

Platform for Alternative Feed Ingredients Evaluation (PAFIE) - Black soldier fly larvae (BSFL) in Kenya

Inception workshop Report

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Cabin Ridge Resort- Limuru, Kenya

23rd -24th July 2025

Contents

Acknowledgements.....	3
Summary	4
Introduction	5
Workshop Objectives and scene setting	5
Opening Remarks	5
Presentations	6
ILRI programs, project and partners	6
The Platform for Alternative Feed Ingredient Evaluation – Black soldier fly larvae (PAFIE – BSFL) project	6
Updates on BSFL initiatives	6
ICIPE Research.....	6
BSF Breeding and BSF innovations.....	7
InsectiPro	7
Questions and answers sessions.....	7
Learnings around BSF, partnerships and linkages (Group exercise).....	9
InsectiPro BSFL production site visit	11
Day Two- Summary	12
BSFL Trials.....	12
Financial and Economic Feasibility.....	12
Frass Trials	12
Reflections and way forward.....	14
Appendix	15
List of participants.....	15
Workshop program	17

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Summary

Commercial livestock feeds primarily rely on plant-based protein sources such as corn and soybean. However, these ingredients are highly susceptible to price instability and supply disruptions due to their dependence on rainfed agriculture and generally low productivity. This challenge is especially pronounced for small-scale farmers, who often cannot afford commercial feeds, resulting in limited access and low livestock productivity.

Black soldier fly larvae (BSFL) offer a promising, sustainable and locally available alternative as a high-protein feed ingredient for poultry, pigs, and fish. However, despite the growing interest and increasing private sector investment, the BSFL value chain in East Africa remains underdeveloped, with most producers operating on a small scale, using diverse organic waste streams to cultivate larvae. The larvae waste conversion efficiency remains low. It is unclear whether BSFL can be profitably produced at scale to drive the livestock feed sector in Africa in a way to enable reliable and affordable access to small scale farmers.

The PAFIE-BSFL research project will explore the potential to produce BSFL at scale to transform livestock feed production in Africa through a business model with enhanced linkages with upstream and downstream actors. The project will be conducted in Kenya and Tanzania and will run from December 2024 – December 2028. Our key project partners include BSF Breeding (South Africa), InsectiPro (Kenya) and Chanzi Ltd (Tanzania).

At an inception workshop held in Limuru- Kenya on the 23-24 July 2025, participants from the central and country governments, academia, private sector and civil society discussed and provided input into the project scope, activities, sites among others. The following are some of the key recommendations that participants made:

1. Incorporate the public health component under the Directorate of Veterinary Services but align it within the existing KEPHIS Standing Committee on imports and exports, with involvement from KEBS.
2. While there is no standalone regulatory framework for BSFL, a production protocol is already in place and should be referenced.
3. Explore partnerships with microfinance institutions and agricultural finance providers to support the scale-up efforts.
4. Engage additional partners with an interest in the circular economy, such as United Nations Environment Programme, to broaden the dialogue and collaboration.
5. Ensure the inclusion of the National Environment Management Authority in discussions related to waste management and environmental compliance.
6. Policy and Regulation- Currently, businesses are required to obtain separate certifications from KEBS, NEMA, and KEPHIS for each product, significantly increasing the cost of doing BSFL related business. There is a need to streamline the regulatory process to make it more efficient and cost-effective. ICIPE has an existing working group on policy, and engagement with this group is recommended for continued follow-up and possible inclusion.

Introduction

The International Livestock Research Institute (ILRI) is collaborating with commercial livestock feed and Black soldier fly industry partners to generate evidence on Black soldier fly larvae (BSFL) innovations that could impact the scalability and economic feasibility of BSFL production along the value chain; the impact on small scale producers' livestock productivity and incomes, and reduce dependency on soybean by 10-15% as a protein source.

These efforts are being implemented under the framework of the Platform for Alternative Feed Ingredients Evaluation – Black soldier fly larvae (PAFIE-BSFL) project funded by the Gates Foundation. The project explores the potential to produce BSFL at scale to transform livestock feed production in Africa through a business model with enhanced linkages with upstream and downstream actors to address challenges associated with high cost and volatility in the supply of protein feed ingredients.

The project is led by the ILRI in collaboration with three BSF companies - BSF Breeding, Insecti Pro, Chanzi Ltd and selected feed companies. It is implemented in Kenya and Tanzania.

On 23 – 24th July the project held an inception workshop for partners and stakeholders in Kenya. The objective of the workshop was to discuss the project's scope, activities, and expected outcomes, and showcase BSFL innovations being trialled at one of the partner's sites in Limuru, Kenya.

Workshop Objectives and scene setting

The inception workshop held at the Cabin Ridge Resort, Limuru Kenya brought together 31 key stakeholders involved in black soldier fly larvae (BSFL) initiatives representing central and county governments, feed companies, research institutions, academia, regulators and civil society.

The following were the workshop objectives:

1. Present and discuss the project's scope, activities, and expected outcomes
2. Receive feedback and input from participants as key stakeholders
3. Showcase selected BSFL innovations currently being trialled at Insecti-pro, a partner site.

Opening Remarks

In his opening remarks, Appolinaire Djikeng ILRI's Director General noted the importance of affordable, high value feed in increasing productivity, especially for smallholder farmers. He noted that poor animal health, poor genetics and limited access to affordable and good quality feed are the key barriers to optimal livestock production in Africa.

Tabitha Gathecha, the Kiambu County Director of Veterinary Services emphasized the project's significance in addressing high feed costs and improving access to quality feeds. She expressed gratitude for the decision to host the workshop in Kiambu County and encouraged the project team to pursue wider partnerships for scale-up. She also assured the county government's full support for the project's implementation.

Presentations

ILRI programs, project and partners

The Program Leader for Livestock Genetics, Nutrition, and Feed Resources, Anu Samuel Frank-Lawale, gave an overview of the program's focus, highlighting the various themes and areas of work. He highlighted the importance of developing integrated technologies to ensure efficient delivery to farmers. He noted that the BSFL project exemplifies this approach by integrating breeding, multiplication, feed formulation, and on-farm testing.

The Platform for Alternative Feed Ingredient Evaluation – Black soldier fly larvae (PAFIE – BSFL) project

The project leads, Emily Ouma and Ben Lukuyu presented the project objectives and the proposed business model to be implemented. The **five project objectives** include.

1. Test BSF technologies from BSF Breeding under local production systems (and using local waste streams) of multiplier companies in Eastern Africa to inform BSF technology development for the region and scaling
2. Evaluate the performance of BSF breeding production technologies and innovations in terms of impact on larvae growth performance and waste conversion efficiency
3. Optimize BSFL-based compound poultry and fish feed formulations to determine the optimal inclusion rates that lead to least cost formulation compared to conventional ingredients
4. Evaluate the impact of BSFL-based feeds on poultry and aquaculture fish productivity and its cost-effectiveness, and profitability for small-scale farmers
5. Evaluate the impact of frass derived from BSFL on maize and legume forage yields and quality, and profitability in Kenya and Tanzania

The proposed project model hinges on strengthened value chain linkages with upstream and downstream actors. The upstream actors such as BSF Breeding have a defined breeding platform that produces high-quality BSFL parent stock and focus on innovations for optimal BSFL rearing and waste-to-feed systems that leverages organic waste streams to rear larvae, using standardized protocols for efficient feed production. The downstream actors include BSFL multipliers, aggregators, feed producers and livestock farmers.

The presentation is available here: <https://hdl.handle.net/10568/176786>

Updates on BSFL initiatives

ICIPE Research

Chrysantus Tanga from the International Centre of Insect Physiology and Ecology (ICIPE) presented highlights of BSFL research being conducted at ICIPE. ICIPE is making various BSFL-based products for both livestock and human consumption. Participants noted that community engagement will be key in promoting acceptability of the products. The presentation is available here: <https://hdl.handle.net/10568/176663>

BSF Breeding and BSF innovations

BSF Breeding shared their experience particularly the insights about the pocket technology in optimizing the bioconversion of organic waste, as temperature and humidity is kept within the range suitable for optimal larvae growth within seven days of inoculation. BSF Breeding exports neonates to Australia, Canada and USA and are ready to engage in long term supply contracts for businesses ready to use their pocket technology. They are setting up another facility in Australia and are partnering with ILRI to trial their pocket technology, as part of this project.

InsectiPro

The company has been in BSF business since 2019, and works with some feed companies as BSFL off-takers and has gained experience in BSF breeding, egg production and neonates for own use, multiplication of BSFL and production of frass. It also works with partners and use neonates from the University of Nairobi, and other commercial farms in Kenya. They use the crate systems for BSFL production, achieving bioconversion rates of about 10% . Insecti-Pro is partnering with ILRI to trial the pocket technology and neonates supplied by BSF breeding. The company also produces crickets for the export market. It has sites in Limuru and Thika in Kenya.

Questions and answers sessions

During an interactive session, participants raised questions and the project team and partners provided responses, as captured below:

Question	Answer
1. Why has the project opted to source neonates from South Africa instead of locally (UoN) considering costs?	The local supply has been inconsistent, and InsectiPro is seeking reliable and stable supplies. In the long term, there are plans to establish a joint venture to support neonate production in Kenya and East Africa.
2. Does the crude protein (CP) get to 45% as some actors indicate?	The CP depends on the waste stream being utilized to grow BSFL. InsectiPro has reached 47% CP consistently. BSF Breeding is supporting the company to develop a recipe that would consistently result in high quality neonates with recommended CP content. There is need to have consistency in quality of the BSFL to be able to compete with soybean. The project should consider having an MSc student to include this as an objective into their research
3. How does InsectPro handle high fat and pathogens in BSFL?	InsectiPro produces BSFL at scale and undertakes steaming and drying of the larvae. They are currently supplying 15 feed millers with larvae consistently.

4. Is the project also improving the quality of neonates?	The current focus is on consistency in the supply of the neonates, quality and affordability
5. Does BSF breeding encounter challenges around handling living organisms?	The focus of BSF breeding is on neonate production and does not involve handling waste streams; therefore, it does not face related challenges
6. How is the survival rate for the neonate's considering transportation from South Africa?	BSF breeding guarantees 80% survival rate, this is because the neonates are only packed two days before shipping
7. Are there any sanitary and phytosanitary requirements when exporting?	There is no need for a veterinary certificate as they are not examinable
8. Is frass considered organic fertilizer? which are the current regulations?	Currently there is no KEBS standards for frass and using only organic fertilizer standards.
9. What is frass application rates and composition in terms on NPK?	NPK is based on substrate used, however you can formulate based on soil type, crop type and agro-ecological zone
10. How has ICIPE Dudu achieved trust among its users?	ICIPE developed and tested and optimized the product. Plans are underway to take the product to the market and get consumer perception
11. How is our entry point to the community to ensure success of the program?	Our entry point to the community is through feed producers' companies when we do formulation of feeds which will work with a pool of farmers in testing the feeds

Learnings around BSF, partnerships and linkages (Group exercise)

Objectives: Stakeholder mapping- understanding the players in the field, their roles and responsibilities

Actors in the BSF business	Location – county and town	What technologies and other innovations are they using/ Products	Key collaborators/ partners
Ressect (group of graduate students at Egerton University)	Collect waste from Nakuru and rear BSFL at Egerton University	Frass BSFL Training farmers	Nakuru Municipality, Swiss Company Incites (EU project) – Ration for fish and chicken: BSFL + Azolla
Flygene Innovations - University of Nairobi (UoN) Flygene Uganda- Makerere University (MUK - Dorcas) and Aarhus University	UoN Upper Kabete (i)	Eggs Technologies on rearing conditions Collects samples of BSF colonies from all counties to assess strains and feed conversion, egg production- Research on BSFL focuses on traits that farmers prefer. Traits influenced by environment, genetic selection of BSFL (trials) Frass fertilizer – targets UoN for coffee production Walk in cages (2m x 2m) Training BSFL drier Mapped different actors in the whole country	Insecti Pro Synergy ICIPE Farmers JKUAT Egerton (Ressect)
Juja Farm: Farmer with 500 pigs and doing BSFL production	Kiambu County	BSFL production – using pig manure	Parent stock from ICIPE

Sanergy	Ukambani	Automated feeding system of BSFL	Insecti Pro and several other companies and players
Harcoat	Juja and Thika (Kiambu County)	BSFL production	Kiambu county – collecting waste
Zihanga Solutions	Kiambu County – Lower	BSFL production Pig feed and poultry rations	
Grincon (members are below 30 years)	Nakuru County – peri urban in pipeline	BSFL production – up to 300 crates Sell eggs to farmers Dried larvae Frass Trainings	Egerton University – for trainings and networking (part of Egerton Uni Living Lab)
EnviroFly (Gloria)	Kericho County	BSFL – own production for poultry. Surplus sold to farmers.	
Alan Ligari	Eldoret	Liquid fertilizer	
JKUAT	Juja	BSFL production	
	Narok (Mara)		
Chanzi	Kikuyu town		
Rose Anne Mwangi	Makuyu	Producers and poultry/pig farmers	
Green ALGI	Sagana	Fish farmers	
Samaki Grow Feeds	Naivasha	Fish feed formulated	
Unga Feed		Fish feed formulated	
Treasurer feeds	Thika	Formulating feed for ICIPE and farmers	
Houdini Ventures(K) Ltd	Jeff Mworio Kithinji 0720067709	(Starting the BSFL production in Isinya)	
Fly Box Kenya	Country manager Martin Njoroge 0721688690	Selling neonates	

InsectiPro BSFL production site visit

Participants visited the InsectiPro BSFL production site to familiarized themselves with the current production system and the pocket technology setup up for the BSFL project trials. During the visit, participants observed the complete BSFL production process, beginning with waste processing and neonate production, followed by dosing of neonates on trays with formulated smoothies. Participants also witnessed the harvesting and pasteurization of larvae, culminating in the packaging of dried BSFL. The visit provided valuable insights into the operational workflow and quality control measures applied throughout the production chain

Unfortunately, participants were unable to compare the current crate system with the proposed pocket technology system by BSF, as the pockets were yet to be received from Tanzania. Participants however toured the container that has been set up for the trials and a representative from BSF breeding presented how the technology will work.



A montage of pictures taken during the tour of the InsectiPro BSFL production facility in Limuru- Kenya (photo caption: ILRI/ Pamela Wairagala)

Day Two- Summary

The second day was dedicated to in-depth planning through four thematic working groups, comprising of team members, partners and technical working group members. The main output of the day was a revised workplan for the project.

The following is a summary of the discussion from each group:

BSFL Trials

This covers neonate studies, pocket technology development, and waste stream assessments.



Group discussion during the inception workshop (photo caption: ILRI/ Pamela Wairagala)

Financial and Economic Feasibility

Reviewing financial models to evaluate the viability of BSFL-based enterprises. .

Discussion

The main concern in this group was availability of the baseline information to be able to analyze financial viability of BSFL production with the current technology before it could be compared with pocket technology. Talash from Insecti-Pro and Gerhard from BSF breeding committed to provide historical data for analysis. The production system varies and therefore definition of a production unit for the purpose of comparison was noted as a challenge which could be resolved by calculating cost of production per unit Kilogram of dried BSFL.

Frass Trials

Assessing the impact of frass application on maize and legume forage crops.

Discussion

Location of the trials

The following are the planned trial locations:

County	Location	AEZ	Forage Variety	Cooperative
Nakuru	Rongai	Medium Rainfall	Sorghum & Lucerne	Tulmwoi
Nakuru	Elburgon	High Rainfall	Maize (Pan 691) & Lucerne	Elburgon Progressive
Baringo	Mogotio	Low Rainfall	Sorghum & Lucerne	Mogotio Dairy Cooperative

Notes:

- Demonstration plot size will be half an acre per farmer.
- In Samburu, pasture is suitable for Samburu Central and Samburu East is best suited for Rhodes and fox tail
- Consider splitting the block in Samburu to cover more than one agro-ecological zone (AEZ)
- Consider having the trial in 3 AEZs as follows Low, medium and high to determine the costing of the approach to be chosen
- Consider Lucerne as a perennial crop; manure application should be four times
- Maintain repeats for sorghum and maize for two to three times for testing soil parameters -consider four seasons

Data Needs (parameters)

1. Soil Analysis for different plots
2. Germination rates
3. Crop vigour- (after weeding, after application of fertilizer)-Vegetation, stem thickness in %, Height, leaf length,
4. Leaf area index-ability of leaf to capture light
5. Greenliness -get a measure
6. Stem diameter
7. Biomass accumulation at different stages and test dry matter and check nutrient absorption at different stages. And test soil at different stages, to check again where in the zone is the nutrient is at a point the plant can absorb
8. Plant populations-not necessarily based on fertilizer application
9. Yield-Biomass after harvesting. Take 5 by 5 and take several, determine dry matter, lucerne dry yield per quadrant
10. Forage analysis – (dm, ndf, cp) for lucerne check cp, maize and sorghum check on energy and digestibility, minerals
11. Cost analysis -for the different treatment should be comparable to farmer practices
12. Who will collect the data?

Reflections and way forward

At the end of the 2-day inception workshop, the following recommendations were made:

1. Incorporate the public health component under the Directorate of Veterinary Services but align it within the existing KEPHIS Standing Committee on imports and exports, with involvement from KEBS.
2. While there is no standalone regulatory framework for BSFL, a production protocol is already in place and should be referenced.
3. Explore partnerships with microfinance institutions and agricultural finance providers to support the scale-up efforts.
4. Engage additional partners with an interest in the circular economy, such as United Nations Environment Programme, to broaden the dialogue and collaboration.
5. Ensure the inclusion of the National Environment Management Authority in discussions related to waste management and environmental compliance.
6. Policy and Regulation- Currently, businesses are required to obtain separate certifications from KEBS, NEMA, and KEPHIS for each product, significantly increasing the cost of doing BSFL related business. There is a need to streamline the regulatory process to make it more efficient and cost-effective. ICIPE has an existing working group on policy- engagement with this group is recommended for continued follow-up and possible inclusion.

Appendix

List of participants

No	Name	Organization	Area of specialization	Position held
1	Gerhard Gous	BSF Breeding S.A Limited	BSF Reproduction	Commercial Director
2	Tabitha N Gathecha	County Government of Kiambu	Veterinary Services	County Director of Veterinary Services
3	Julius Muiruri	County Government of Kiambu	Agro Economist	Acting Director - Livestock Director
4	Jane Odero-Waititu	County Government of Nakuru	Animal Science - Nutrition Option	Disease Control Officer/Livestock Production Officer
5	Loldoos Billy Saiguran	County Government of Samburu	Livestock Production	Principal Livestock Production Officer
6	Bockline Omedo Bebe	Egerton University	Animal Science - Production Systems	Professor
7	Doreen Gacheri	GENCO Livestock and Fresh Meat Export Limited	Large Scale Fodder Production	CEO
8	Tanga Mbi Chrysantus	International Centre of Insect Physiology & Ecology (ICIPE)	Entomology	Head of Insects for Food, Feed and Other uses
9	Dennis Beesigamukama	International Centre of Insect Physiology & Ecology (ICIPE)	Black Soldier Fly Farming - Feed & Fertilizer	Post Doctoral Fellow
10	Nina de Groot	Insecti Pro		
11	Talash Huijbers	Insecti Pro	BSF Reproduction	CEE
12	Kipkemoi Changwong	Kenya Agricultural & Livestock Research Org (KALRO)	Animal Nutrition	Director, Livestock Systems
13	Joel Kareithi Gatagwu	Kenya Marine & Fisheries Research Institute	Analytical & Environmental Chemistry	Senior Analyst
14	Bernard Mukoye	Kenya Plant Health Inspectorate Service (KEPHIS)	Crop Protection (Plant Virology)	Principal Plant Health Inspector

15	Renny Chemtai	Land O'Lakes - Venture 37 NPA Forage	Animal and Dairy Nutrition	Dairy Nutritionist
16	Zephaniah Mayaka	Land O'Lakes - Venture 37 NPA Forage	Animal Forages - Market Intelligence	Forage Business Development Lead
17	Domitila Njoki	Ministry of Agriculture & Livestock - State Dept Livestock	Animal Nutrition	Asst Director Livestock Production - Food & Nutrition
18	Caroline Mirieri	Ministry of Agriculture & Livestock - Directorate Veterinary	Entomology	Assist Director - Zoological Services
19	Joan Wairimu Mwangi	Prosper Feed Industries	Feed Production	
20	Joyce Maina	University of Nairobi	Animal Nutrition	Professor
21	Charles Gachuri	University of Nairobi	Animal Nutrition	Professor
22	Abigael Nuna	University of Nairobi - FLYgene	BSF Breeding, Egg Production Research	Chief Operations Officer & Faculty Manager
23	Appolinaire Djikeng	ILRI - Nairobi		Director General
24	Anuoluwapo Frank-Lawale	ILRI - Nairobi		Program Leader - Livestock Genetics, Nutrition & Feed Resources
25	Ben Lukuyu	ILRI - Nairobi		Senior Scientist - Feed Specialist
26	Emily Ouma	ILRI - Uganda		Senior Scientist - ILRI Country Representative, Uganda
27	Ijudai Jasada	ILRI- Nairobi		Senior Scaling and Innovation Expert
28	Simon Turere	ILRI - Nairobi		Program Manager - People, Policies & Institutions (PPI)
29	Pamela Wairagala	ILRI - Uganda		Knowledge Management & Comms Manager
30	Joseph Auma	ILRI - Nairobi		Monitoring and Evaluation Officer
31	Julius Githinji	ILRI - Nairobi		Research Officer

Workshop program

Platform for Alternative Feed Ingredient Evaluation – Black soldier fly larvae (PAFIE – BSFL) project inception workshop

23 – 24 July 2025, Cabin Ridge Resort, Limuru Kenya

Workshop program

Day 1 (23rd July)

Time	Activities	Responsibility
8.30-9.00	Arrival and registration	Julius Githinji and Joseph Auma
9:00-9:20	Introductions	
9:20-9:45	Opening session	
	Welcome, introduction, objectives Remarks by Kiambu County Chief Officer Remarks by ILRI Program Leader	
9:45-10:30	Introduction to the project and project partners	
	The Platform for Alternative Feed Ingredient Evaluation – Black soldier fly larvae (PAFIE – BSFL) project	Emily Ouma and Ben Lukuyu
10:30-11:00	Coffee / Tea Break	
11:00 – 11:30	Overview of BSF Breeding and BSF innovations	Gerhard Gous
	Overview of Insecti Pro and insect production	Talash Huijbers
11:30 – 11:45	Q & A session	
11:45 – 12:00	Updates on BSFL initiatives by ICIPE	Chrysantus Tanga
12:00 – 12:45	Learnings around BSF, partnerships and linkages (Group exercise)	Pamela Wairagala
12:45 – 13:15	Report back to plenary and discussions	
13:15 – 13:30	Closing remarks and next steps	Emily Ouma and Ben Lukuyu
13:30 – 14:30	Lunch Break	
14:30 – 16:30	Field Visit-InsectiPro-Limuru	Julius Githinji and Joseph Auma

Day 2 (24th July)

Time	Activities	Responsibility
9:00 – 9:30	Recap of Day 1 and setting the scene for Day 2	Emily Ouma and Ben Lukuyu
9:30 – 10:30	Deep Dive planning sessions – 4 working groups (i) BSFL trials – neonates, pocket technology and waste stream assessments (ii) Financial and economic feasibility assessments from financial models of the BSFL businesses (iii) Optimization of BSFL-based compound poultry and fish feed formulations to determine the optimal inclusion rates that leads to the least cost formulation (iv) Frass trials on maize and legume forages	Project team
10:30 – 11:00	Coffee/Tea Break	
11:00 – 12:00	Continuation of planning	
12:00 -13:00	Presentation from the different working groups in plenary for discussions	Pamela Wairagala
13:00 – 13:15	Reflections and moving forward	Emily Ouma and Ben Lukuyu
13:15 – 14:00	Lunch Break	
14:00 – 16:00	Field visit to Insecti Pro Thika site	Julius Githinji