Black soldier fly farming

Our third hotseat session

1st June 2022

FOOTPRINTS AFRICA

About our hotseat series

What do circular businesses need to grow sustainably?

At Footprints Africa, in building the first and most comprehensive database of over 500 examples of circular business models, we always asked this question to entrepreneurs. For the most part, the answers are not surprising.[1]

There is one, though, which has cropped up a lot more than others. First and foremost, many entrepreneurs want to be connected to other businesses doing similar things elsewhere on the continent. They want to learn from the experience of their peers and get diverse perspectives, whether that be from people who have been there already, have deep subject-matter expertise, or simply a different problem-solving mindset.

The hotseat approach

The hotseat session brings together a group of entrepreneurs and experts. It invites them, through a question-only format, to help people with the thorniest challenges they are facing. For the first series we have chosen four themes where we have the greatest numbers of businesses working in parallel across the continent:

- Plastic waste to construction materials,
- Regenerative agriculture,
- Black soldier fly farming, and
- E-waste.

It's in these areas where we see many examples of what we sometimes call 'parallel evolution': where businesses are creating bespoke business models and often seeking different solutions to the same challenges. This means there is huge scope for collaboration.

The black soldier fly hotseat

On 1st June we held the third of these hotseat sessions, convening a group of over 30 black soldier fly farmers, subject matter experts and investment specialists. We selected three challenges and put them to the wisdom of the crowd. As with the first two sessions, we were delighted with the intensity of the discussion and the generosity of people's contributions. As the series progresses we are struck with how the questions that have been asked for one theme can be read across to others, building a bank of creative ideas to help many circular businesses.

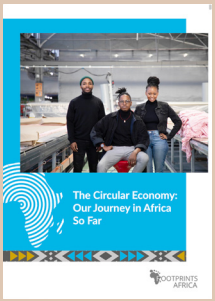
We are sharing this account of the event so that more people can draw on the insights, and so that the session participants can see them again. [2]We have followed the Chatham House rule (no comments are attributed) so that people could express themselves as freely as they like.

We are grateful to the support of **Sitra**, the Finnish Innovation Fund, which has made this hotseat series possible.

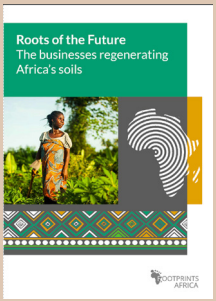
Footprints Africa's work on the circular economy transition

At Footprints Africa we are on a mission to prove business can be a force for good at scale. We have an ambitious circular economy programme which maps and measures businesses' circularity and increases their impact across the African continent, as well as our B Corp programme.

Our first report showcasing circular economy businesses across Africa is **here:**



Our latest report on Regenerative Agriculture is **here:**



You can find more information and a presentation on our extensive case study work on our site: **www.footprintsafrica.co.**

1 See page 8 of our first circular economy report: **The Circular Economy: Our Journey in Africa so Far**

2 Please note that the content of the summary has been lightly edited for clarity and length.

Why black soldier fly?

Black soldier fly (BSF) farming is a business model that is burgeoning both in Africa and globally.[3] It is easy to see why given its benefits and potential. First, you may need to overcome any squeamishness you have when it comes to maggots in order to fully appreciate the incredible role they can play in our food systems…

BSF is a powerful alternative to animal feed from soy or fish meal, mitigating many of the harmful effects and holding the potential to be carbon negative . Not only are its protein levels higher, but BSF also removes waste from our system and can produce nutrient dense fertiliser.

BSF production can be scaled up or down, and contribute towards more localised and resilient value chains, supporting communities to 'close the loop' more effectively. The fly larvae consume all kinds of waste, from agricultural to slaughterhouse waste producing droppings (frass) that can be used as fertiliser. Their protein and nutrient content makes them an ideal source of food for a wide variety of farm and domestic animals. Chitin extracted from the fly exoskeleton has even more ambitious potential uses, from semiconductors to construction material.

BSF farming has appeared repeatedly in our research as we scan the African continent for case studies. We have mapped over 50 businesses so far, which we know from our interviews to be a fraction of the number that is out there. Most of them are less than five years old, and many of them are in an intense process of experimenting and scaling up

The challenges

Three companies shared their challenges in the session. We picked those which we think will have as broad an appeal as possible to BSF businesses across the continent. These are:

1. How do I optimise my breeding environment to ensure predictable and profitable product volumes?
2. How do I increase market readiness for my product?
3. How can we better access more advanced knowledge that we can turn into practical guidance for farmers to improve their incomes?

We are grateful to the three businesses for exposing and articulating their challenges, and sharing them with the session's participants.

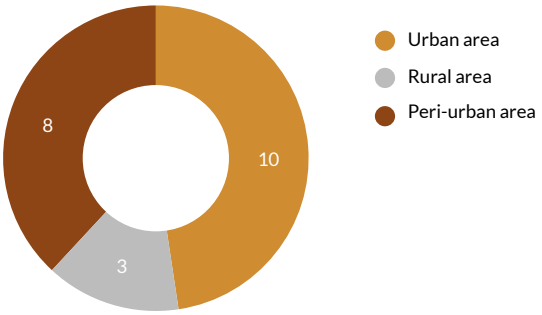
3 'Fly farming is a mini-livestock industry poised to get big', Anthropocene Magazine, July 2020, available at: https://www.anthropocenemagazine.org/2020/07/fly-farming-is-a-mini-livestock-industry-poised-to-get-big/

Profiling the hotseat participants

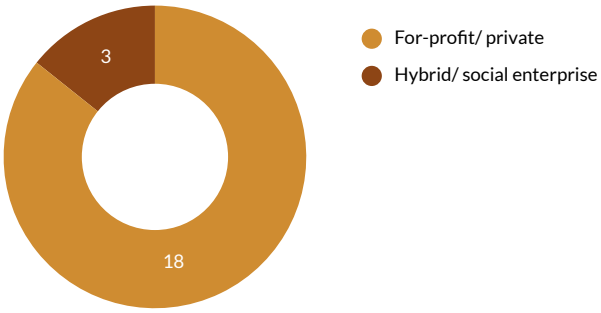
Survey responses

These figures are drawn from 22 responses by participating businesses to the **Footprints Africa circular economy questionnaire.**

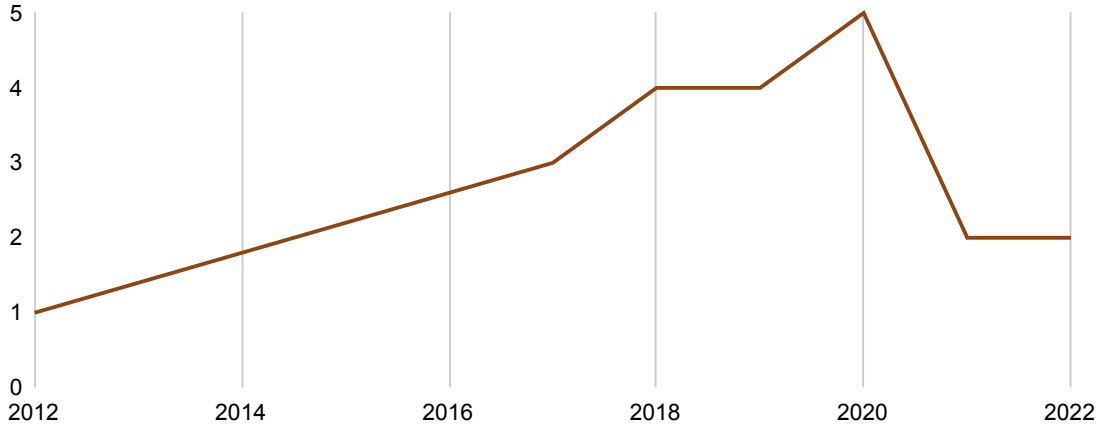
Context of operations



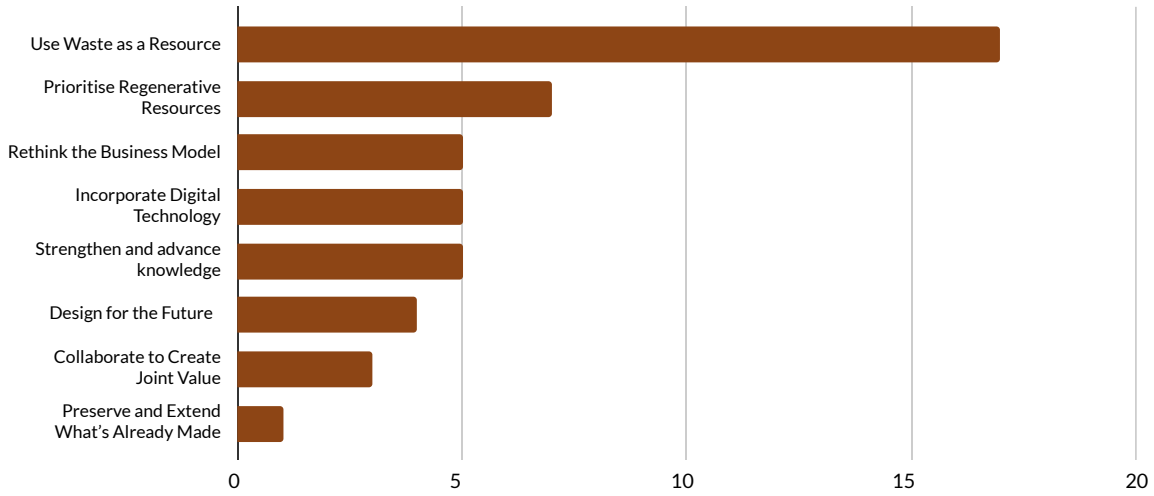
Business type



Businesses' start years

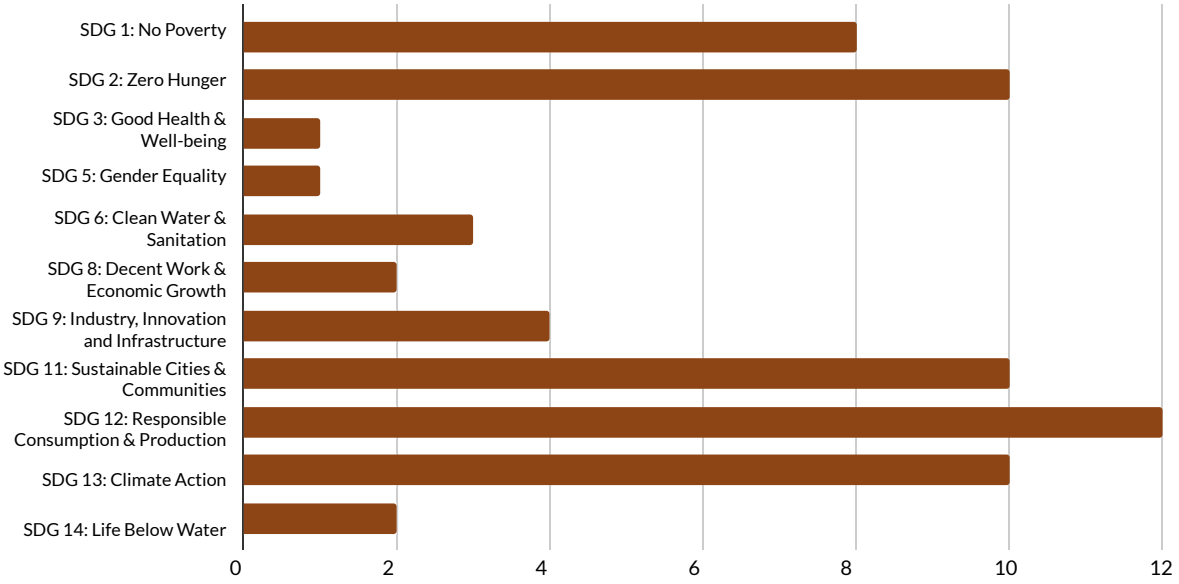


Circular economy strategies



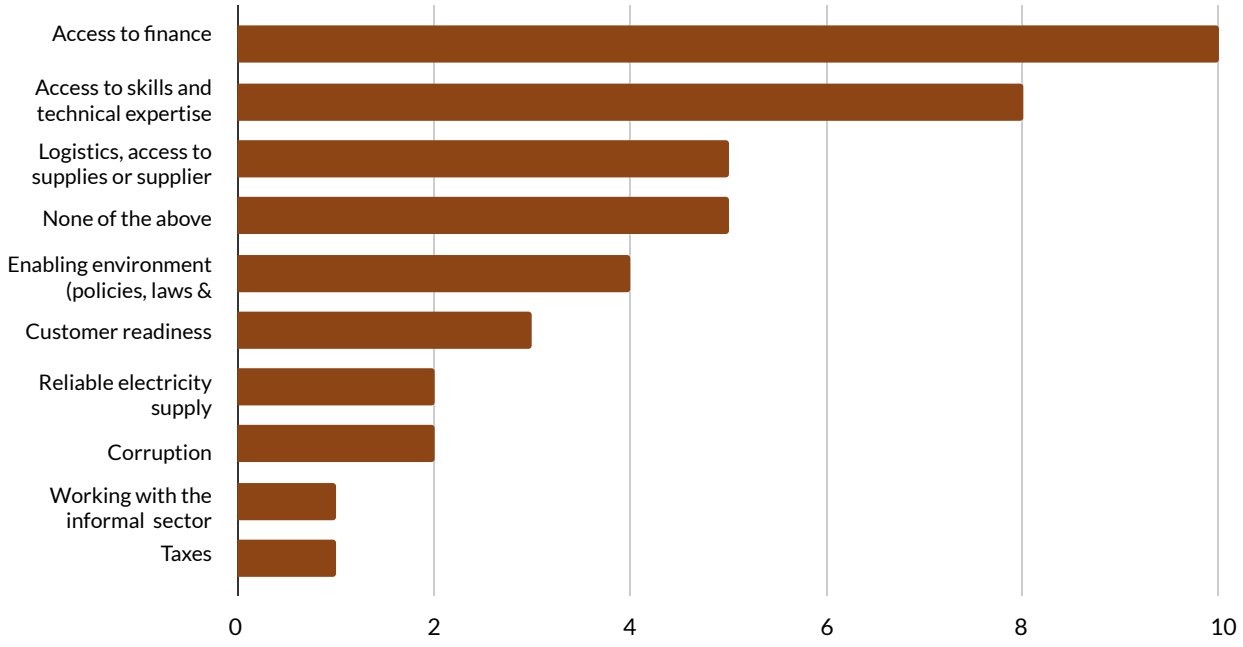
For our mapping work we use Circle Economy's **circular economy strategies** as a reference point.

Priority Sustainable Development Goals



Respondents to the Footprints Africa questionnaire are asked to pick their top three Sustainable Development Goals.

Main challenges that businesses face

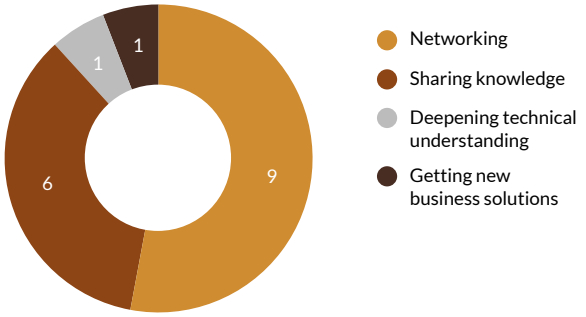


Again, respondents to the Footprints Africa questionnaire are asked to pick their top three options.

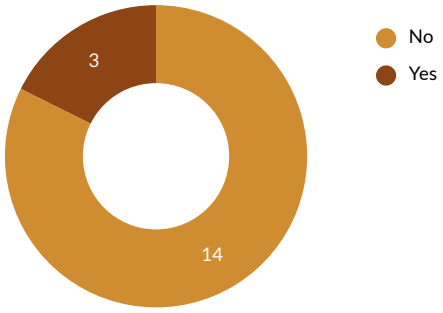
In-session poll responses

These figures are from 17 responses to the in-session poll.

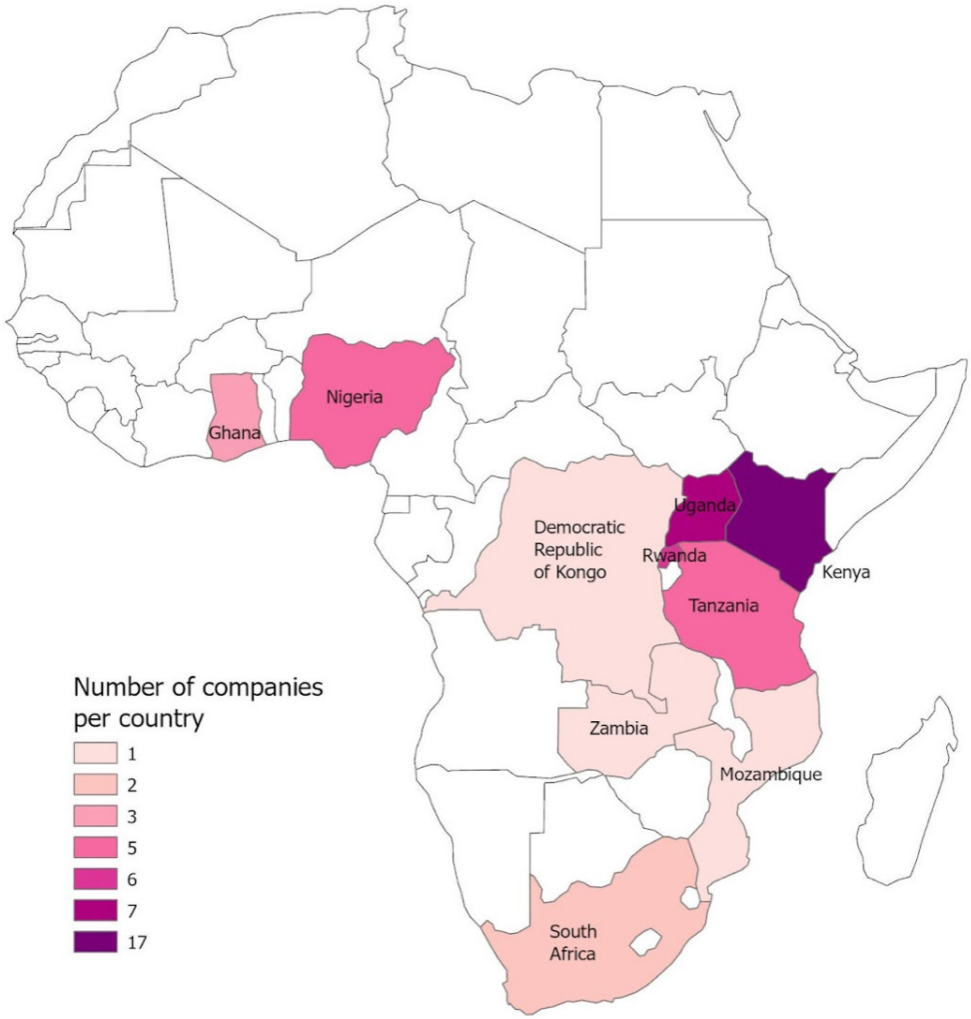
What businesses found most valuable from this session



Proportion of hotseat participants who are already part of a professional BSF network



Mapping BSF businesses across the continent



Map courtesy of GRID-Arendal plotting the locations of the 50 black soldier fly businesses we have uncovered across the continent to date.

Challenge 1

How do I optimise my breeding environment to ensure predictable and profitable product volumes?

Business 1 description

Business 1 produces high protein chicken and fish feed as well as organic compost. The company was established after 6 years of research on the breeding and feeding characteristics of BSF. Business 1 has also developed a home and commercial bin for households and commercial users. The bin can be used to produce live larvae from food waste for domestic chicken or fish rearing.

Background information

- Insect protein is Business 1's main product and its business model demands predictable volumes through optimising breeding.
- There are many variables in controlling the breeding environments (light, temperature, humidity, etc) and one can only change one at a time to understand the impact of that change and minimise error.
- Large programmes have the funds (>$10m) to create and control the perfect breeding environment whereas Business 1 has a more limited budget.

The questions that were asked

- Are you able to collaborate with other producers who might have already developed the answers to your challenge? Some businesses could be interested to collaborate and share their lessons?
- If you don't want to collaborate with someone who's competing for the same clients as you, have you thought of collaborating with universities or student groups with a high capacity for innovation and problem-solving?
- What apparently completely different kind of business has a surprisingly analogous solution for you?
- Have you looked at what kinds of smart technology already exist for similar activities that you might be able to harness?
- What is the barrier to you raising the $10 million plus and doing that expensive version?
- On predictability: do you have any set number on the maximum fluctuation in your output?
- Do you need to optimise your feedstock for more predictable outputs?

- Who could do the modelling of different options for you on a low- or no-cost basis?
- Do you have a data monitoring system in place? Might that be useful to identify patterns and timing in the fluctuations you encounter?
- On feedstock: if you are adjusting variables in the breeding environment, should the amount of feedstock also be factored in? Even bigger BSF programmes have challenges on accessing consistent levels of feedstock. To what extent would that influence your outcome, going from lab- to pilot- to a more commercial scale?
- How limiting are the weather fluctuations in your production process? In Tanzania and Kenya the weather is quite nice for black soldier fly, compared to, for example, Europe or other regions.
- When did you find that predictable volumes were not, in fact, possible?
- Could you share the breeding environment itself with another producer? This could mean that you would not have to raise the funds for your own breeding environment, but to raise it together with another producer, or simply buy time and space from that other producer.

Challenge 2

How do I increase market readiness for my product?

Business 2 description

Business 2 upcycles organic waste through insect farming to promote a circular economy in Sub-Saharan Africa. Their products include meal made from BSF larvae and fertiliser made of frass (fly droppings). In addition, Business 2 offers training and consultancy on BSF production and facility set up. They provide a portable starter-kit that farmers can use to recycle their domestic waste for backyard farming.

Background information

- Business 2 aims to increase its organic waste upcycling capacity from its current 12 tonnes to 1,000 tonnes per year.
- Its target markets are fish farmers and animal food producers.
- BSF rearing for animal feed and to produce organic fertiliser is still quite new. Business 2's animal feed does not look pleasing or comparable to existing animal feed products and may not be acceptable to many potential customers.
- At the moment its animal feed does not compete on price with fish meal, although fish meal supply is inconsistent and quality is variable. This suggests the market may be ripe for alternatives.

The questions that were asked

- Is the look and the feel of animal feed derived from BSF that problematic once it is mixed with other raw materials? Is there a way that you can make it look different so you can disguise its origins?
- How informed are end users about the benefits of your product over other 'conventional' products?
- Do you have a champion - somebody that is respected in the industry or in the area that you live? Those champions can often convince others. If you can convince that champion, they will do the convincing on your behalf.
- Could you give samples to target potential clients who could then talk your product up, and make others more comfortable using it?

- Have you considered trying some pilots, or held direct discussions with customers on how to make the product more acceptable for them?
- Are there edible insects already on the market that you can compare BSF to, in terms of value, and use this as a sensitization and brand building opportunity?
- How do you intend to go into teaching people the benefits of BSF?
- Have you, among the fish farmers and animal food producers, been able to segment them and pursue the most receptive segment of that market, or those markets?
- Do you know fully what is the main motivation for your customers to buy your product instead of another company's?
- Is it possible to produce a product that stays on the market for a longer shelf life, and in so doing, create another commercial advantage?
- If the issue is creating new markets, are there existing markets that you can tap into, where you can use channels that are already there - existing leverage points?

Challenge 3

How can we better access advanced knowledge that we can turn into practical guidance for BSF farmers to improve their incomes?

Business 3 description

Business 3 is a black soldier fly farm based in Kenya. Knowledge exchange is a key part of their model. Business 3's core business is consultancy, training and selling breeding stock to start colonies. They train farmers to rear BSF on their own farms for their poultry, fish, pigs. They are also piloting a pelleting project for fish feed.

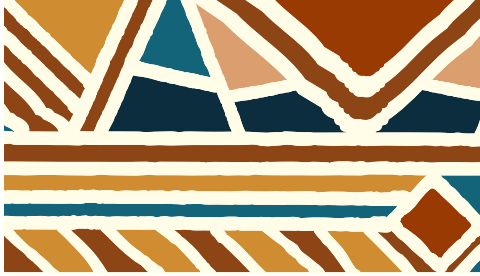
Background information

- Business 3 sells breeding stock to farmers and buys back their mature larvae to process into animal feed.
- Business 3's ambitious target is to move from processing 3 tonnes per month to 10 tonnes per day through an outgrower model.
- BSF is capital intensive but after initial investment it becomes more human labour-intensive and therefore doing effective training is vital.
- Business 3 uses outdoor production but there are colder areas in Kenya that need indoor production.
- The significant investment in equipment for drying larvae is one of the critical challenges to reaching their target processing level.

The questions that were asked

- What are the partnerships that can support you to make sure that knowledge is translated into accessible material for farmers? Are there existing partnerships that you can link with?
- Have you looked into locally-based options or alternatives, such as solar drying, as opposed to conventional drying methods that could be more affordable or cost effective?
- Given high equipment costs, have you considered pooling resources so that multiple users would pay a sort of service fee, solving the access problem?
- Labour intensivity is presumably a good thing in BSF farming - it means job creation. How do you measure and communicate those benefits to customers or funders so it's not viewed as a cost?
- Are you open to combining knowledge and needs to talk to producers of, for example, technological equipment to illustrate what your partners' and communities' needs are?
- Concerning different funding models for equipment: are there any circular economy funders who have products that are better suited to the needs of your sector?
- Do you have a feedback mechanism for the BSF producers you have trained where you understand what worked, and what did not work, and ways of improving training and the knowledge sharing with them?
- How could you get funding for a processing hub for the people you train or whom you work with as outgrowers, - to create a centralised (or decentralised) system where people share the facility?
- Entrepreneurs across the continent are adapting equipment to their own needs (for example plastics recyclers using grinders designed for different purposes and materials). Is there equipment designed for a different purpose that could be adapted to your needs on a more cost-effective basis?
- Can you partner with non-local equipment manufacturers so that they can showcase their equipment being used, and pay you advertising revenue?
- Have you asked BSF buyers how far they might stretch to accommodate the price increase of the equipment investment?

Hotseat participating organisations



Key details on participants' businesses

Organisation	Country	Web
5 acre farm	Uganda	-
African Circular Economy Facility	Côte d'Ivoire	-
Afriprot	Kenya	www.facebook.com/AfriProt
AgriLife	Tanzania	www.agrilife.co.tz
Biobuu	Tanzania	www.biobuutz.com
Briquette du Kivu	Democratic Republic of Congo	www.fortomorrow.org/explore-solutions/briquette-du-kivu
Center for Insect Research and Development	Uganda	-
Ecodudu	Kenya	www.ecodudu.com
EntoFarm	Ghana	www.entofarm
Entomo Farms	Zambia	www.entomofarm.biz
Envibuzz Consule Limited	Kenya	www.facebook.com/bsfkenya
Fair & sustainable insect farm	Kenya	www.fairandsustainable.nl
Green-Eco-Operatives	Uganda	www.greeneco-operative
Indintambwe Feed Ltd	Rwanda	-
Inseco	South Africa	www.inseco.co.za
Mago Farm	Rwanda	www.magofarm.co.rw
Mangau Animal Feeds	South Africa	www.mangauanimalfeeds.co.za
Manna Insect	Finland	www.linkedin.com/in/ykamarjanen
Neat Eco-Feeds	Ghana	www.neatecofeedsltd.com
Nguru Farm	Uganda	www.ngurufarm.com
NovFeed	Tanzania	www.novfeed.com
Penuel farm	Rwanda	-
Prime Proteins	Rwanda	-
ProEnto	Netherlands	-
Protein Master	Kenya	www.proteinmaster.net
Ressect	Kenya	www.ressect.com
Sectagreen	Nigeria	-

Sitra	Finland	www.sitra.fi
Sitra	Finland	www.sitra.fi/en
Susamati	Mozambique	www.susamati.negocio.site
The Bug Picture	Kenya	www.thebugpicture.com
The Insectary	Kenya	www.theinsectary.co.ke
The Power Circle	Rwanda	-
Urban Akwu	Nigeria	www.urbanakwu.africa
West African Feeds	Ghana	www.ghanacic.org/clients/west-african-feeds
Yale School of Environment	United States	www.environment.yale.edu
New York University	New York	www.nyu.edu

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See www.footprintsafrica.co for more information on the programmes Footprints Africa runs to support businesses to develop purpose-driven cultures and so empower their employees to improve their social and environmental impact.

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