INSECT CULTIVATION

Cricket boxes and nesting trays

Pallet boxes for cultivation and storage

Racks with bins for mealworms

Pupa hatching box for black soldier flies

ENGELS

serving logistics and the environment

INSECT CULTIVATION

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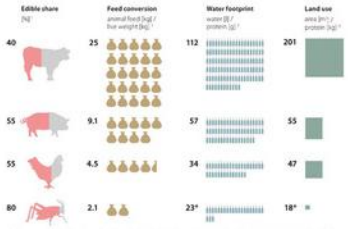
The demand for protein is growing enormously, but local production is lagging behind. Space and raw materials to produce food the old-fashioned way, are becoming increasingly scarce. The solution is sought in a sustainable circular economy.

The engine for the transition to a more sustainable economy are the insects.



Insects, and insect larvae in particular, have the potential to be an efficient and powerful source of protein for use in the food industry, as animal feed, but also for humans and pets.

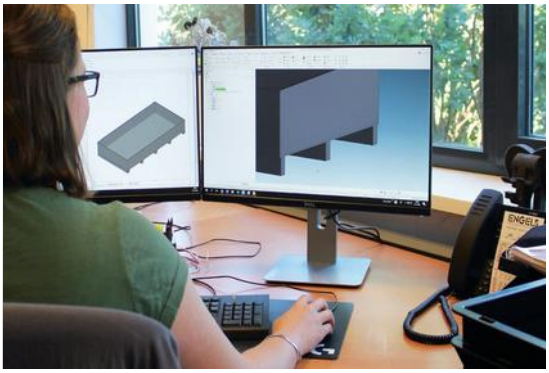
Some growth markets are:

- **Mealworms**
- **Flies (Black Soldier Flies)**
- **Crickets**

Engels supplies and develops plastic containers, pallet boxes and racks to facilitate and optimize the breeding of various insects at every stage of the process. Standard products are usually in stock and can be delivered directly from the spacious warehouses in Eindhoven and Beringen.

All our branches have fully equipped showrooms where you can see the products with your own eyes and judge the quality.

Engels likes to think along with its customers in order to produce the best solutions. This can vary from minor adjustments to a product that is completely customized.



From idea to new product.

INSECT CULTIVATION

BLACK SOLDIER FLIES (BSF)

In the transition to a circular economy, organic residual flows are converted into alternatives for protein sources used in animal feed.

The engine of this transformation are the insects, especially the larvae of the Black Soldier Fly (BSF).

Why breed black soldier flies? Black soldier flies (BSF) are interesting for use in animal feed because of the proteins and fats that the larvae contain.

Step 1. Egg to larva

Hatching the eggs can be done directly above the feed until the young larva weigh 5 mg in +/- 10 days. Then rearing to harvestable larvae begins. Divide the young larvae over plastic nesting boxes. Place the filled bins in the stack up to 8 to 9 pieces high, on a transport roller for a flexible work floor.

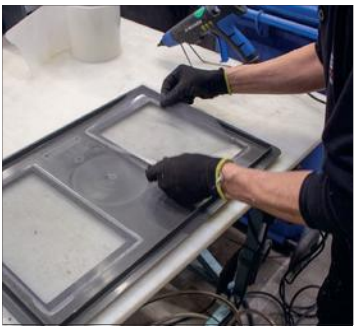
Stackable plastic container

Ideally, the walls of the nesting box should not be too low, because the worms crawl around more and need to be stirred more often than, for example, mealworms.

Art.no.	Description
SB-642312-0203-9	stackable container, 600 x 400 x 230 mm, closed and reinforced bottom, closed walls with 2 open handles

Especially for the cultivation of black soldier flies, Engels cut two rectangles from a standard lid and closed them with gauze. This prevents the flies from flying out and allows heat and light to pass through.

Art.no.	Description
EN-64-1-BSF	Fly cover, 600x400 mm with two rectangular mesh holes



INSECT CULTIVATION

BLACK SOLDIER FLIES (BSF)

Only production or also reproduction?

If the larvae are also used for reproduction, you choose two streams here. One for rearing into harvestable larvae and one for rearing into a new generation of flies.

You can make these streams recognizable by opting for two-color bins or by using labelling.

Young flies are lured from a dark pupa storage to a lighted fly cage.

Step 2a. Production: Harvesting the larvae

When the mash has been processed into dry powder, the container can be harvested. This can take 7 to 14 days. The larva will now weigh between 100 and 300 mg. Shake the larva through a 3 or 4 mm sieve into the container below.

Custom frame with stainless steel grid

Art.no.	description
MW-503475-FRAME	custom frame with stainless steel grid, 500 x 340 x 75 mm

Step 2b. Reproduction: Larva to prepupa

The larva meant for reproduction receive extra, high-quality feed, because the larger the flies, the more eggs they lay. Once they are the desired size, strain the prepupae out of the substrate and place them in a darkened pupae hatching box or room until they are a full pupa (+/- 7 days).

Our assembly department is perfectly equipped for custom cutting and welding of plastic products such as the puppet hatching box.

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BLACK SOLDIER FLIES (BSF)

Step 4. Pop to fly

The pupae will transform into flies. The guideline for 1 kg of pupae is 1 m^3 net (5000 to 8000 flies). Attract the young flies from the darkened pupa storage to the fly cage. Place lighting above the fly cages. This promotes mating of the flies.

Fly cage

Step 5. Fly to egg

Place egg lamellae near the lure. An egg-laying lamina has many crevices and cracks where the female flies will lay their eggs. The eggs can be harvested from 6 days after the first flies have hatched until two weeks later.

Our egg colllectors are made of durable and hygienic plastic. Easy to clean and reuse.

Art.no.	Description
SBI-64145-001Z-6	insect box, 600 x 400 x 145/80 mm

Art.no.	Description
SBI-64200-001Z-6	insect box, 600 x 400 x 200/125 mm

Features of the insect box:

- **Extra carrying capacity through reinforced wall construction**
- **Suitable for automated handling**
- **Washable in industrial washing systems**
- **Easy to clean thanks to smooth surface and drainage holes**
- **Laminar airflow**

INSECT CULTIVATION

CRICKETS

Engels pallet boxes and bins are used in every phase of the process, both standard and custom-made.

Breeding process crickets:

1. **Crickets lay eggs**
2. **Hatching cricket eggs**
3. **Hatched cricket eggs (pinheads) to new ones living spaces**
4. **Harvest adult crickets**
5. **Processing to final product duct**

The bottom of the bin is milled out a mold.

Then sloping treads for the crickets are bonded and welded into the bin.

Engels developed a two-part laying box for breeding crickets. This tray consists of two parts that can be clicked together. The upper part is equipped with a very fine mesh stainless steel mesh. The female crickets lay their eggs through the mesh in the moist soil in the bottom box. The eggs are now safely in the lower part, without other crickets being able to damage or eat them.

Art.no.	Description
20-00509 RVSGAAS	400x300x60mm

The nesting trays are then turned over in harvesting bins developed by Engels. The harvesting bins consist of two Euronorm bins, of which the upper bin consists of two compartments, separated by sloping walls and a central slot.

Art.No.	Description
EN-6417 BREEDING	600x400x170mm

The baby crickets (pinheads) climb up the sloping walls and then fall through the center slot into the bin below.

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CRICKETS

The pinheads are moved from the harvest bins to their new living environment: stacked pallet boxes. They stay here for 37 days until they reach adulthood.

The crickets find the pallet boxes a pleasant hiding spot and do not feel the need to jump out.

Art.no.	Description
PB-120885-U41E-7	pallet box 550 litres, 1200 x 800 x 850 mm, closed flat bottom and walls, access hatch in 1 long side, 4 legs
PB-120885-UA1E-7	pallet box 550 litres, 1200 x 800 x 1000 mm, closed flat bottom and walls, access door in 1 long side, 4 swivel castors ø125 mm with rubber tyres

The nesting trays are already in the pallet boxes ready for the collection of the new cricket eggs.

The adult crickets then go into 800 x 600 x 220 mm E-line Euronorm containers into the cold store, so that they hibernate. They then go into the freezer for further processing.

Euronorm containers are very suitable for working with food products as they:

- **Are made of food grade plastic so suitable for open contact with foods.**
- **Have a smooth and strong bottom and are easy to clean.**
- **Can be stacked with each other (up to hundreds kilograms).**

INSECT CULTIVATION

MEALWORMS

Before cultivating mealworms, it must be checked whether work is done manually or mechanically.

With machine cultivation, the cultivation trays must be agreed with the manufacturer of the machines. When cultivating manually, people often opt for growing in stacks and/or growing in racks.

For the storage and distribution of the feed over the mealworm bins, we supply food grade hand scoops and large volume bins on wheels

Grow in racks

For the cultivation of mealworms, low plastic containers with dimensions of 600x400x70 mm or 125 mm are available. Internal height of 65 or 120mm.

Depending on preference, racks can be supplied with 1 or 2 columns, on legs or wheels, 1 bin deep or 2 bins deep.

Grow in stacks

Special stacking containers are used to breed mealworms. The high stacking angles in combination with the lowered side walls ensure good air circulation between the stacked containers. The stable sieve insert for laying eggs can be easily moved around while the eggs and larvae remain in the tray.

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BINS

Our own Normbox product line is the most extensive product line in Europe. Characteristics of the Normbox product line:

- Because the containers are made of food grade safe plastic, they are suitable for open contact with foodstuffs.
- Due to the firm and smooth bottom they are easy to clean.
- Our bins are stackable and are very sturdy in a stacked state
- Available from stock in various sizes and colours.

Standard with smooth bottom

Engels has various transport dolly in its range to make it easier to move the bins.

Art.no.	Description
TR-614116 -101S-5	transport dolly, loadable up to 200 kg, with galvanized castors

Art.no.	Description
80-184-185	heavy-duty transport roller, double-walled, 2 swivel and 2 fixed castors, loadable up to 500 kg

INSECT CULTIVATION

BINS

The steel racks are custom-made to fit a large number of standard bins. The racks can be moved easily and are also very space-saving.

Art.no.	Description
E 6407	600x400x70mm, 13 L

Art.no.	description
EN-6407-1-7	600x400x75mm, 14 L

Art.no.	description
EN-6422-1-7	600x400x220mm, 40 L

Art.no.	Description
EN-8612-1-7	800x600x120mm, 45 L

Art.no.	Description
EN-8622-1-7	800x600x220mm, 90 L

Art.no.	Description
EN-8632-1-7	800x600x325mm, 134 L

Art.no.	Description
EN-64-0-7	support lid 600x400 mm

Art.no.	Description
EN-86-3-7	support lid 600x400 mm

INSECT CULTIVATION

PALLET BOXES

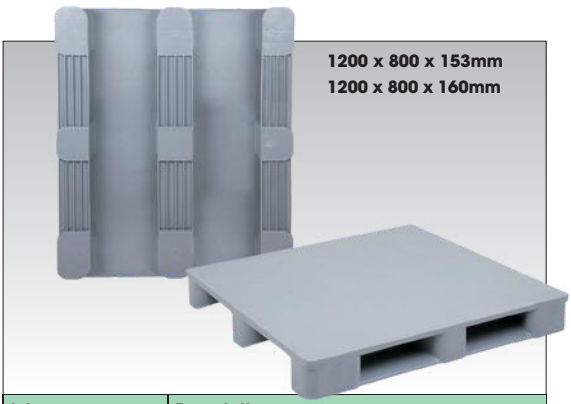
Our Strong pallet boxes are standard made of frost-resistant HDPE and are suitable for open contact with foodstuffs. The smooth walls and bottoms make our pallet boxes easy and quick to clean.

Art.no	Description
PB-121076-0F00-7	pallet box with 3 skids, 1200 x 1000 x 760 mm, 610 L, gray
PB-121076-0F00-5	pallet box with 3 skids, 1200 x 1000 x 760 mm, 610 L, blue

Product features pallet boxes:

- **Manufactured from impact resistant plastic (HDPE)**
- **Suitable for use in cold stores**
- **Food grade**
- **Hygienic design**
- **Weather and UV resistant**
- **Heavy duty**

Hygiene pallets are smooth all around. There are no cracks, seams and hidden places where mold can settle.



1200 x 800 x 153mm
1200 x 800 x 160mm

Art.no.	Description
HP-120815-030B-7	hygiene pallet with 3 runners, gray
HP-121016-030B-7	hygiene pallet with 3 runners, grey

Space for label, logo or tracking.

Engels offers various types of pallet boxes and can produce them in any desired combination. All pallet boxes can be additionally equipped with a drain tap, plug, lid, wheels, etc.

Want to see more?

Visit our website to view all brochures per industry and product (group).

Engels Logistiek BV and Engels Logistics NV are part of the Engels Group NV, a family business founded in 1960 that aims for stable growth from generation to generation.

With offices in the Netherlands, Belgium, Germany, Portugal, France and the United Kingdom.

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