THE HIVE™

MANUAL

LIVIN
THE HIVE ARRIVES!

What is even greater than eating healthy and sustainably grown food? Being part of a movement of like-minded people all around the world, growing a food revolution together! We are really excited for you to embark with us on this great journey of becoming a micro-livestock farmer with your Hive™.

This manual will cover the basics for helping you start breeding, feeding, preparing and eating mealworms.

The Hive is the first device of its kind to grow and harvest food-quality insect protein on your kitchen counter. It is the only device of its kind to incubate the entire growth process of *Tenebrio molitor* inside a largely closed system. From beetle to egg to mealworm larvae to pupa, the Hive gives your mealies a nice and warm home, ventilation and once they are ready to collect them for you as a food, the Hive separates the healthy and fresh mealworms from anything you don’t want to eat such as fine feed remains.

We hope that your experience with the Hive is both rewarding and positive. Please share your learnings with us as Livin Farms, the Hive Community and Social Media so we can get many more people to join this movement and learn from each other. In case you ever have any concern or problems with your Hive, we are here for you too! Please contact us at support@livinfarms.com.

If not otherwise stated, all the photography in this publication is owned by © Livin Farms Ltd
LIFE OF THE MEALWORM

MEALWORM
While mealworms can, under certain living conditions, live up to 9 months before turning into a pupae, the mealworms in your Hive will turn into pupae starting in week 10 of their lives. You will harvest them in their 14th week for food :)

EGGS
Within 4-18 days, there will be new baby mealworms hatching from the eggs.

PUPAE
Within 6-18 days, the pupa turns into a new beetle.
* They don’t eat or move but they are alive!

ADULT BEETLE
While beetles can live up to 2-3 months, it is not unlikely that around 50% of your colony dies within 2-4 weeks. They will then be replaced by new ones hatched out of pupae collected from your mealworm colony.
HIVE PARTS OVERVIEW

- REMOVABLE BEETLE INLAY WITH PUPAE TOWER (1)
- ADDITIONAL TRAY LID FOR HARVEST TRAY (1)
- GROWTH TRAYS (5)
- CARBON FILTERS FOR TRAY LIDS (5)
- ALUMINIUM HARVEST PLATE (1)
- HARVEST STRAY (1)
- BACK COVER FOR CLEANING TRAY (1)
- PUPAE HARVEST CUP (1)
- HARVEST FUNNEL (1)
- HARVEST FUNNEL LID (1)
- 12V 6A POWER SUPPLY (1)
- LEADS INDICATING HARVEST TIME (5)
- BLUE LED INDICATING HARVEST PROCESS ACTIVE (1)
**LID**

- Carbon filter covered
- Feeding Luke and air vent
- Opening for sensors
- Back carbon filter case
- Layer structure
- Built into hive
- Fan for ventilation
- Heat provided from bottom

**BEETLE INLAY**

- Beetle inlay
- Is moved between trays
- Pupae tower
- Beetle area
HARVEST AREA

FRESH WORMS HARVESTING AND FALLING THROUGH SLOT INTO HARVEST TRAY

PUPAE STAY ON TOP

HARVEST TRAY

PUPAE SEPARATOR

HARVEST PLATE

HARVEST BUTTON
GETTING STARTED

First steps

1. Plug in the main power plug into your wall socket (utility power must match power requirements of 240V). Please refer to appendix for specific electrical appliances safety precautions. Switch on Hive with ON/OFF switch in the back.

2. One after the other, pull tray out for about 3/4 of the length. Open the front part of the lids and insert the starter kits into the respective layers. Make sure that after inserting your worms you close the lid tightly.

3. Make sure that lid is always tightly closed all around the edges. Make sure that every tray is pushed fully into the back in order to ensure proper ventilation through the trays.

START UP
The Hive is designed to operate in indoor conditions at temperatures between 15°C to maximum 30°C and humidities of maximum 75%. Once unpacked, pick a spot indoors that has a level surface and is located in full shade. Do not situate the Hive on a steep slope, angled or too small surface – this may result in tipping. Make every effort to avoid placement too close to other electrical devices (air conditioners, pool filters) or radiant, thermal masses like concrete walls that may heat up the unit.

**Starterkit** Pack 1 in Tray 1:
- put baby mealworms below the beetle inlay

Pack 2 in Tray 2
Pack 3 in Tray 3
Pack 4 in Tray 4
Pack 5 in Tray 5

*Details of Starter Kit to be confirmed*
**FEEDING YOUR WORMS**

*We recommend every 2 days*

We recommend to feed your worms every other day. Put in only the amount of food that they can eat within up to 48 hours. Remove any feed that looks moldy or dry. Pull out the tray and open the front lid to insert feed. The feed should contain carrots or other hard vegetables and grain such as oats.

To create the best conditions, best is a combination of a dry substrate composed of any dehusked grains and some fruits and vegetables to add vitamins, minerals and water. Mealworms don’t need lipids so it is not recommended to add oily products. Tenebrio molitor are omnivorous and can eat a large variety of food but not all foods are created nutritionally equal- this may sound complicated but here is a list we made for you that will make it very easy.

**YES PLEASE!**

- a substrate of:
  - Rolled oats
  - Wheat or oat bran
  - Whole wheat flour
  - Whole bread crumbs
  - Maize flour
  - Corn meal
  - Potato flakes

- organic or thoroughly washed fruits and veggies such as:
  - carrot and carrot peels
  - apples
  - radish
  - cabbage
  - potato and sweet potato
  - bell pepper stems
  - ginger peelings
  - curcumine peelings
  - pumpkin
  - salad

- mealworm superfoods:
  - brewer yeast
  - spent grain
  - coffee grounds (not more than 10%)
  - bran

**NO GO!**

- meat or fish offal
- eggs
- dairy post-cooking scraps
- with oils and spices
- rotten fruits or veggies
- wood, wooden stems or leaves
- onions
- garlic
- highly treated non-peeled fruit&veg

If you feed them with your food scraps, feed them with raw non-spiced ingredients.

Bananas and other soft fruits or vegetables get moldy and sticky very quickly and could make a mess in your tray in a short period of time. Mealworms can clean out the flesh of your banana peeling but you’ll have to sort out the rest quickly.

Variety is great. Just as for you, different kinds of fruits and vegetables will provide a large spectrum of different vitamins and minerals, so don’t hesitate to give them different kinds of vegetables.
MAINTAINING A CLEAN COLONY
We recommend at least once during the life of your colony

1. Take out the filter on the front lid.
2. Open the whole tray lid and remove the small filter in the back.
3. Make sure the tray is tightly closed again after removal of filters.
4. Put the back cover tightly on the back opening.
5. Shake the tray so that fine dirt can exit the tray through the small holes in the front lid. You can use the fine dirt as a fertilizer for your plants!
6. Make sure filter case is put into tray again after cleaning and that the lid is closed tightly. Make sure to remove the back cap before you push tray in again. Make sure the lid is closed tightly.

Daily Maintenance
For better humidity household, soak the lid filter with distilled clean water whenever it gets dry.
HARVESTING

When green harvest light indicates (every 18 days)*

1. When green light is on it means that tray is ready for harvest.
2. Take out that tray.
   *We recommend not to give your mealworms any feed 48 hours prior to harvest.
3. Make sure your colony is cleaned before harvest! There should be no feed remains left in the tray.
4. Pour the contents of the tray into the harvest funnel.
5. Close harvest lid tightly.
6. Push harvest button to start harvest process. The blue light will light up until it is ongoing. It will take 4 hours to finish.
7. After 4 hours, the harvest separation process is complete. The blue light will be off. Open the lid and you will see that your pupae will have separated.
8. Pour the pupae onto beetle tower in the tray with beetle inlay.
9. Remove remaining dirt on harvest plate.
10. Take out freshly separated worms. Freeze them for a couple of hours before processing and cooking. Bon Appetit!
11. Clean harvested tray. Do not use aggressive cleaners, soap and water is enough.
12. Put beetle inlay into harvested and cleaned tray
13. Harvest finished! Green light is off.
PUPAE HARVESTING

We recommend at least once during lifetime, after you see pupae

1. Starting in week 10 of the mealworm development, you will start to see pupae. In order to keep them safe, we recommend that you harvest them regularly.

2. Remove harvest plate from harvest area.

3. Place pupae cup onto harvest surface.

4. Pour the contents of the tray into the harvest area.

5. Push harvest button several times, check in between whether material went through.

6. Pour harvested pupae onto pupae tower in beetle inlay.

7. Pour rest of the worm harvest back into tray to continue growing.

8. Put harvest plate back into harvest area.
FAQ
most commonly asked questions

WHAT IS YOUR “CLIMATE SMART ENVIRONMENT”?  
Insects are the perfect survivalist, that’s how they became the most successful living creatures on planet earth. Each species of insect adapted to fulfill a special niche. In the Hive™, we created an optimal niche for your mealworms and beetles. With our technology of micro-controllers and sensors connected to a set of heat plates and fans, there will be perfect climate conditions at any time. With the dimensions of our trays, mealworms and beetles will live in high density surrounded by their feed.

WHAT CAN I DO WITH THE MANURE THAT I CLEAN OUT?  
It is a valuable plant fertilizer! Put it into your plant bins and see your plants flourish and bloom. Almost nothing that comes from your Hive is waste.

WHAT AMOUNT OF MEALWORMS DO I NEED TO EAT TO FULFILL MY PROTEIN NEED?  
A typical serving of traditional meats like lean beef, pork, chicken, and fish ranges from 60-100g. We recommend a similar serving size for mealworms, although it may be less when used in a mixed dish. Fresh mealworms contain about 20% protein, which is the same as raw beef! Together with a healthy and diverse diet, mealworms can easily help you fulfill your dietary needs as a healthy meat substitute.

WHAT CAN I FEED MY MEALWORMS? ANYTHING I SHOULD NOT PUT INTO THE DEVICE?  
Typical kitchen scraps that we would feed our mealworms are for example: carrots, apples, potatoes, some cheese scraps, tomatoes, different fruits, roots, salads. They also love grain such as oats or bread. Basically, you can feed them anything. Just make sure that you don’t put in: moldy or rotten foods, soups or very greasy, oily or liquid substances, dishes that are very spicy or acidic. Also do not feed too much cellulose heavy foods (salads, grass). In general, just make sure that you feed a good proportion of moist and dry foods. We recommend against feeding meat scraps, mealworms can be considered vegetarian! Please also take care you don’t feed them things with pesticides on it. You have the power to control how healthy your food is!

HOW MUCH FEED DO THEY NEED?  
This depends very much on the type of feed that you add as well as at which life stage your mealworms are. Rule of thumb is about half a small apple and about a hand full of oats. You will soon find out how fast your mealworms eat. Just check in the first weeks of having them, as soon as the food is gone, you can feed again. Never let any food get moldy in there!

IF I ONLY FEED THEM ON XYZ, WILL THEY TASTE LIKE IT?  
Insects are very simple organisms and the type of feed you add does influence their taste. Be creative! But make sure your mealworms are still healthy when experimenting with different feeds!

DO I HAVE TO BE CONCERNED ABOUT ANIMAL WELFARE WITH THE HIVE?  
Every organism has to be treated with respect, no matter how large or small it is. We are concerned with animal welfare at Livin Farms and want to act absolutely protective of all the species that we deal with. We designed the Hive in a way that the worms can be happy in there. Insects in nature occur in large amounts on small spaces. Therefore, we can assume that they feel well when held like this, totally opposite from a cow or pig! The harvest process was also designed so that the worms harvest without much stress.

WILL THERE BE ANY NOISE COMING FROM MY HIVE?  
There will be a very mild humming from the ventilation and occasional vibration that is happening in the device. Apart from that, you will not notice your Hive. Of course, if you get really, really close you might be able to hear a tiny bit of mealworm wriggling ;)

WILL THERE BE ANY SMELL COMING FROM MY HIVE?
There are really only two sources where smell could come from: the fine excrements of the mealworms and the food that you place in the trays. Ideally, you will never overfeed your worms which should prevent any unwanted smell from rotten foods. The excrements are usually very dry which makes them almost odorless. Make sure you never feed too moist substances. The Hive has carbon filtration pads in the back and front of each growing tray through which air is ventilated. Therefore, occasional smells are typically very well contained.

COULD THE WORMS ESCAPE?
We designed the Hive so that the worms will be very well contained in the device and can not escape. That being said, they are still living beings and in some very unlikely case, it could happen that one or the other one finds its way out somehow. But don’t worry, unless they are a huge hoard, they won’t start breeding somewhere unwanted in your house and they are also not hard to catch. They are all in all very lovely beings, relax!

WHAT HAPPENS IF I FORGET TO FEED THEM OR GO ON A HOLIDAY?
Mealworms can live for several weeks without feeding. However, mind that this is a stress situation for your mealworms and they won’t be growing in the same speed as they would with normal feeding. If you go on a holiday, treat your Hive like an aquarium- have your neighbor come by once a week at least to check if it’s all alright. Another option is to put your worms and beetles in the fridge at about 8°C. They will fall asleep (hibernate) and wake up even after several weeks. Eggs, Babies and Pupae can be more sensitive to this.

WHAT HAPPENS IF I FORGET TO HARVEST THEM?
Harvesting is happening in 18 days cycles. The green LED below the harvest-ready tray will light up. If you do forget to harvest or decide not to for one week that’s fine too and your mealworms will have more time to grow bigger. If you do not harvest for another 18 days, another tray LED will light up to indicate that there are harvest-ready worms. As soon as the trays are harvested and you insert the beetle inlay, the LED will go off and the Hive will know that in that tray the cycle is starting all over again.

HOW DO I KILL THEM? IS IT CRUEL?
The best way is to put them into your freezer. Insects are very dependent on their outside temperature. In freezing them, their body temperature comes down and they start hibernating and die without stress. There is no slaughtering here, they go take a winter nap, something that they are used to in nature. Please make sure they are deeply frozen for a reasonable amount of time (minimum 5 hours), so they are not in the hibernation mode anymore.

CAN I EAT THEM RAW? HOW DOES THE FURTHER PROCESSING WORK?
We very explicitly recommend to cook them before processing further. Please consider mealworms like any other type of meat. If raw or undercooked, people can react sensitively to it. If you cook them thoroughly (in boiling water for a few minutes), they are totally safe to eat and process further. You can then fry them, roast them, mix them into sauces or all kinds of recipes. Be creative and have fun with this new type of meat! Dried and ground we also use them as protein source in sweet dishes like granola or cookies.

WHAT IF I HAVE A BIG FAMILY, A RESTAURANT OR SIMPLY WANT TO HARVEST MORE?
For now, we recommend you to simply get more than one Hive. We are working on modular and scalable Hive versions for scaling up production. If you have a commercial project, please get in touch with us and we can design a solution tailored to your needs!

HOW MANY MEALS CAN I MAKE OF ONE HARVEST?
This depends how meat-heavy you make your meals! We are typically getting about 3 mixed meat dishes out of one week’s harvest (e.g. risotto, lasagne or salads). We have previously made 4 burger patties out of 100-200g of mealworms!

HOW DO I KEEP MY HIVE CLEAN?
In your harvest routine, you will have one harvest every 18 days, after which you can take out the harvest area and put your pupae back into the pupation chamber in the beetle area in the top. Also, it is a chance then to clean the last tray before the harvest area, as it will be empty. Simply swipe it with a wet cloth.

CAN THERE BE ANY ALLERGIES OR DISEASES FROM MEALWORMS?
People with shellfish allergies might react sensitively to eating insects too! The only allergies that have been reported to come from mealworms were from people sieving mealworms from their frass, getting in touch with a lot of the dirt and fine excrements. This is not the case when harvesting with the Hive. Anatomically, mealworms are very different from humans, it is very unlikely that there are
WHAT KIND OF POWER SUPPLY DO I NEED?
Plug in the main power plug into your wall socket (utility power must match power requirements of 240V). Please refer to appendix for specific electrical appliances safety precautions.

WHAT EXACTLY HAPPENS IN THE HARVEST PROCESS?
All the mature mealworms with their frass, some dead ones and some pupae fall into the harvest area. There, they land on the first vibrating separation membrane. The pupae stay on top of this first membrane while all the rest goes through to a second plate, the harvest plate. This one has an angled surface and is heated in a certain rhythm, motivating your fresh worms to crawl down into the harvest area. The fresh, lively mealworms will start wriggling away from the center, crawl on the angled surface edge and fall into the harvest tray. The fine dirt and the dead ones (don’t worry in every healthy colony you have some dead ones) and frass will stay on the harvest plate. You can then clean the dirt and frass and harvest the pure, clean mealworms in the harvest area.

any diseases transmitted - unlike other livestock like pigs which are closer related to us and therefore can transmit their diseases easier.
You are in charge of growing your mealworms healthy and feed them responsibly. Livin farms does not take any responsibility or liability for the consumed harvest.