International Conference on Legislation and Policy on the Use of Insect as Food and Feed in East Africa

March 2 – 3, 2016
The Vic Hotel, Kisumu, Kenya

icipe
African Insect Science for Food and Health

NWO
Netherlands Organisation for Scientific Research

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IDRC
International Development Research Centre

CRDI
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On behalf of
Federal Ministry for Economic Cooperation and Development

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Australian Centre for International Agricultural Research

International Conference on Legislation and Policy on the Use of Insect as Food and Feed in East Africa

NAME

EMAIL

LINKEDIN

RESEARCHGATE

MOBILE

2016

January

Sun	31	3	10	17	24
Mon		4	11	18	25
Tue		5	12	19	26
Wed		6	13	20	27
Thu		7	14	21	28
Fri	1	8	15	22	29
Sat	2	9	16	23	30

February

Sun		7	14	21	28
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March

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April

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May

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June

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July

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August

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Sat	6	13	20	27	

September

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Tue		6	13	20	27
Wed		7	14	21	28
Thu	1	8	15	22	29
Fri	2	9	16	23	30
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October

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Mon	31	3	10	17	24
Tue		4	11	18	25
Wed		5	12	19	26
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November

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Tue	1	8	15	22	29
Wed	2	9	16	23	30
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Fri	4	11	18	25	
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December

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Tue		6	13	20	27
Wed		7	14	21	28
Thu	1	8	15	22	29
Fri	2	9	16	23	30
Sat	3	10	17	24	31

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Conference Goal, Objectives and Expected outcome

Goal:

To inform governmental regulatory authorities and other stakeholders, the importance of insects as food and feed to improve food and nutritional security in East Africa and the need to develop, adapt and strengthen legislations and policy to govern their use.

Objectives:

1. To create awareness among regulatory authorities on the role of insects as food and feed; and the need to develop and strengthen legislation and policy to regulate its application.
2. To share experiences and lessons among participants from Africa, Asia, Europe and the USA with regard to legislation and policy in the use of insects as food and feed.
3. Draft recommendations to inform policy on the regulation of insects for food and feed in East Africa.

Expected outcomes:

1. Awareness on the role of insects to improve food and nutritional security in East Africa enhanced
2. Global perspectives on the regulatory issues related to insects for food and feed discussed and opportunities to develop and strengthen legislations, policy and regulations in Africa highlighted.
3. Food and feed safety issues related to microbes, toxicity, allergens etc are comprehensively discussed and R&D options that can facilitate removal of barriers to improve utilization are deliberated and recommended.
4. Biodiversity issues that may impinge on R&D activities in the field of insects as food and feed are discussed and recommendations on ways to remove such barriers highlighted/ formulated.
5. Consumer concerns are comprehensively discussed and addressed and opportunities for R&D to minimize impact identified and recommended
6. Stakeholders concerns and expectations are addressed to secure investment.
7. Recommendations from the meeting are widely disseminated among stakeholders including media houses.

Programme

TIME	SESSIONS	LEAD PRESENTER
DAY 0 (Tue 01, Mar. 2016)	**FIELD VISITS AND EXCURSIONS – OPTIONAL**	
DAY 1 (Wed 02, Mar. 2016)	**OPENING SESSION - SETTING THE SCENE: CHAIR (PROF. M. AYIEKO); RAPPORTEUR (MS. AFTON HALLORAN & DR. S. SUBRAMANIAN); VENUE (MFANGANO CONFERENCE ROOM)**	
07:30-09:00	Registration	Conference desk
09:00-09:10	Welcome remarks	Prof. M. Ayieko (JOOUST, Kenya)
09:10-09:20	Presentation of meeting objectives & agenda	Dr. S. Ekesi (*icipe*, Kenya)
09:20-09:30	Opening speech 1	Dr. S. Kelemu, DG (*icipe,* Kenya)
09:30-09:40	Opening speech 2	Prof. B. Estambale, DVC (JOOUST, Kenya)
09:40-09:50	Opening speech 3	Prof. S.G. Agong' VC (JOOUST, Kenya)
09:50-10:00	Group photo	
10:00-10:30	*Coffee break*	
	SESSION 1: IMPORTANCE OF INSECTS TO IMPROVING FOOD AND NUTRITIONAL SECURITY - STRENGTHENING LEGISLATION & POLICY TO FACILITATE THEIR USE (KEYNOTE SPEAKERS): CHAIR (PROF. NANNA ROOS & DR. DAVID MWANGI); RAPPORTEUR (MR. CHRISTOPHER MUENKE & DR. ISAAC OSUGA); VENUE (MFANGANO CONFERENCE ROOM)	
	Suggested focal points: (i) importance of insects for food and nutritional security in specific regions (ii) status of legislation and policy (iii) consumer perception (iv) research and policy gaps to be addressed	
10:30-10:50	A global perspective on regulatory frameworks for insects as food and feed	Dr. Paul Vantomme (FAO, Rome)
10:50-11:10	EU perspective	Dr. Wolfgang Trunk (EU, Belgium)/ Prof. Nanna Roos (UC, Denmark)
11:10-11:30	Developing Good Agricultural Practices (GAP) Standard for Cricket Farming in Thailand	Prof. Yupa Hanboonsong (KKU, Thailand)
11:30-11:50	Legislation and Policy Framework in the use of Insects as Food and Feed – The African Perspective	Mr. Deusdedit Mubangizi (UNBS, Uganda)

TIME	SESSIONS	LEAD PRESENTER
11:50-12:30	Panel discussion - Q&A session 1	
12:30-13:30	*Lunch break*	
	SESSION 2: CONSUMER PERCEPTIONS: CHAIR (DR. DENNIS RANGI & DR. DOROTHY NAKIMBUGWE); RAPPORTEUR (DR. HENRY OGOLLA & MS. MARWA SHUMO); VENUE (MFANGANO CONFERENCE ROOM)	
	Suggested focal points: (i) Nutiritional and health benefits of Insect consumption (ii) food and feed processing options for insects (iii) Packaging and labelling	
13:30-14:00	Nutritional contribution of insects in the food basket	Prof. Nanna Roos (UC, Denmark)
14:00-14:20	Edible insects from a chef prospective	Mr. R Flore (NFL, Denmark)
14:20-14:40	Gastronomy: North-South Idea of Processing and Consuming Edible Insects	Prof. M. Ayieko (JOOUST, Kenya)
14:40-15:00	Exploiting edible insects as food for infants and young children: Experiences and future prospects	Dr. J. Kinyuru (JKUAT, Kenya)
15:00-15:30	*Tea/coffee break*	
	SESSION 3: FOOD & FEED SAFETY; SANITATION & PATHOLOGY; BIODIVERSITY: CHAIRCHAIR (PROF. MARCEL DICKE & DR. HELIDA OYIEKE); RAPPORTEUR (DR. TANGA MBI & MR. HENRY MAGARA); VENUE (MFANGANO CONFERENCE ROOM)	
	Suggested focal points: (i) food and feed safety issues related to microbes and chemicals (ii) disease constraint in insect colonies and sanitation (iii) opportnities and impact, harmonization of policies among regulatory bodies in realtion to biodiversity access, (iv) lessoons and relevance for East Africa	
15:30-15:50	Microbiological concerns in the Insects for food and feed value chain	Dr. S. Subramanian (*icipe*, Kenya)
15:50-16:10	Insects as a primary source of feedstock for meat and fish production; Safety and quality considerations	Dr. A. Charlton (FERA, UK)

TIME	SESSIONS	LEAD PRESENTER
16:10-16:30	Insect diseases and sanitation in production cultures	Prof. J. Eilenberg (UC, Denmark)
16:30-16:50	Use of biodiversity and underutilized resources	Dr. Helida Oyieke (NMK, Kenya)
16:50-17:30	Panel discussion - Q&A session 2	
17:30-18:30	Student/project poster session	See page 12
18:00	*Cocktail*	
DAY 2 (Thu 03, Mar. 2016)	**SESSION 4: INDUSTRY EXPECTATIONS: CHAIR (DR. JOHN KINYURU & DR. SAMUEL KASIKI); RAPPORTEUR (DR. NICHOLAS KORIR & MR. KENNEDY PAMBO); VENUE (MFANGANO CONFERENCE ROOM)**	
	Suggested focal points: (i) Commercial opportunities related to insects for food and feed (ii) Technological and legislative barriers to access these opportunities (iii) Recommendations to overcome these barriers	
08:30-08:50	Enviroflight	Mr. Glen Courtright (USA)
08:50-09:10	Building an insect facility: the interaction between scientists, engineers and business drivers	Mr. D. Drew (South Africa)
09:10-09:30	Commercial Black Soldier Fly (BSF) opportunities in Kenya	Mr. O. Ensor (Kenya)
09:30-09:50	Promoting the use of insects in aquafeeds with vigilance: An industrial perspective	Ms. S. Nakimu (Uganda)
09:50-10:10	Prospects and constraints for the small-scale production of insects for feed on farm	Dr. M. Kenis (CABI, Switzerland)
10:10-10:30	*Tea/coffee break*	
10:30-10:50	Unilever	Ms. D. Mugane (Kenya)
10:50-11:10	Flying Food – setting up a cricket value chain in Kenya and Uganda	Mr. E. Beckers (The Netherland)

TIME	SESSIONS	LEAD PRESENTER
11:10-12:00	Panel discussion - Q&A session 3	
12:00-13:00	*Lunch break*	
	SESSION 5: R4D TO SUPPORT PRODUCTION, LEGISLATION, POLICY: CHAIR (PROF. CHRISTIAN BORGEMEISTER & PROF. YUPA HANBOONSONG); RAPPORTEUR (DR. ANNETTE JENSEN & MR. EVANS NYAKERI); VENUE (MFANGANO CONFERENCE ROOM)	
	Suggested focal points: (i) Updates on on-going and new R4D projects to address gaps (ii) Accomplishments (iii) project focus in relation to policy and legislations related to insects for food and feed (iv) recommendations to inform policy decisions (v) complimentarities, cross-cutting activities and opportunities of collaboration	
13:00-13:10	GREEiNSECT – a research project about insects for food and feed in Kenya	Prof. N. Roos (UC, Denmark)
13:10-13:20	Improving livelihood by increasing livestock production in Africa (ILIPA)	Prof. M. Dicke (WU, The Netherland)
13:20-13:30	INSFEED: Insect Feed for Poultry and Fish Production in Kenya and Uganda	Dr. K. Fiaboe (*icipe*, Kenya)/D. Nakimbugwe (MU, Uganda)
13:30-13:40	*Ento*FOOD: Insect-based products to enhance food and nutritional security in sub-Saharan Africa	Dr. S. Subramanian (*icipe*, Kenya) / Prof. C. Borgemeister (UoB, Germany)
13:40-13:50	Updates on the living lab project: Expanding opportunities for youth in the fish and poultry sub-sectors	Prof. Paul Wachana (USIU, Kenya)
13:50-14:10	**SESSION 6: CONFERENCE RECOMMENDATIONS**	
14:10-14:20	**Vote of Thanks - Dr. Komi Fiaboe**	
14:20	*Coffee break/Break away options*	
	Media interviews	
	Networking	
	Side meetings	
19:00	**CONFERENCE DINNER**	

Student presentations

1. **Cricket farming, an alternative livelihood strategy: learning from Thailand —** Ms. Afton Halloran, PhD, University of Copenhagen, Denmark, aha@nexs.ku.dk
2. **Utilization of farmed edible crickets (*Acheta domesticus*) to improve child nutrition in Kenya —** Ms. kipkoech carolyne, PhD, JKUAT, Kenya, kipkoechcarolyne@gmail.com
3. **'Analysing social acceptance of foods from edible insects requires new thinking: what options do we have? —** Mr. Kennedy Pambo, PhD, JKUAT, Kenya, kennedypambo@gmail.com
4. **Prospects and challenges of insect-driven feed: Black soldier fly (*Hermetia illucens*) as a model species —** Ms. Marwa Shumo, PhD, Uinversity of Bonn, Germany, mshumo@icipe.org
5. **Physico-chemical stability of selected fresh and semi-processed edible insects oils —** Mr. Edwin Kamau, MSc, JKUAT, Kenya, kamau.edwin@rocketmail.com
6. **Consumer preferences, willingness to pay and potential demand for insect-based food products in Kenya —** Mr. Mohammed H. Alemu, PhD, University of Copenhagen, Denmark, mha@ifro.ku.dk,
7. **Acceptance of insects as an alternative protein source for poultry and fish feeds in Uganda —** Ms. Elizabeth Sikahwa, MSc, Makerere University, Uganda, sikahwaliz@yahoo.com
8. **Acceptance of Insects as a source of Protein in Poultry and Fish Feed in Kenya —** Mr. Kimutai Bett, MSc, University of Nairobi, Kenya, kimbett79@gmail.com
9. **Farmer demand for purchased poultry and fish feed in Kenya —** Mr. John Macharia, MSc, University of Nairobi, Kenya, johnmacharia74@gmail.com
10. **Influence of preliminary processing on the chemical and microbial quality of selected edible insects —** Ms. Dorothy Nyangena, MSc, JKUAT, Kenya, dorothynyangena@gmail.com
11. **Nutritional profiling of substrates and insects, development of processing protocols and effect of processing on safety —** Mr. Tom Bbosa, MSc, Makerere University, Uganda, tombosax19@gmail.com
12. **Optimization of rearing protocols - Crickets, Black Soldier Flies and Grasshoppers —** Mr. Francis Ssengendo, MSc, Makerere University, Uganda, sengendofrancis@gmail.com
13. **The effect of food substrates on the development and survivorship of the house cricket *Acheta domesticus* L. (Orthoptera: Gryllidae) in Kenya —** Mr. Magara Henlay, PhD, JOOUST, Kenya, hmagara@icipe.org
14. **Growth Performance of *Acheta domesticus* and *Gryllus bimaculatus* fed on different agro-byproducts —** Ms. Mary Orinda, PhD, JOOUST, Kenya, maryakinyi2010@gmail.com
15. **Feeding substrates for optimization of black soldier fly larvae production —** Mr. Evans Manyara, PhD, JOOUST, Kenya, evans.nyakeri@gmail.com
16. **Crickets feed resources: Current practices and constrains —** Ms. Jacline A. Oloo, MSc, JOOUST, Kenya, jacqueslangi@gmail.com
17. **Market Potential for Edible Insects as Feed in Kenya —** Ms. Nancy Ndung'u, PhD, JKUAT, Kenya, wamwitha.j@gmail.com

NOTES

Abstract 01

A global perspective on regulatory frameworks for insects as food and feed

Paul Vantomme, FAO, Rome

Email: Paul.Vantomme@fao.org

FAO made a first attempt in compiling a global review on national legislation existing up to May 2014 dealing explicitly with the use of insects for food and animal feed and this paper is available at: http://www.fao.org/forestry/edibleinsects/84745/en/ . During the last 2 years, new countries joined by adopting insect encompassing food/feed legislation, while others have further expanded their existing frameworks.

For each country in the world, legislation governing food and animal feed and the elaboration and enforcement of the corresponding rules on their production, user safety, processing, transport and trade belong to the competency of its relevant institutions and parliament. In the EU, the authority regarding food and feed legislation belongs to a supra-national, regional entity (Commission-Parliament), however still with some "flexibility" admitted to individual member states.

At the global level, the direct consumption of insects as human food is trivial and may vary from insignificant in (mostly "western") countries to a fully accepted but often occasional snack food available in niche markets in at least 50 countries worldwide, where eating insects is "tolerated" rather than regulated. The fast growing interest by consumers in "western" countries over the last 4 years for insect based foods is a global driver in developing insect inclusive food legislation everywhere and culminated with the approval of insects as a Novel Food category by the EU Parliament/Commission in October 2015. As the EU is the world's second largest food importing region, EU food legislation and rules are taken as a model for elaborating food laws elsewhere in anticipation of an expected growing trade of insect based/containing food products to the EU.

Probably the highest potential will be for farming insects on agricultural/food waste streams as to produce animal feed. Worldwide, farmed insects are a legally allowed feed for pet animals that do not enter into the ("commercial") human food chain. However for feeding livestock, since the outbreak of the "mad cow" disease some 15 years ago, legislation worldwide does not allow any longer the (re-) use of animal based proteins (also called PAP) into livestock feed (although animal fat and some fibers, like feathers are still allowed, which means that insect fat is legally allowed in livestock feed in the EU). The driving force to change the current PAP restrictions and feed legislation in general, mainly to allow insects and their proteins into livestock feed, now largely comes from the feed industry (because of the high cost of the presently used protein sources like fish and soybean meals in compound feeds), but also from a range of other stakeholders concerned about environmental sustainability, animal health, growing antimicrobial resistance, green/local economy and poverty alleviation. Since the last 2-3 years a growing number of countries worldwide are now at various stages of legal approval and testing for including insect(/meal)s into commercial feeds for poultry and aquaculture farming, and with the allowed substrates for feeding the insects, procedures, processing and insect farming practices defined.

NOTES

Abstract 02

Developing Good Agricultural Practices (GAP) Standard for Cricket Farming in Thailand

Yupa Hanboonsong, Division of Entomology, Faculty of Agriculture, Khon Kaen University, Khon Kaen 40002, Thailand

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The consumption of insects for food is a common practice for Thai people, especially in the Northeast region. Various wild and farmed insect species are eaten. The farming of cricket insects began 15 years ago as a new industry for rural regions and small scale farmers. Since then the production has gradually increased so that today it includes medium and large scale farms. The trade in crickets and processed products has expanded from local markets to national and international markets. As a consequence of this growth, producers, traders and related stakeholders are in the process of setting up a farm standards related to food safety for officially recognized of farmed cricket as a legitimate food source. The pathway of development of the Good Agricultural Practice (GAP) standard for cricket farming will be described. The regulations and requirements for GAP encompasses the whole chain of cricket farm process including location, quality management, harvesting and storage as well as hygiene and sanitation will be discussed. The resulting “Q mark” standard will indicate such produce is of high quality and safety for consumers.

Key words: GAP, cricket farming, food safety, insect legislation.

NOTES

Abstract 03

Legislation and Policy Framework in the use of Insects as Food and Feed – The African Perspective

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Insects are the most abundant multicellular organisms on planet Earth and are thought to account for more than 70% of all species. Historically, Africans have used insects for various purposes to enhance their livelihoods. Insects have been used as food, as feed for animals, in medicine, in environmental preservation and even in surgery where heads of soldier ants were used as surgical stitches! The use of insect protein as a replacement for expensive protein sources from fish or plants has been seen as one key area of interest for further development.

However, the use of insects for various purposes in Africa has gone on for long without proper legislative and policy controls. As a result, the associated dangers such as wrong use of some insect species have resulted into accidents, sicknesses and even deaths. Misuse of insects has been reported in consumption of wrong species and harvesting some insects to near extinction. Legislation is needed in terms of laws and regulations that govern the nurturing, harvesting and use of these insects for benefit of mankind and to protect the insects from extinction. The legislation needs to be supported by policy framework that spells out the broad and specific policies.

In Africa, policies and legislation were formalized during colonial times to replace the previous traditional system where policies and rules were unwritten and only passed orally from generation to generation. Today, legislation and policy formulation has taken root in Africa but the problem is that many important sectors such as insect usage, have not been prioritized because responsible people do not see the importance and urgency. Yet it is absolutely necessary to focus on this sector and look at policy issues such as; usage (food, feeds, medicine, etc), institutional framework, legal and regulatory framework, implementation strategies and funding considerations for sustainable growth. Key policy objectives should include; increased insect production, compliance to standards, reducing production costs, stimulating interest and capacity among private and public sectors, among others. For example, standards issues are often relegated to secondary level or ignored outright to the detriment of communities that end up suffering health and safety hazards that would otherwise be sorted by sanitary and phyto-sanitary (SPS) standards.

This paper brings forth historical and cultural issues of insects for food, feed, medicine and environmental protection in Africa, the policy and legislative environment in Africa and implications, policy gaps, strategies and processes. Most importantly it focuses on challenges and key questions for Research and Development (R&D) as well as looking at the future of insects for food and feed in Africa.

NOTES

Abstract 04

Nutritional contribution of insects in the food basket

Nanna Roos, Institute for Sports and Nutrition, University of Copenhagen, Denmark

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A diverse diet, with balanced contribution from plant- and animal-source foods, is documented to be the best way to secure nutrient adequacy meeting human requirements. In food insecure populations the diet is often in risk of lacking sufficient amounts of particularly animal-source food (meat, fish, milk, egg) to secure adequate supply of essential nutrients for good nutrition and health. Micronutrient deficiencies are widespread, in particular vitamin A, iron and zinc deficiencies, but also deficient intake of B12 are at risk of being a public health problem. Vitamin B12 is exclusively contributed from animal-source or fermented foods, while vitamin A, iron and zinc are contributed on more bioavailable forms in animal-source foods, compared to plant foods. Animal-source foods also provides a higher proportion of essential amino acids, as well as the essential n-3 fatty acids which may be difficult to cover in sufficient amounts in a purely plant-based diet.

The nutritional contribution from the more than 2,000 insect species recorded as edible is highly variable, because of biological variation between species, and also because the insects are consumed in different morphological stages (egg, larvae, pupae and adults). The protein content varies from below 10 to 70 % of dry matter, and fat content is equally variable, in the edible parts of various insects. If the larvae stage of an insect is consumed it may be the life-stage where fat accumulation peak. For example, palm weevil larvae (*Rhynchophorus phoenicis*) can contain up to 70% fat (dry matter). Also protein quality and fatty acid composition is highly variable, as well as the micronutrient composition. One assessment of protein quality taking amino acid composition and human digestibility into account, found that eri silk larvae (*Samia ricinii*) had protein quality comparable with beef. Fatty acid profiles of various insect species generally show that insects are good sources of essential n-6 and n-3 fatty acids, though typically not providing significant amounts of the long-chained polyunsaturated fatty acids (e.g. docosahexaenoic acid (DHA) provided from fish. However, averaging across the large range of species-to-species variation, insects are in a dietary context to be recognized as a valuable animal-source foods which can contribute the important amino acids, fatty acids and micronutrients which typically are at risk of being deficient in mainly plant-based diets in food insecure populations. In privileged populations with sufficient access to a diverse diet, insects can nutritionally complement or replace meat. Mass-rearing of selected insect species is a promising valuable contribution to local and global food systems. To achieve the full benefit from this novel food sector, the nutritional value of the species selected for mass production needs to be documented in details, along with establishing food safety standards for raw and processed insects. The nutritional significance of chitin, the exo-skeleton of insects, needs further investigation. Also documenting the bioavailability of specific nutrients, especially iron and zinc, is needed to fully document the nutritional contribution from different insect species.

NOTES

Abstract 05

Edible insects from a chef prospective

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During the last few years, insects have been defined as the food of the future. However, in order to deliver a more precise gastronomic message to the world we must acknowledge that insects have always been commonplace in the diets of different human societies. Recently, interest in using insects for human consumption has grown in a number of different directions. Even famous chefs, in places where insects are not identified as common, have been attracted by the idea of using insects as ingredients. From a gastronomic prospective, there are multiple reasons for arguing why insects can play an important role in promoting sustainability through food.

The promotion of edible insects in various entrepreneurial circles has mainly been driven by the argument of environmental sustainability and nutrition. However, we must exercise caution when speaking specifically to only one of the many merits of insects as we can easily underestimate or misunderstand the other elements that contribute to making a diet sustainable and well integrated in a different culture. For this reason, our research was founded on mainly promoting the argument of deliciousness, and how this concept is addressing issues of diversity and nutritional necessity from a more holistic prospective. Building and valorising the traditional knowledge of the cultures and societies where this has been a norm, we can understand how the concept of edible insects goes far beyond just an ingredient.

The dishes that we have developed during our research sheds light on the relationships between territory, flavours, culture and human beings and represents connections that are not always evident but provide an important basis when working with food.

NOTES

Abstract 06

Gastronomy: North-South Idea of Processing and Consuming Edible Innsects

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Entomophagy is not a new idea. It has been practiced for centuries even though few individuals do not readily accept it as a norm in our modern eating. Human consumption of insects (anthropo-entomophagy) is still a no-go in many parts of the western world. Most people in the western societies still suffer the yukh syndrome and have influenced several non-westerners to think the same. As stated by authors, thinking of taking a bite off a bug leads to feelings of disgust. The cultural aversion against eating insects is so extensive. When we think of entomophagy, several questions come to our mind. The question most people ask is whether entomophagy is safe or not. Other people have claimed that it is the declining availability of land for production of conventional animals for protein food that is compelling human to turn to insects as food and feed. The bottom line in entomophagy is that edible insects are safe for human consumption, easy to farm, cost effective, environmental friendly and healthy for human and livestock feeding. The objective of this presentation is to introduce edible insects in African eating places including exotic restaurants to make it part of modern and local gastronomy in areas where insects are farmed. This paper therefore discusses the various options available for consuming edible insects in the western society (North) and in the developing (South) countries. It highlights the African traditional methods of consuming edible insects, some of which are the preferred methods of ensuring maximum bioavailability of the valuable food nutrients. It goes further and discusses selected dishes of edible insects that may meet the standards and expectations of current (modern) consumers based on eating habits and behavior of indigenous Kenyan. It outlines concerns and considerations that should be put in place to encourage and popularize edible insects in local restaurants.

NOTES

Abstract 07

Processing edible insects as food for infants and young children: Experiences and future prospects

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Poor nutritional quality of food for infants and young children often limits growth especially during the complementary feeding period. The complementary feeding period is well recognized as a "window of opportunity" for preventing malnutrition. Complementary foods in developing countries have for a long time been cereal based which have been associated with low nutritional quality hence aggravated levels of child malnutrition. Studies have shown that school going children consuming diets high in animal source foods grow better however, animal source foods, such as milk or meat, are often unaffordable and therefore local affordable alternatives are needed. Recently in Africa, supplementation of cereals with locally available legumes as a protein source has been exploited such as soya bean, groundnut, cowpeas, pigeon peas, common bean, bambara nuts among others. Studies on complementary foods development with animal foods as ingredients are fewer or have not been widely reported. It's postulated that a mix of plant and animal source based complementary foods are nutritionally capable to manage nutritional health similar or even better than plant based sources only in some aspects. Previously most work have been mainly based on the use of fish, however recent studies have also studied edible insects such termites in Kenya and spider in Cambodia.

There has been an awakening on utilization of edible insects to fight food and nutrition security globally and therefore their utilization in complementary feeding may be of interest. The WinFood study carried out in Kenya and Cambodia proved the concept that it's possible to develop complementary foods based on edible insects, foods that were comparable to the foods given as standard care in management of malnutrition. The study also assessed the effect of insects based complementary foods during complementary feeding with varied results on standard anthropometric measures of height and weight, body composition, fat-free mass, fat mass, essential fatty acids, and micronutrient status. The effects on these parameters will vary depending on the species of insects used in the ingredient as there is reported variability of nutrients across and within species. The role of chitin in nutritional health and acceptability of foods needs to be explored with the hope to de-mystify whether chitin is beneficial to the child health.

Therefore, insects need to be recognized as an important animal-source foods which can supplement the plant based complementary foods. It can even replace conventional meat in some communities with promising nutritional and economic impact. The role of food industries will be very critical if the impact is to be felt. This has to however be galvanised by mass production systems coupled with regulations that guarantee accessibility as well as safety.

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Abstract 08

Microbiological concerns in the Insects for food and feed value chain

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Globally ~2,000 species of insects are consumed by about 2 billion people and in Africa insect consumption has been strongly recommended as a strategy to enhance food and nutritional security. In recent years, there has been a growing interest to promote the use of edible insects in the food and nutritional security debate and as an alternative protein sources in animal feeds. Despite the important role that insects can play in terms of food and feed security, there are several microbiological concerns that must be addressed to assure consumer confidence. In this regard various studies must be undertaken to analyse the microbiological content of whole insects as fresh, processed and stored to meet regulatory standards. Greater risks are posed by contamination with saprophytic fungi, yeast and bacteria depending on the substrates used for rearing, processing, storage and packaging techniques adopted. Saprophytic fungi belonging to *Aspergillus* spp., *Penicillium* spp, which are mycotoxicogenic and bacteria belonging to *Enterobacteriaceae* are frequently reported on fresh and processed edible insects. For instance, unacceptable levels of mycotoxins have been reported from poorly processed edible insects like mopane worms in Africa. More detailed assessments on these potential risks associated with microbial contaminants needs to be undertaken on a broad spectrum of insects that are to be utilized for food and feed to establish quality control parameters and inform policy decisions in Africa. Development and implementation of hygienic measures in the entire production and utilization chain for edible insects could help mitigate most of these microbial concerns.

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Abstract 09

Insects as a primary source of feedstock for meat and fish production; Safety and quality considerations

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The European Parliament has adopted an 'own initiative' resolution with respect to the EU's protein deficit. This resolution tabled measures that seek to end Europe's dependence on imported protein crops for animal feed and improve on our currently less than 30% self-sufficiency in protein supply. A significant proportion of this protein is imported soya (whether as beans or meal), a crop that has historically been associated with sustainability issues in Latin America. The UK currently imports approximately 2.5 million tonnes of soya per year, the majority of which is destined for animal feed, principally for pigs and poultry. The EU resolution indicates that urgent action is needed to replace much of the imported protein crops with alternative European sources. Land availability issues and the rising costs of plant and fish derived protein provides a critical platform for the development of a co-ordinated approach to fully evaluate insects as an alternative source of protein for animal feed.

Insects grown specifically with the intention of being fed to domestic animals/fish have been the subject of evaluations for several decades (e.g. Bondary and Sheppard, 1987; Newton et al., 2005; Hem et al., 2008). These have never reached a stage that has led to any significant replacement of traditional plant/fish-based protein used for livestock production with insect based protein. This is largely due to systems being explored and developed on a local, isolated level with no integration or co-ordinated development of know-how to enable adoption at the national and international levels. Importantly, until recently, much of the work to date has made little or no attempt to assess; safety, social and acceptability issues. The work presented here places the primary research emphasis on developing large-scale insect production methodologies for the production of material for incorporation into animal feed. A particular emphasis is placed on European Union requirements for the chemical safety/quality of feed and resultant insect reared meat and fish.

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NOTES

Abstract 10

Insect diseases and sanitation in production cultures

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Like other husbandry, insect produced for food and feed may suffer from diseases. Important insect diseases are found among virus, bacteria, fungi and nematodes. Examples of insect diseases will be given. If not diagnosed and managed, such insect diseases may be very harmful for the production. There are, however, differences among the insect species produced for food and feed: for example, house crickets (*Acheta domesticus*) and mealworms (*Tenebrio molitor*) seem to suffer more from insect diseases than black soldier flies (*Hermetia illucens*). However, over time it can be expected that all insect species being mass produced will be infected with insect diseases (known or unknown) in between. Development and implementation of diagnostic tools and control options to assist the insect industry are therefore needed and in Europe initiatives have been taken to address this. While insect diseases pose a threat to the production, they do not in themselves pose a threat to humans or other vertebrates. For example, insect virus are taxonomically very different from virus infecting vertebrates and cannot be transmitted from insects to vertebrates.

NOTES

Abstract 11

Use of biodiversity & Underutilized Resources

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The term biodiversity or biological diversity simply means the diversity of life in all its forms. The diversity ranges from variations at genetic levels within a species, through diversity at species up to ecosystem levels. Biodiversity forms a very critical element of livelihood of people worldwide and its importance to human society cannot be overemphasized. It is an essential source for food, feed, natural medicine, clothing, housing, tools and many other purposes. Poor people, especially those living in areas of low agricultural productivity, depend heavily on the genetic diversity of the environment. An estimated 40% of the global economy is based on biological products and processes while 80% of the needs of the poor are derived from biological resources. It is unfortunate however, that the global food security increasingly depends on a narrowing range of animal and plant species. Only about 30 plant species out of the global agricultural biodiversity are used to meet 95% of the world's food energy needs. In the end, food supply is provided on average by a mere 100 species, subsequently neglecting the wealth of plant genetic resources that could contribute to increasing food security and improving nutrition, generating income and reducing poverty, as well as furthering the sustainable use of natural resources. Nevertheless, given appropriate value addition, management and conservation strategies, the neglected and underutilized species (NUS), could play a significant role in global food security. A significant number of these neglected species are currently facing extinction and this has generated a global conservation concern.

The conservation of biodiversity has become a major concern for obvious environmental, social and economic reasons. The concerns arise from threats facing biodiversity and these include rampant habitat changes, over-exploitation, pollution, invasion by alien species and climate change to cap it all. A review report of the Convention on Biological Diversity targets for reducing biodiversity loss by 2010, (*Goal 8 sub-target 2*), indicated that the target was not achieved globally. It has become more evident that the conventional preservation of genetic integrity of genetic resources by either conserving them within their original ecosystems (*in-situ* conservation) or outside their original habitat (*ex-situ* conservation) is not adequate. A paradigm shift must take place in the conservation policies towards more holistic approaches to biodiversity management, value addition and utilization, including both *in situ* and *ex situ* approaches." For this to happen, R & D is critical.

NOTES

Abstract 12

Commercial Black Soldier Fly (BSF) opportunities in Kenya

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Kenya has strong feed milling and agriculture industries, which currently use Omena as the main source of animal-based protein. Inconsistent in supply and quality, Omena rarely adheres to KEBS standards. BSF larvae are a reliable, consistent, and effective replacement for Omena as a protein source in animal feed. To ensure that high-quality protein sources are available to feed millers and farmers, Sanergy wants to work with national regulators to set standards for BSF-derived products.

Keywords: Black soldier fly, protein, animal feed

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Abstract 13

Promoting the use of insects in aquafeeds with vigilance: An industrial perspective

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Access to suitable fish feeds is a primary limitation to the growth of aquaculture in East-Africa. The freshwater Silver cyprinid (*Rastrineobola argentea*: Common name: Mukene, Omena, Daaga), the main fishmeal is costly due to the competing demands from Livestock feeds and human consumption. Several plant and animal-based alternative proteins sources like soybean and chicken offal have been studied and found suitable for use in aquafeeds. However, soybean is also sought for by humans and other competing demands, while the cost of processing Chicken offal is prohibitive; making them less available for use in aquafeeds. Recently, meals made from the freshwater shrimp, *Caridina nilotica* and mung beans, *Vigna radiata*, have been tested as potential alternative protein sources to *R. argentea* in fish feed; and Ugachick Poultry Breeders Ltd has been central at this. The findings showed that *C. nilotica* can effectively be used in Nile tilapia diets with or without *R. argentea* fishmeal, but the impediment is the seasonal availability of *C. nilotica*. Moreover when included in fish diet at high concentrations, palatability, acceptability, digestibility and hence feed utilization are reduced. Accordingly, there is need to search for other alternative protein sources that are either naturally available throughout the year or those whose production can be fairly controlled by man.

The combined effort to culture insects for practical use in aquafeeds by researchers is therefore an exciting gesture to the aquafeed and other livestock feed industry. Globally, putting in use insects to farm fish is envisaged as an outstanding innovation that if well managed could be feasible in alleviating the growing aquafeed protein deficit. Elsewhere, particularly in Asia (Japan and China) insects are increasingly being used in livestock feeds.

In East Africa, the INSFEED project (and probably many others) is on-going to explore the possibility of using insects in aquafeeds. While the feed industry is awaiting the project findings, there are concerns that researchers need to think through. First, the industry is concerned about the ability of the technology being tested to generate adequate volumes of insect protein for use in aquafeeds, and whether it would be sustainable. Besides, the feed industry is already constrained by the high cost of fishmeal; hence the technology being engineered to produce insects must be cost effective. Secondly, the shelf life of both the insect protein and aquafeeds thereof would greatly impact their use, since raw materials are usually gathered in bulk prior to processing, yet the processed aquafeeds are also stored under uncontrolled conditions of temperature and humidity. Accordingly, the feed industry welcomes any research aiming at addressing the protein deficit for aquafeeds to focus at affordability, sustainability, shelf life, and safety of both the feeding organisms (fish) and subsequently humans.

Key words: Aquafeeds, East Africa, feed cost, insect protein, shelf life.

NOTES

Abstract 14

Prospects and constraints for the small-scale production of insects for feed on farm

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Insects for feed can be produced in large production units but also directly on farm to feed the farmed animals, in particular poultry, pigs or fish. Both large livestock producers and smallholder farms can consider breeding insects for their own production. The projects PROTEINSECT and IFWA (Insects as Feed in West Africa) both explore the prospects and constraints of this option. Considering the increasing costs of other protein sources, in particular fish meal, and the undisputed high quality of insect proteins, insects provide a promising alternative source of proteins for animal feed.

Smallholder farmers from different continents have traditionally collected locally abundant insects to feed their livestock. A good example is termites, which are used to feed poultry by many smallholder farmers in Africa. In some West African regions, over 70% of the farmers give termites to chicks, often as the only source of proteins. Termites are mainly collected through the destruction of termite mounds, but various more sustainable techniques have been developed to trap termites on farm.

Collection and trapping methods, however, are only practical for very small producers. To rely on larger and stable quantities of insects, breeding systems are more appropriate. Only a few insect species are suitable for mass production for animal feed because they must be very easy and cheap to produce to compete with the traditional protein sources. Economic viability is the main constraint in the use of insects as animal feed. Fly larvae are particularly suitable because they can be reared cheaply and rapidly on waste material, for example manure, agro-industrial waste, domestic or market waste, etc. Among the numerous fly species, the black soldier fly and the house fly are presently used by farmers. The two species can be produced either by rearing adults in captivity and placing eggs on substrates, or by exposing substrates for natural oviposition. The different fly species and production systems show different strengths and constraints. These will be illustrated through the description of several examples of farm-based production systems in West Africa and China, developed in the PROTEINSECT and IFWA projects.

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Abstract 15

Flying Food – setting up a cricket value chain in Kenya and Uganda

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The Flying Food project (www.flyingfoodproject.com) aims at rearing and eating crickets as a delicious, affordable and healthy solution for malnutrition. The project is based on a public-private-partnership consortium between Kenyan, Ugandan and Dutch partners. Within the project the whole value chain will to be set up, from rearing and processing to marketing and sales, as well as the logistics of the whole operation. After the four-year project, the whole value chain will be operational, resulting in a sustainable business model for small scale cricket rearing. Flying Food runs at the shores of the Victoria lake – the Nyanza region in Kenya and the Masaka region in Uganda. It is a highly result oriented project.

Facilitating entrepreneurship and income generation

The business model of Flying Food combines the common consumption of insects with inclusive business. Inclusive businesses are based on a valid business model and include people with lower incomes into the value chain as producer, salesman or consumer. The reason for inclusive business models is the fact that 60% of the world population lives below poverty level. This group represents a huge market potential to start new businesses.

Status and link to legislation

At the moment a successful international Flying Food coalition and learning alliance is functioning effectively. In the pilot phase a dozen Cricket Knowledge Centres (CKC's) have been set up in both Kenya and Uganda including a monitoring system. These CKC's consist of lead farmers which operate the Flying Food rearing system based on the commercially successful system of one of the Dutch partners, Kreca Ento-Food in which crickets are reared in ventilated crates. When crickets production exceeds consumption of farmers themselves, the surplus is sold to processors who convert the crickets into shelf stable products for the regular food chain. The CKC's act as training centres for future cricket farmers.

For these trainings several training modules have been developed for crickets in general, rearing system, harvesting and basic processing, monitoring, threats and marketing. Training modules on basic business skills and regulatory affairs and hygienic code are under construction. For the latter one experience of Dutch insect breeders will be used. Their production and products will soon match the European Novel Food Directive for which a lot of procedures on safe production (environment, animal welfare, workers welfare and traceability) and food safety and quality are developed. These will be translated for training modules and the farmers handbook for cricket farmers. Flying Food's set of trainings, training presentations and monitoring system can then be the first steps for standard Good Agricultural Practices in Kenya and Uganda.

Research has been done (and ongoing) on optimising rearing e.g. substrate development, feed based on local resources etc. Furthermore research has been done on iinfluence of processing on the protein digestibility of the house cricket, drying process for crickets and developing cricket products. Based on market orientation and analysis and consumer surveys a market strategy is developed for both countries including branding.

Partners

Partners in the Flying Food project are: TNO (coordinator), JOOUST University, ADS, MIXA Foods and Beverages and Kenya Biologics Ltd. in Kenya, ICCO ROCEA and Family Diet Ltd. in Uganda and VENIK, Kreca Ento-Food B.V., NGN Pro-Active, Nostimos B.V., M. Ruig en Zonen B.V., ICCO Cooperation, BoPInc and HAS University of Applied Sciences in the Netherlands. Associated partners are the Uganda Martyrs University and the Masaka District. The project runs from 2013 till 2017 and is supported by the Netherlands Ministry of Foreign Affairs in the framework of the FDOV Public Private Partnership program".

NOTES

Abstract 16

GREEiNSECT – a research project about insects for food and feed in Kenya

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GREEiNSECT is a collaborative research project aiming to investigate how mass-production of insects (cricket and black soldier fly) can be developed in Kenya, as a novel food source, and for animal feed. The project is a partnership between University of Copenhagen and partners in Kenya: Jaramogi Oginga Odinga University of Science and Technology (JOOUST), Bondo, Kenya; Jomo Kenyatta University of Agriculture & Technology (JKUAT), Nairobi, Kenya; and International Centre for Insect Physiology and Ecology (Icipe), Nairobi, Kenya. The project receives support from international research partners in Thailand and Cambodia, from FAO in Rome, and from private entrepreneurs (Agriprotein in South Africa and EnvironFlight in USA).

The project activities are centered around research to investigate the technical aspects of developing insect mass-rearing systems in Kenya; their applications to food-, nutrition-, and feed security; and their potential economic, social and environmental impacts. GREEiNSECT supports research capacity building in Kenya through institutional support and support to PhD students in Kenya. Five PhD students in Kenya and three PhD students enrolled at University of Copenhagen are conducting research covering various topics within cricket and black soldier fly production; food processing and nutritional aspects; producer and consumer perception and acceptance; and environmental and climate impacts.

GREEiNSECT is supported by the Consultative Research Committee for Development Research, Danida, Ministry of Foreign Affairs, Denmark for the period 2014-2017. PhD students registered in Copenhagen are also supported by University of Copenhegn; Social Sciences and Humanities Research Council of Canada; and Agricultural Transformation by Innovation (AgTraIn).

NOTES

Abstract 17

Improving livelihood by increasing livestock production in Africa

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Poultry, pig and fish farming are the fastest growing agribusiness activities in East Africa. However, the high cost of feeds greatly hampers profitable gains for small and medium-holder farmers in these sectors. There is a research need for alternative sources of low-cost feed supplements. The ILIPA project (Improving livelihood by increasing livestock production in Africa) will exploit the potential of insects, mainly the black soldier fly (BSF), *Hermetia illucens* in commercial production of a low-cost, high-quality protein source to supplement feeds for poultry, pig and fish farmers. Through its consortium partners, the project will create awareness and market opportunities in production of insect-based protein for the livestock industry. The project will work with youth and women farmer groups to build their capacity to rear BSF and market thereby ensuring farmer participation in establishment of intensive insect-based agribusiness enterprises. The consortium will also engage in research to assure high nutrition and microbial safety of the insect-based protein products.

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Abstract 18

Insect Feed for Poultry and Fish Production in Kenya and Uganda (INSFEED)

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In many African countries, poultry and fish industries are among the fastest growing agri-businesses. However, the use of expensive inputs such as fish and plants as feed ingredients is threatening the survival of producers. In nature, insects are feed sources for fish and poultry and have been demonstrated to have higher protein content than conventional fish and soybean meals. Since protein is the most expensive ingredient in poultry and fish diets, feeding them with insects is a viable option. The INSFEED project, funded by IDRC (the Canadian International Development Research Centre) and ACIAR (the Australian Centre for International Agricultural Research), is a proof of concept project intended to demonstrate the feasibility of developing insect-based feeds for sustainable, safe and cost-effective poultry and fish production and to verify that the idea is capable of being useful and attractive enough to be translated into commercial enterprise. We intend therefore to: (a) Establish strong scientific bases for the use of insects as feed in poultry and fish farming in Kenya and Uganda, (b) Test the technical feasibility and economical profitability of the proposed technology with feed producers and farmers and (c) Create favourable social and political conditions for using the technology at large scale

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Abstract 19

EntoFOOD: Insect-based products to enhance food and nutritional security in sub-Saharan Africa

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Food insecurity and undernourishment are key developmental challenges that Africa has had to grapple with more than any other region in the world. Equally concerning is the rapid erosion of traditional food systems and practices in Africa such as edible insects. Among the edible insects consumed in east Africa, crickets (e.g. the house cricket *Acheta domesticus*), the longhorn grasshopper (*Ruspolia differens*), and a variety of saturniid caterpillars (e.g. *Imbrasia zambesina* and *Cirina forda*) are part of the food culture of communities in Kenya and Uganda improving the health of rural communities. Trade in edible insects is also a major source of income and contributes to livelihood improvements. Currently communities access edible insects through wild harvesting in a non-sustainable and destructive manner. Harnessing benefits of edible insect consumption for food and nutritional security is only possible through ensuring regular and safe supply of insects.

Lack of information on bio-ecological factors that influences the outbreak and abundance of edible insects hinders development of improved harvesting/rearing techniques. Edible insect rearing technologies in Africa are at best sketchy. Understanding the constraints to insect rearing such as entomopathogens, diapauses and optimizing rearing substrates/conditions is crucial to establish stable and healthy insect colonies. Further nutritional composition of edible insects is influenced by factors such as the insect species, host plants, rearing substrate, conditions of storage and processing. Information on these factors needs to be generated and transferred to the insect producers, harvesters, policy makers and the end-users. Food safety issues related to pathogenic microbes, heavy metals, pesticides and mycotoxins that may be present in the rearing substrate and the final product of the target insects can constitute a risk to humans and must be assessed and informed to regulatory instruments governing the production, use and trade of insects along the value chains.

Considering the above opportunities and research needs, *Ento*FOOD is a complementary partnership project of *icipe*, University of Bonn, University of Hohenheim's Food Security Centre and national agricultural research systems from Kenya and Uganda to address research needs and enhance food and nutritional security through the use of insects as food. The strategic research thrust in the project includes (i) developing and optimising production systems for the target edible insects; (ii) establishing the nutritional attributes of target edible insects and assess appropriate post-harvest technologies; (iii) establishing food safety (chemical and microbiological) and regulatory requirements to inform policy; and (iv) socio-economic assessment on community perception, willingness to accept insects as food and the effect of consumption on anthropometric parameters of consumers. Innovation and technology transfer and training of project partners, insect farmers, graduate students and the private sector to increase knowledge on the use of insects as food in the target countries is also a key focus of *Ento*FOOD.

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Abstract 20

Updates on the Living Lab Project: Expanding Business Opportunities for Youth in the Fish and Poultry Sub-Sectors

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USIU-Africa and its consortium of partners seeks to develop an AgriFoods Living Lab that involves testing agribusiness innovation models, action research of insect feeds and training and capacity building for fish & poultry entrepreneurs in Kenya. The study is motivated by unprecedented changes in weather patterns resulting in current unsustainable food production. Agricultural land is often usurped by urban functions. Consumer values are widely diverse and governmental policies are often still in favor of the old routines that have proven to be sub-optimal at least and while cities and agriculture become more intertwined, many people still act as if urban and rural are completely different and unconnected worlds.

The project is using the Living lab model which aims at improving the experiential learning of youth (50% females) Agri-food entrepreneurs by carrying out applied research while providing a platform for education, marketing, management, as well as industry, NGO's and government linkages.

The program duration is 18 months and was successfully launched at an inception meeting on September 15, 2015. Already 60 youth were selected to participate in the program. The applicant representation of men to women was 66% to 34%, but we were able to select 30 men and 30 female. The entrepreneur's baseline data has been collected. Some of the key results of the baseline data include demographic profiles (age distribution as well as gender and regional representation) and training needs assessment. The results indicate that participants did not do well in the area of who their competitors are and how much more would customers pay for their products (on average 44 and 42 out of 60 participants respectively missed the perfect mark). However, participants seemed to be more aware of their product idea (on average only 25 out of 60 participants missed the perfect mark).

By the end of the project life, 60 poultry and fish entrepreneurs drawn from all over Kenya will have been trained to adopt and actualize the project activities in the field.

NOTES

Annex I: Instructions to Moderators-Chair and presenters

Instruction for Keynote speakers (SESSION 1)

- On the day of your presentation, present yourself at the conference desk as soon as you arrive at the Conference Hall at VIC Hotel.
- Time and place of your presentation may be found in the conference program
- A PC is available at the conference desk where you can test your presentation
- Your presentation time is limited to 20 minutes – unless stated otherwise in the conference program. Your presentation is not followed by a question and answer session but panel discussion after all the keynote speakers have spoken.
- The Chair of the session will give you a signal when you have 2 minutes left to close your presentation.
- Save your presentation using PowerPoint with a .ppt or pptx extension – compatible with PowerPoint 2007.
- In case of a virtual site presentation, we encourage you to use Skype but be reminded that a stable internet connection cannot be guaranteed and failure is a high possibility; the presentation may be obstructed or canceled altogether in the middle of a technological hiccup.
- We shall provide a pointer during your presentation
- Kindly bring your presentation on a USB flash drive.
- Should you require technical support in the presentation hall, kindly approach supporters black t-shirts
- Give yourself plenty time by uploading and checking your presentation in the conference hall prior to start of the day.

Instruction for presenters at Regular Oral Sessions (SESSIONS 2-5)

- On the day of your presentation, present yourself at least 20 minutes prior to your presentation at the conference desk.
- Time and place of your presentation may be found in the conference program
- A PC is available at the conference desk where you can test your presentation
- Your presentation time is limited to 15 minutes and 5 minutes for questions/ comments – unless stated otherwise in the conference program.
- The Chair of the session will give you a signal when you have 2 minutes left to close your presentation.
- A panel discussion at the end of your session is expected with you as one of the Panelist.
- Save your presentation using PowerPoint with a .ppt or pptx extension – compatible with PowerPoint 2007.
- In case of a virtual site presentation, we encourage you to use Skype but be reminded that a stable internet connection cannot be guaranteed and failure is a high possibility; the presentation may be obstructed or canceled altogether in the middle of a technological hiccup.
- We shall provide a pointer during your presentation
- Kindly bring your presentation on a USB flash drive.
- Should you require technical support in the presentation hall, kindly approach supporters black t-shirts
- Give yourself plenty time by uploading and checking your presentation in the conference hall prior to start of the day.

Instruction for student poster presentation (SESSION 2)

- On the day of your presentation, present yourself at least 20 minutes prior to your presentation at the conference desk.
- Time and place of your presentation may be found in the conference program
- A PC is available at the conference desk where you can test your presentation
- Your presentation time is limited to 5 minutes to briefly outline your objectives, methods and findings and direct the audience to your poster for further details.
- The Chair of the session will give you a signal when you have 2 minutes left to close your presentation.
- Save your presentation using PowerPoint with a .ppt or pptx extension – compatible with PowerPoint 2007.
- We shall provide a pointer during your presentation
- Kindly bring your presentation on a USB flash drive.
- Should you require technical support in the presentation hall, kindly approach supporters black t-shirts
- Give yourself plenty time by uploading and checking your presentation in the conference hall prior to start of the day.

Instructions to Moderator/Chair of Keynote session (SESSION 1)

- Time and place of presentation is available on the conference program
- Kindly be available in the designated room 15-20 minutes before the start of the session.
- The Moderator of the session serves as the Chair of the session
- Technical support staff with black t-shirts will be in the room waiting to provide support as necessary.
- Keynote presentations shall last 20 mins and are not followed by question and answer session.
- Carefully track the presentation time and give the Keynote Presenter a sign when 2 minutes is left
- A panel discussion comprising all presenters at the keynote session will be held.
- The Panel discussion shall last for 60 minutes
- Carefully Moderate the Panel discussion overseeing the total of legislation and policy as it relates to insect as food and feed.

Instructions to Moderator/Chair (SESSIONS 2-5)

- Time and place of presentation is available on the conference program
- Kindly be available in the designated room 15-20 minutes before the start of the session.
- The Moderator of the session serves as the Chair of the session
- Technical support staff with black t-shirts will be in the room waiting to provide support as necessary.
- Presentations shall last 15-20 mins (sessions 2-4) and 10 minutes (session 5) followed by 5 min of questions and answers.
- Carefully track the presentation time and give the Presenter a sign when 2 minutes is left.
- Carefully moderate the question and answer session ensuring that questions and responses are succinct.
- A panel discussion is expected at the end of sessions 2 and 3 to be chaired by Moderators of the same sessions.
- Carefully Moderate the Panel discussion overseeing the total of food and feed safety, sanitation and pathology; consumer perceptions; and biodiversity as it relates to insect as food and feed.

Annex II: Moderators/Chairs for the various session

OPENING SESSION - SETTING THE SCENE

- Prof. Monica Ayieko (JOOUST, Kenya)

SESSION 1: LEGISLATION & POLICY (KEYNOTES)

- Prof. Nanna Roos (UC, Denmark)
- Dr. David Mwangi (KALRO, Kenya)

SESSION 2: FOOD & FEED SAFETY; SANITATION & PATHOLOGY; BIODIVERSITY

- Prof. Marcel Dicke (WU, The Netherlands)
- Dr. Helide Oyieke (NMK, Kenya)

SESSION 3: CONSUMER PERCEPTIONS + ANIMAL FEEDS

- Dr. Dennis Rangi (CABI, Kenya)
- Dr. Dorothy Nakimbugwe (MU, Uganda)

SESSION 4: INDUSTRY EXPECTATIONS

- Dr John Kinyuru (JKUAT, Kenya)
- Dr. Samuel Kasiki (KWS, Kenya)

SESSION 5: R4D TO SUPPORT PRODUCTION, LEGISLATION, POLICY

- Prof. Christian Borgemeister (UoB, Germany)
- Prof. Yupa Hanboonsong (KKU, Thailand)

Annex III: Panelist

Panel discussion 1 (Session 1): (moderated by: PROF. NANNA ROOS)

- Dr. Paul Vantomme (FAO, Rome)
- Dr. Wolfgang Trunk (EU, Belgium)/Prof. Nanna Roos
- Prof. Yupa Hanboonsong (KKU, Thailand)
- Dr. Mr. Deusdedit Mubangizi (UNBS, Uganda)
- Dr. David Mwangi (KALRO, Kenya)
- Mrs. Margret Aleke (KEBS, Kenya)

Panel discussion 2 (Sessions 2 and 3): (moderated by: DR. DENNIS RANGI)

- Dr. S. Subramanian (icipe, Kenya)
- Dr. A. Charlton (FERA, UK)
- Prof. J. Eilenberg (UC, Denmark)
- Dr. Helida Oyieke (NMK, Kenya)
- Mr. R Flore (NFL, Denmark)
- Prof. M. Ayieko (JOOUST, Kenya)

Panel discussion 3 (Sessions 4): (moderated by: MR. GLEN COURTRIGHT)

- Dr. M. Kenis (CABI, Ghana)
- Mr. D. Drew (Agriprotein, South Africa)
- Mr. A. Vallabhaneni (Sanergy, Kenya)
- Ms. S. Nakimu (Ugachick, Uganda)
- Mr. E. Beckers (TNO, The Netherlands)

Annex IV: Rapporteurs

OPENING SESSION - SETTING THE SCENE

- Dr. Afton Halloran (UC, Denmark)
- Dr. S. Subramanian (*icipe*, Kenya)

SESSION 1: LEGISLATION & POLICY (KEYNOTE SPEAKERS)

- Mr. Christopher Muenke (CMS Consulting, Denmark/ UC, Denmark)
- Dr. Isaac Osuga (KU, Kenya)

SESSION 2: FOOD & FEED SAFETY; SANITATION & PATHOLOGY; BIODIVERSITY

- Dr. Chrysantus Tanga (*icipe*, Kenya)
- Mr. Henry Magara (*icipe*, Kenya)

SESSION 3: CONSUMER PERCEPTIONS

- Dr. Henry Ogolla (JOOUST, Kenya)
- Ms. Marwa Shumo (UB, Germany)

SESSION 4: INDUSTRY EXPECTATIONS

- Dr. Nicholas Korir (Sanergy, Kenya)
- Mr. Kennedy Pambo (JKUAT, Kenya)

SESSION 5: R4D TO SUPPORT PRODUCTION, LEGISLATION, POLICY

- Dr. Annette Jensen (UC, Denmark)
- Mr. Evans Nyakeri (JOOUST, Kenya)

Roles and responsibilities of the Rapporteur

- Meet with the session Moderator to review the presentation titles for the session and agree on a reporting format as outlined here
- Note all cogent points, remarks and conclusions related to the theme of the session
- Register all recommendations and outcomes
- Prepare a written report for immediate delivery during the workshop
- Report should consist of a bullet point list of issues and actions.
- Submit the written report of the meeting in PowerPoint slides without exception to the meeting Organizers as part of the overall outcome document of the meeting

NOTES

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