REPORT

Integrated Circular Food System held on 22nd April 2025

Venue:

Demo Farm

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Introduction

This report outlines a sustainable and integrated agricultural model presented during the Integrated Circular Food System event held on 22nd April 2025 at the Demo Farm in Nakuru, Kenya. The model combines chicken egg incubation, compost farming, Black Soldier Fly (BSF) farming, and compost manure production. These interconnected systems form a closed-loop cycle that reduces waste, enhances productivity, and supports climate-smart practices, food security, and economic sustainability for smallholder farmers.

Aligned with Sustainable Development Goal 2 (Zero Hunger), this model also supports TVET institutions like RVNP in promoting agricultural education, green skills, and research-driven innovation essential for a resilient, circular food economy.

PARTICIPANTS

- CSAYN Members
- Trainers and Trainees

Components of the Integrated System

1. Chicken Egg Incubation

Overview:

Artificial hatching using solar-powered incubators.

Optimal Conditions:
- Temperature: 37.5°C
- Humidity: 50–55% (Days 1–18), 65–70% (Days 19–21)
- Egg Turning: Every 2–4 hours
- Duration: 21 days

Outputs and By-products:
- **Day-old chicks**
- **By-products:** Unhatched and infertile eggs, eggshells (used as BSF feed

2. Black Soldier Fly (BSF) Farming

Overview:

BSF larvae convert organic waste into protein-rich feed and organic fertilizer.

Inputs:
- Chicken manure
- Unhatched/infertile eggs
- Food waste and crop residues

Outputs:

BSF larvae: Animal feed (40–45% protein, 30–35% fat)
BSF frass: Organic fertilizer
Organic waste reduction: Up to 90%

Key Benefits:

Benefit	Description
Climate Impact	Cuts methane emissions
Waste Reduction	Reduces organic waste volume by 80–90%
Feed Replacement	Can replace 50% of poultry feed protein
Income Generation	Sale of larvae and frass
Soil Fertility Boost	BSF frass enhances compost

3. Compost Manure Production

Overview:
Pit composting of layered organic materials (manure, BSF frass, eggshells, residues).

Inputs:
- Chicken manure
- BSF frass
- Crop residues and kitchen waste

Benefits:
- Reduces dependency on chemical fertilizers
- Enhances soil fertility and moisture retention
- Improves crop yields

4. Organic Farming

Sustainable crop farming involves growing food while preserving natural resources, improving soil health, and reducing dependence on external synthetic inputs. In your circular system, crop farming becomes a **regenerative process** - powered by natural fertilizers (compost, manure, BSF frass) and supported by organic methods.

Circular Resource Flow Model

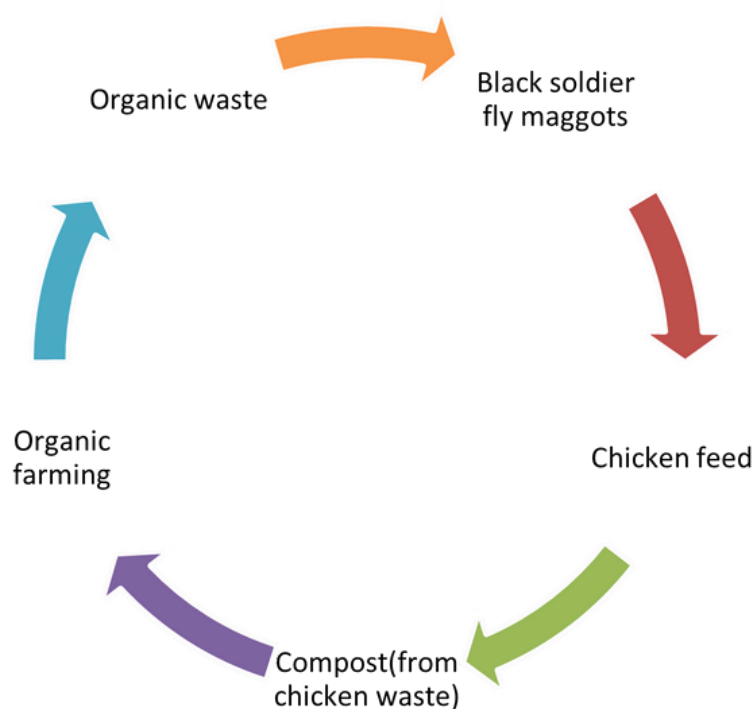Each system is interconnected in a self-sustaining loop, where outputs from one process become inputs for another.

Flow Description:

1. Chicken manure → Compost system
2. Unhatched eggs → BSF feed
3. BSF larvae → Poultry feed
4. BSF frass → Compost enhancer
5. Compost → Crops → Organic waste → BSF feed

This flow reduces environmental impact while increasing on-farm resource efficiency

Sustainability and Economic Impact

Area	Impact
Soil Fertility	Enhanced with organic matter and microbial life
Waste Management	Converts organic waste into valuable resources
Feed Cost Savings	Reduces reliance on commercial poultry feed
Fertilizer Cost Savings	Cuts down need for synthetic fertilizers
Revenue Streams	Chicks, larvae, compost, and crops
Environmental Benefits	Reduced greenhouse gases, improved biodiversity

Organic waste → Black soldier fly maggots → Chicken feed → Compost(from chicken waste) → Organic farming → Organic waste

Alignment with Sustainable Development Goals (SDGs)

SDG 1: No Poverty

Build resilience of the poor and reduce exposure to climate-related extreme events.

- **Income Generation:** Sale of chicks, BSF larvae, and compost offers diversified revenue streams.
- **Resilience:** The circular model reduces dependency on external inputs, lowering operational costs for poor and smallholder farmers.
- **Micro-enterprise potential:** Encourages rural entrepreneurship with minimal capital outlay.

SDG 2: Zero Hunger

Double the agricultural productivity and incomes of small-scale food producers.
- **Productivity Boost:** Compost increases yields of food crops while BSF larvae improve poultry production.
- **Food Security:** Produces both plant- and animal-based food resources on-site.
- **Access to Affordable Inputs:** Farmers can produce their own feed and fertilizer, reducing hunger caused by high input costs.

Cross-cutting benefits:

- Encourages **agroecological practices.**
- Promotes **local food systems** and **nutrition security.**
- Supports **youth and women** involvement in sustainable agriculture.

Practical Farm Model (1-acre)

Unit	Inputs	Outputs
Poultry	Feed, water, fertile eggs	Chicks, manure, waste eggs
Incubation	Fertile eggs, electricity	Day-old chicks
BSF Unit	Waste, manure, infertile eggs	Larvae, frass
Composting	Manure, frass, residues	Organic manure
Crop Production	Compost, water, labor	Vegetables, grains, residues

Recommendations

- Training on BSF rearing and composting techniques
- Adoption of low-cost incubators for decentralized poultry production
- Encouraging on-farm feed production to reduce feed imports
- Setting up composting hubs for cooperative farming groups
- Government and NGO support to finance integrated farm systems

Conclusions

This integrated, circular food system creates a regenerative agricultural model that is aligned with global development priorities. It is pro-poor, resource-efficient, and climate-resilient, contributing directly to SDG 1 (No Poverty) and SDG 2 (Zero Hunger). By linking chicken incubation, BSF farming, and compost manure preparation, farmers can break the cycle of poverty and food insecurity while building local, sustainable food economies.

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