig slaughterhouse (Reinhard Fries)
- Information from the slaughtered animal (Reinhard Fries)
- Morphological post mortem (Reinhard Fries)
- Practical at Makerere University: post mortem inspection of four pig carcasses (Reinhard Fries) and demonstration of methods to detect *Trichinella* larvae (Maximilian Baumann, Kristina Roesel)
- Further sampling (where and why and how) (Reinhard Fries)

Unit 4

Elements of hygiene (1 day)

- Challenge: shelf life and food safety as a basis for food and nutrition security (Reinhard Fries)
- Prevention: Good Manufacturing Practice/Good Hygiene Practice along the food chain (primary production, slaughtering, post-harvest handling and processing) (Reinhard Fries)
- Intervention: HACCP (Reinhard Fries)
- Field visit/practical followed by group discussions: butcheries and pork joints, formal supermarket in Kampala (Reinhard Fries)

Agenda

DAY 1: Monday 7 April 2014		
8:30-9:30	Registration	
9:30	Opening prayer and welcome	Francis Ejobi
9:35-9:55	Welcome address by ILRI Uganda country representative	Danilo Pezo
9:55-10:20	Official opening	Michael Ocaido
10:20-10:30	Group photo	
10:30-10:50	<i>Tea/coffee break</i>	
10:50-12:30	Setting the scene: Background experiences, expectations: World Café	Sam Okech
12:30-13:30	<i>Lunch break</i>	
Unit 1: All along the food chain: The given situation in Uganda		
13:30-14:15	The concept of a food chain ('farm-to-fork')	Reinhard Fries
14:15-15:00	Pig value chain map Uganda	Peter Lule
15:00-15:30	<i>Tea/coffee break</i>	
15:30-16:15	Regulatory framework for pork safety in the pig value chain in Uganda	Jolly Hoona
16:15-17:00	Value addition: processed pork products	Herbert Kwizera
17:00	End of Day 1	
DAY 2: Tuesday 8 April 2014		
Unit 2: The disease risks along the food chain - Detection and control options along the chain		
8:30-9:00	Registration	
9:00-10:00	Preparing for the day: debrief of messages learnt during previous day and discussion on points with increased risk for pork safety	Kristina Roesel
10:00-10:10	<i>Tea/coffee break</i>	
10:10-12:25	Parasitic diseases in pork in Uganda	Peter-Henning Clausen and Kristina Roesel
12:25-13:15	Transboundary diseases in pigs in Uganda	Maximilian Baumann
13:15-14:00	<i>Lunch break</i>	
14:00-15:00	Selected bacterial diseases affecting pork in Uganda	Joseph Erume
15:00-16:00	The role of the slaughter hub in disease surveillance and control	Reinhard Fries
16:00-16:15	<i>Tea/coffee break</i>	
Unit 3a: Elements of inspection: Ante mortem		
16:15-18:00	Information from the live animal, its history or the history of the herd or region Individual and/or herd-based clinical examination	Reinhard Fries
18:00	End of Day 2	
DAY 3: Wednesday 9 April 2014		
8:00	Departure to Wambizzi abattoir for practical ante mortem	
8:30 – 12:00	Observation and application of lessons learned: ante mortem Demonstration by trainers Application by trainees	Reinhard Fries/Maximilian Baumann
12:30-13:30	<i>Lunch break</i>	<i>Back at Namirembe Guest House</i>
Unit 3b: Elements of inspection: Post mortem		
13:30-14:30	Information from the slaughtered animal	Reinhard Fries
14:30-15:00	<i>Tea/coffee break</i>	
15:00-17:00	Morphological post mortem Further sampling (where and why and how)	Reinhard Fries
17:00	End of Day 3	

DAY 4: Thursday 10 April 2014		
8:00	Departure to Makerere University for practical post mortem	
8:30-12:00	Observation and application of lessons learnt: post mortem Demonstration of trichinoscopy and digestion assay for the detection of <i>Trichinella</i> larvae in pork Demonstration by trainers; application by trainees	Reinhard Fries Maximilian Baumann/Kristina Roesel
12:30-13:30	<i>Lunch break</i>	<i>Back at Namirembe Guest House</i>
Unit 4: Elements of hygiene and verification measures		
13:30-14:30	Challenge: shelf life and food safety as a basis for food and nutrition security	Reinhard Fries
14:30-15:30	Prevention: Good Manufacturing Practice/Good Hygiene Practice along the food chain (primary production, slaughtering, post-harvest handling and processing)	Reinhard Fries
15:30-16:00	<i>Tea/coffee break</i>	
16:00-17:00	Intervention: HACCP	Reinhard Fries
17:00	Closing Day 4	
18:00	Pick up for group dinner at Nicodemus Pork Joint	
DAY 5: Friday 11 April 2014		
8:00	Pick up for visit of pork joints, butcheries in Wandegeya and Uchumi supermarket (Quality Cuts/Fresh Cuts display)	
8:30-12:00	Observation and application of lessons learnt: good hygiene practices Discussions between trainers and trainees	Reinhard Fries/Maximilian Baumann
12:30-13:30	<i>Lunch break</i>	<i>Back at Namirembe Guest House</i>
Unit 5: wrapping up		
13:30-14:30	Progress control	Maximilian Baumann
14:30-14:45	<i>Tea/coffee break</i>	
14:45-15:30	Course evaluation	Maximilian Baumann
15:30-16:00	Handing over of certificates	Francis Ejobi
16:00	Closing of course	

Training material

The trainees received a CD-ROM including all lectures and presentations given at the workshop as well as the workshop discussions notes.

For further reading, soft copies of the following resources were included:

- Atlas of transboundary animal diseases by PJ Fernández and WR White
- Abattoir development: options and designs for hygienic basic and medium-sized abattoirs, FAO 2008
- Guidelines for slaughtering, meat cutting and further processing, FAO 1991
- Guide to good farming practices for animal production food safety, World Organization for Animal Health/FAO 2010
- Manual good practices for the meat industry, FAO 2004
- Manual on meat inspection for developing countries, FAO 2000
- Meat processing technology for small- to medium-scale producers by G Heinz and P Hautzinger, FAO 2007
- Standard Operating Procedures for *Trichinella* digestion assay, International Commission on Trichinellosis
- Standard design for small-scale modular slaughterhouses, FAO 1988

List of participants

Stakeholder workshop 7–8 April 2014

Name	Affiliation	Sex (M/F)	Country of origin	Country Classification
Adongo, Vicky Valentine	Fresh Cuts/Quality Cuts	F	Uganda	Developing
Ahimbisibwe, Emilia	Senior veterinary officer, Kampala City Council Authority (KCCA)	M	Uganda	Developing
Amulen, Magdalene	Fresh Cuts/Quality Cuts	F	Uganda	Developing
Baumann, Maximilian	FUB	M	Germany	Developed
Clausen, Peter-Henning	FUB	M	Germany	Developed
Dione, Michel	ILRI Uganda	M	Senegal	Developing
Ejobi, Francis	Makerere University, Safe Food, Fair Food Uganda	M	Uganda	Developing
Erume, Joseph	Senior lecturer microbiology at COVAB	M	Uganda	Developing
Fries, Reinhard	FUB	M	Germany	Ind
Hoon, Jolly	Ministry of Agriculture, Animal Industry and Fisheries	F	Uganda	Developing
Iga, Daniel	IrishAid	M	Uganda	Developing
Isabirye, Robert	Kamuli District local government, veterinary officer in Namwendwa sub-county	M	Uganda	Developing
Kabasa, William	Lab manager and Industrial training coordinator at COVAB	M	Uganda	Developing
Kaboyi, Winyi	Ministry of Health, Assistant Commissioner Veterinary Public Health	M	Uganda	Developing
Kasibule, Daniel	District Veterinary Officer, Kamuli	M	Uganda	Developing
Kiryabwire, David	District Veterinary Officer, Mukono	M	Uganda	Developing
Kiwuwa, Julian	GIZ Kampala, Financial System Development Program	F	Uganda	Developing
Kwizera, Herbert	Food Inspection & Farm Management at Kyambogo University	M	Uganda	Developing
Lubega, Simon	Manager, Wambizzi abattoir	M	Uganda	Developing
Lule, Peter	ILRI/National Agricultural Research Organization	M	Uganda	Developing
Lwanira, Jane Rose	KCCA	F	Uganda	Developing

Masiga, Clet	Association for Strengthening Agricultural Research in Eastern and Central Africa (ASARECA)	M	Uganda	Developing
Mayanja, Lawrence	Animal husbandry officer, meat inspector Kabonera pig hub	M	Uganda	Developing
Mugagga, Peter	ACME Foods	M	Uganda	Developing
Mulindwa, Chris	Pig Production and Marketing Ltd	M	Uganda	Developing
Nadiope, Gideon	Volunteer Efforts for Development Concerns (VEDCO)	M	Uganda	Developing
Nsadha, Zachary	COVAB	M	Uganda	Developing
Ocaido, Michael	Veterinary epidemiologist, Head of Department of Wildlife and Aquatic Animal Resources at COVAB	M	Uganda	Developing
Okanga, Kenneth	Chief technician, Department of Veterinary Public Health, COVAB	M	Uganda	Developing
Okech, Sam	COVAB	M	Uganda	Developing
Omagor, Sam	Uganda Meat Industry, Kampala	M	Uganda	Developing
Ouma, Emily	ILRI Uganda	F	Kenya	Developing
Pezo, Danilo	ILRI Uganda	M	Costa Rica/Peru	Developing
Roesel, Kristina	ILRI/FUB	F	Germany	Developed
Ssejamba, Nicholas	Animal husbandry officer, Mukono/National Agricultural Advisory Services (NAADS)	M	Uganda	Developing
Sserwadda, Joseph	Animal husbandry officer; meat inspector Masaka Municipality	M	Uganda	Developing
Waalabyeki, David	KCCA	M	Uganda	Developing
Zziwa, Emmanuel	ASARECA	M	Uganda	Developing

Trainees (8–11 April 2014)

Name	Affiliation	Sex (M/F)	Country of origin	Country Classification
Adongo, Vicky Valentine	Fresh Cuts/Quality Cuts	F	Uganda	Developing
Amulen, Magdalene	Fresh Cuts/Quality Cuts	F	Uganda	Developing
Isabirye, Robert	Kamuli District local government, veterinary officer in Namwendwa sub-county	M	Uganda	Developing
Kabasa, William	Lab manager and Industrial training coordinator at COVAB	M	Uganda	Developing
Kasibule, Daniel	District Veterinary Officer, Kamuli	M	Uganda	Developing
Kiryabwire, David	District Veterinary Officer, Mukono	M	Uganda	Developing
Kwizera, Herbert	Food Inspection & Farm Management at Kyambogo University	M	Uganda	Developing
Lubega, Simon	Manager Wambizzi abattoir	M	Uganda	Developing
Lwanira, Jane Rose	KCCA	F	Uganda	Developing
Mayanja, Lawrence	Animal husbandry officer, meat inspector Kabonera pig hub	M	Uganda	Developing
Nadiope, Gideon	VEDCO	M	Uganda	Developing
Nsadha, Zachary	COVAB	M	Uganda	Developing
Okanga, Kenneth	Chief technician, Department of Veterinary Public Health	M	Uganda	Developing
Omagor, Sam	Uganda Meat Industry, Kampala	M	Uganda	Developing
Salongo, Kajjimu Sebastian	KCCA	M	Uganda	Developing
Ssejjemba, Nicholas	Animal husbandry officer, Mukono/NAADS	M	Uganda	Developing
Sserwadda, Joseph	Animal husbandry officer - meat inspector Masaka Municipality	M	Uganda	Developing
Waalabyeki, David	KCCA	M	Uganda	Developing
Fries, Reinhard	FUB	M	Germany	Developed
Clausen, Peter-Henning	FUB	M	Germany	Developed
Baumann, Maximilian	FUB	M	Germany	Developed
Roesel, Kristina	ILRI/FUB	F	Germany	Developed

Training evaluation by participants

An evaluation form was filled in by the 16 participants at the end of the course and different aspects of the training were rated (Tables 1–5). Overall, the trainees considered their personal learning success as very high (12.5%) and high (62.5%).

What the participants appreciated most were the practical sessions and field visits, including the demonstration of the digestion assay for the detection of *Trichinella* larvae. The contents of the lectures and observations during field visits were discussed after each major subject, an activity that was valued by both trainees and trainers. During the discussions, the participants applied what they had learned to the Ugandan situation and compared it to the German system. The interaction with fellow meat inspectors and foreign experts was also considered useful. A big downside of the training was the short duration of only five days. Many participants expressed the need to extend the training by at least another week.

Suggestions for improvement included visits to model farmers to discuss good farming practices and body condition scoring and visits to feed millers. The contents of the training were presented using the farm-to-fork approach which was regarded as very useful but there was not enough time to travel to farms or village butchers. There was also interest in visiting formal processing plants, an activity that had been envisaged by the course organizers but proved to be difficult to realize for a big group. It would have been good to have more carcasses with disease signs available for the post mortem unit because seeing a lesion on a carcass or the *Trichinella* larvae under the microscope is the best way to remember it. However, it was not possible to store more carcasses in advance due to the lack of cooling facilities at the city's pig abattoir and at the university.

For adult learners, it was suggested to cover the theory sections in the morning when concentration is highest and schedule field visits and practical in the afternoon. Since many of the participants are not trained veterinarians or academics, scientific language (for lymph nodes or Latin names of diseases) should be kept to minimum. The trainees preferred to have more printed material. However, all of them were given a CD-ROM containing the training materials, photos and additional resources. As a follow-up to the training course, participants expressed interest in annual refresher training courses as well as training for local slaughterhouse workers, traders and butchery owners. They also requested training in specific microbiological testing methods, meat grading techniques and pork processing for value addition. The slaughterhouse management would appreciate a visit to a slaughterhouse abroad to apply in Uganda what they can learn in a foreign country where the pig industry is already more developed.

Table 1: Rating of personal learning success (n=16)

Rating	Number of participants
Very high	2 (12.5%)
High	10 (62.5%)
Medium	4 (25.0%)
Low	-

Table 2: Teaching methods (amount)

Session	n	Rating		
		Too little	About right	Too much
Lectures	16	2 (12.5%)	12 (75.0%)	2 (12.5%)
Outside visits	16	5 (31.3%)	9 (56.3%)	2 (12.5%)
Practical	16	9 (56.3%)	5 (31.3%)	2 (12.5%)

Table 3: Practical and visits

Place visited/practical session	n	Rating		
		Very useful	OK	Not useful
Wambizzi abattoir: ante mortem	16	12 (75.0%)	4 (25.0%)	-
Makerere University: post mortem	14	12 (85.7%)	1 (7.1%)	-
Trichinostomy/ <i>Trichinella</i> digestion assay	14	13 (92.9%)	1 (7.1%)	-
Butchers in Wandegaya	13	5 (38.5%)	8 (61.5%)	-
Formal supermarket	13	8 (61.5%)	5 (38.5%)	-

Table 4: Lectures

Title of lecture	n	Rating level of lectures			Rating amount of lectures		
		Easy	OK	Too hard	Too little	OK	Too much
World Café	13	2 (15.4%)	11 (86.4%)	-	1 (7.7%)	12 (92.3%)	-
Introduction	15	1 (6.7%)	14 (93.3%)	-	-	15 (100.0%)	-
The food chain from farm-to-fork	14	-	13 (92.9%)	1 (7.1%)	1 (7.1%)	12 (85.7%)	1 (7.1%)
Uganda smallholder pig value chain	14	8 (57.1%)	6 (42.9%)	-	4 (28.6%)	10 (71.4%)	-
Regulatory framework for pork safety in Uganda	14	2 (14.3%)	8 (57.1%)	4 (28.6%)	6 (42.9%)	6 (42.9%)	2 (14.3%)
Value addition: processed pork	14	1 (7.1%)	13 (92.9%)	-	2 (14.3%)	12 (85.7%)	-
Selected parasitic diseases of pigs	14	-	12 (85.7%)	2 (14.3%)	-	12 (85.7%)	2 (14.3%)
Pig parasites in Uganda – results from the ILRI assessments	15	-	15 (100%)	-	-	15 (100.0%)	-
Transboundary diseases in the Ugandan pig value chain	15	3 (20.0%)	11 (73.3%)	1 (6.7%)	3 (20.0%)	11 (73.3%)	1 (6.7%)
Bacterial diseases in the Ugandan pig value chain	15	1 (6.7%)	12 (80.0%)	2 (13.3%)	3 (20.0%)	10 (66.7%)	2 (13.3%)
The role of the slaughterhouse in disease surveillance	15	2 (13.3%)	12 (80.0%)	1 (6.7%)	2 (13.3%)	13 (86.7%)	-
Technical procedures of ante mortem	15	1 (6.7%)	13 (86.7%)	1 (6.7%)	4 (26.7%)	10 (66.7%)	1 (6.7%)
Technical procedures of post mortem	15	1 (6.7%)	12 (80.0%)	2 (13.3%)			
Application of hygiene techniques	16				5 (31.3%)	9 (56.3%)	2 (12.5%)
	14	4 (25.0%)	9 (56.3%)	3 (18.8%)	2 (14.3%)	11 (78.6%)	1 (7.1%)

Table 5: Logistics (quality)

Item	n	Rating		
		Fair	OK	Very good
Travel arrangements	16	3 (18.8%)	9 (56.3%)	4 (25.0%)
Accommodation	10	-	6 (60.0%)	4 (40.0%)
Teaching facilities	15	1 (6.7%)	8 (53.3%)	6 (40.0%)
Leisure	15	4 (26.7%)	9 (60.0%)	2 (13.3%)

Progress control by participants

Fifteen of the 18 participants completed and submitted a progress control at the end of the workshop. The 14 questions below addressed aspects that were covered during the training.

1. List and describe the **three (3)** most common pig diseases in Uganda. (6 points)
2. Mention at least **three (3) constraints** of an efficient pig supply/value chain. (3 points)
3. Which **transboundary animal diseases** in pigs are hardly distinguishable in ante mortem and post mortem inspection? (2 points)
4. What clinical signs or symptoms in an **acute case of foot and mouth disease in pigs** can be detected in the **ante mortem** examination? (1 point)
5. What **pathological finding** can you find **in this animal** in the **post mortem** examination? (2 points)
6. What **zoonoses** in pigs are of particular importance for you as meat inspectors? Name at least one (1) and give a reason. (2 points)
7. If a pig is slaughtered with the **acute form of erysipelas**, is the meat then fit for human consumption? Answer 'yes' or 'no'. (1 point)
8. What causes **milk spots (white spots) in the liver of pigs**? (1 point)
 - Cysts of the human tape worm *Taenia solium*
 - Migrating larvae of *Ascaris suum*
 - Larve of *Trichinella spiralis* encapsulated in liver cells
9. How is infection with *Trichinella* spp. acquired **in people**? (1 point)
 - Ingestion of raw or under-cooked infected pork or pork products (sausages, salami or ham)
 - Ingestion of oocysts of *Trichinella spiralis*
 - Consumption of under-cooked infected meat from wild boar, warthogs and bush pigs
10. Why is the **history** of an animal important for **ante and post mortem inspection**? (1 point)
11. Explain what is meant by the terms 'observation', 'diagnosis' and 'assessment' in the context of **post mortem** inspection. (3 points)
12. What are the **steps** to take when **inspecting a pig carcass**? (3 points)
13. Name some **detection techniques** used in a **hygiene check**. (3 points)
14. What are your **practical approaches to hygiene at the slaughterhouse**? (2 points)

Results

Percentage of questions answered correctly	Proportion of respondents
Over 80%	33% (5/15)
71–80%	47% (7/15)
61–70%	0
51–60%	13% (2/15)
≤ 50%	7% (1/15)

Annex 1: World café discussion

What are the hazards of concern to meat safety and quality in Uganda and what are their sources?

(Chair: Peter-Henning Clausen)

	Group 1 (meat inspectors)	Group 2 (capacity builders, researchers, policy)	Group 3 (investment partners and private sector)
Pre-harvest	<p>Poor management (husbandry)</p> <p>Hygiene (poor feed, handling)</p> <p>Drug abuse when feeding</p> <p>Poor enforcement in farms as treatment</p> <p>Biosecurity (movement of pigs)</p>	<p>Poor biosecurity on farm: disease and infection/poor hygiene + extensive system = prerequisite for parasite infestations</p> <p>Drug residues in pigs for slaughter/pork: not observing recommended withdrawal period</p> <p>Poor feed quality (aflatoxin residues in pork)</p> <p>Transport</p> <p>Animal welfare; stress results in shedding of more bacteria (<i>Salmonella</i>) and/or reduced meat quality</p> <p>Lack of policy guidance along all nodes</p>	<p>Lack of confinement</p> <p>Poor production systems</p> <p>Poor feed quality (contamination)</p> <p>Poor quality of drugs</p> <p>Misuse of drugs</p> <p>Lack of good animal husbandry processes</p> <p>Weak policy enforcement/weak legislation</p> <p>Lack of guidance on breeding processes</p>
Harvest	<p>Transportation and animal welfare</p> <p>Movement control</p> <p>Poor hygiene in slaughter</p> <p>Environment (people, equipment and animal)</p> <p>Illegal slaughterhouses/places</p> <p>Lack of training of meat inspectors (inefficient meat inspection services)</p> <p>Poor infrastructure slaughterhouses</p>	<p>Contamination during slaughter (poor hygiene)</p> <p>Meat inspectors: poor meat inspection; also lack of meat inspection</p> <p>Animal welfare (poor handling)</p> <p>Poor infrastructure (lack of slaughter facilities)</p>	<p>Mishandling/overloading during transport</p> <p>Contamination of the meat during slaughtering</p> <p>Lack of trained meat inspectors</p> <p>Corruption by the enforcement personnel</p> <p>Lack of knowledge/training for the players</p> <p>Poor enforcement of legislation and audits</p>
Post-harvest	<p>Poor handling, packaging and transfer</p> <p>Hygiene of handlers</p>	<p>Contamination (poor hygiene)</p> <p>Not respecting cold chain</p> <p>Poor preparation (poor cooking)</p>	<p>Inappropriate storage and meat handling equipment</p> <p>Poor infrastructure</p>
Cross-cutting		<p>Poor diagnosis (lack of surveillance)</p> <p>Poor policy legislation and enforcement, poor cooperation between traders and inspectors</p> <p>Lack of risk assessment along the value chain</p>	

Which are the most critical points in terms of meat safety management systems?

(Chair: Reinhard Fries)

Group 1 (meat inspectors)	Group 2 (capacity builders, researchers, policy)	Group 3 (investment partners and private sector)
<p>Inspectors should be at the farm to let the animals to the abattoir No supervision at the slaughter slabs Hazards (human)</p> <ul style="list-style-type: none"> • Diseases (parasites) • Drug administration and residues • Contamination during the process (abattoir hygiene is poor) • Improper procedures (scalding using dry materials) and burning • The fate of disposals <p>Quality</p> <ul style="list-style-type: none"> • Injuries during transport (quality) • Feeding (fish) • Poor handling of live animals: stress impacting on the meat quality 	<p>Safety</p> <ul style="list-style-type: none"> • Diseases (zoonotic or not): <i>Salmonella, E. coli, Brucella</i> • Parasites: cysticercosis/<i>Trichinella</i>/Trypanosoma • Toxins (aflatoxins, feed) • Drug residues (antibiotic/antiparasitic substances) • Substances from the environment <p>Quality (at the time being)</p> <ul style="list-style-type: none"> • Blue pork (?): not accepted • Stress during handling animals along the line • Poor hygiene at pre-slaughter, slaughter and processing 	<p>Quality</p> <ul style="list-style-type: none"> • Spoilage microorganisms affecting shelf life (quality) • Poor transportation (quality) • Drugs and vaccines (misuse, withdrawal period not observed) • Farm level: protective measures <ul style="list-style-type: none"> ◦ (treating animals against parasites) ◦ hygiene at farm level and the abattoir including distribution (personnel: no training) • Arrangement of site (abattoir and processing) • Feed fish <p>Hazards</p> <ul style="list-style-type: none"> • Parasites: <i>C. cellulosae, Ascaris, Trypanosoma, Trichuris, Trichinella</i>

What prevents some of the key control measures from being applied effectively and how can we overcome these gaps? (Chair: Maximilian Baumann)

Group 1 (meat inspectors)	Group 2 (capacity builders, researchers, policy)	Group 3 (investment partners and private sector)
<p>Capacity and organization of meat inspection</p> <ul style="list-style-type: none"> • Meat inspection should go back to line ministry (centralized) <p>Lack of organized slaughter places/centralized slaughter</p> <ul style="list-style-type: none"> • Support centralized slaughter <p>Attitude of traders and sellers, processors is profit-driven</p> <p>Weak enforcement</p> <ul style="list-style-type: none"> • Sensitization/training of stakeholders <p>Lack of awareness</p> <ul style="list-style-type: none"> • Sensitization/training of stakeholders <p>Corruption</p> <ul style="list-style-type: none"> • Sensitization/training of stakeholders <p>Poor law adherence to rules, laws and regulations</p> <ul style="list-style-type: none"> • Sensitization/training of stakeholders <p>Conflict of interests</p> <p>Inadequate facilities along the chain</p>	<p>Lack of national programs</p> <ul style="list-style-type: none"> • Implementing programs which are funded <p>Lack of knowledge of all stakeholders (producers to consumers)</p> <ul style="list-style-type: none"> • Training, capacity building at all levels <p>Lack of willingness/awareness to apply regulations if in place</p> <ul style="list-style-type: none"> • Sensitization (workshops), sanctions <p>Lack of appropriate infrastructure (slaughter slabs)</p> <ul style="list-style-type: none"> • Invest in good and appropriate infrastructure <p>Poor policy enforcement</p> <ul style="list-style-type: none"> • Increase staff numbers, motivate and facilitate <p>Farmers cannot afford to pay for control measures of traders</p> <ul style="list-style-type: none"> • Subsidies (tricky!), appropriate financial system, cost-sharing <p>Lack of properly equipped staff</p> <ul style="list-style-type: none"> • Increase staff numbers, motivate and facilitate <p>Corruption</p> <ul style="list-style-type: none"> • Penalization, create awareness, education, proper payment <p>Scientifically sound standards</p>	<p>Lack of knowledge and training (farmers, transporters, slaughterhouse workers, processors)</p> <ul style="list-style-type: none"> • Seminars, workshops, demonstrations (stakeholders should be properly organized, each section/level of the value chain should have knowledge) <p>Equipment not suitable</p> <ul style="list-style-type: none"> • Investment/agricultural credit funds <p>Transportation systems poor</p> <ul style="list-style-type: none"> • Enforce legislation <p>Weak enforcement of legislation (problem bureaucracy)</p> <ul style="list-style-type: none"> • Enforce legislation • Revision, dissemination, sensitization <p>Lack of formalized slaughter places (no cold rooms)</p> <ul style="list-style-type: none"> • Grants/credit scheme if the market is there and producers assured <p>Costs are critical</p> <p>No enforcement staff</p> <ul style="list-style-type: none"> • more staff needed <p>Private sector investment; provide more funds</p> <p>Corruption</p> <ul style="list-style-type: none"> • sensitization <p>Organization of farmers</p> <ul style="list-style-type: none"> • sensitization

Annex 2: Lessons from Day 1

<p>Producers</p> 	<p>Safety depends much on production: drugs, feeds ('only poor quality'), parasites Housing, effluent handling, environmental pollution and meat contamination go hand in hand Safety and quality highly depends on the producer Aflatoxins result in poor quality meat</p>
<p>Traders and transporters</p> 	<p>Animal welfare related to poor quality Poor handling, especially during loading and offloading No legislation: permit fraud, no quarantine enforced Seasonality of market/capital Diseases Post-harvest cooling</p>
<p>Slaughter (including slabs and butcheries)</p> 	<p>Lack of qualified butchers and slaughter men Lack of equipment (metal, wood) Improper slaughter place arrangement ('we do it in a mediocre way') Lack of cleaning utilities (soap, brushes) Poor waste and effluent handling: complaints from neighbours and spread of disease through collecting and distributing manure at slaughter No protective wear, no insurance Lack of enough meat inspectors Water availability (including harvested water); should be subsidized Mixing of animals in holding pens Poor drainage, especially during rains</p>

Pork processors	
	<p>Misuse of drugs at farm and disease Poor transport 'If the meat is spoilt or contaminated before it reaches us, there is not much we can do!' Time from slaughterhouse to processing plant is an important factor (mitigating strategy: wash carcass with water heated to 55°C, disinfect and store in cold room Inspection should also be at farm 'Does it have a stamp?' Traceability is a big problem Have internal microbiology lab but lag time between sampling and results</p>
Consumers	
	<p>Major problem not pork itself but</p> <ul style="list-style-type: none"> ○ how it is prepared: frying – retailers use 'oil that is one week old'; roasting – consumers are in a rush and eat pork that is still 'soft' inside ○ utensils not changed for one week ○ water source ○ vegetables ○ in the villages (Mbale), pork is heated over burning banana leaves (does not get hot enough) <p>There is no 'critical mass' demanding pork safety Only consumer specification is skinless pork Need to form a consumers' association Most pork (70%) consumed outside of homes ASARECA study in Burundi, Rwanda, Kenya, Tanzania, Uganda: those who consume roasted pork are more at risk than those who consume it deep-fried Alcohol related to pork consumption High demand for by-products (ears, offal, eyes/brains by Chinese)</p>
Enabling environment	
	<p>Some laws there but not effective (enforcement) Lack of organizational infrastructure In Africa, the concept should be farm-to-stomach Many researchable areas</p>