

GOOD AGRICULTURAL PRACTICES FOR CRICKET FARMING

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Crickets are one of the insects that the United Nations Food and Agriculture Organization (FAO) has encouraged people around the world to consume more because they represent a very convenient and sustainable protein source.

FAO estimates that the world's population will grow to 9 billion within the year 2050. Because of that, there will be a shortage of human food and animal feed. Insects are already sold as food, frozen, dried, canned, or in powder.

The powder can be used to make processed food like cookies or pasta, with the chance to export these products to foreign countries, such as the European Union (EU), China, the United States or Japan. This may be beneficial for the income of the farmers.

Cricket farming can complement the traditional farming activities (like rice and sugar-cane) without affecting them, and can also leverage on the periods of the year when crops do not require work. In years, Thailand has developed a solid tradition in cricket farming which can now be useful for the emerging market of packaged products containing insects. In order to establish confidence in the safety of these new products, the ACFS has developed the Good Agriculture Practices for cricket farming. The GAP is a set of guidelines that cricket farmers will follow to rear in a safe, optimized, standardized way.

Good Agricultural Practices (GAP) for cricket farming

This document explains how to comply with the GAP from the Agricultural Standard for Good Agricultural Practices for Cricket Farms. Auditing Accreditation and the GAP Certification cricket farming is based on TAS 8202.

1. Scope

This document lists the requirements for Good Agricultural Practices (GAP) in the case of cricket farming, from the farm set up to the farm management, the health of the insects, the protection of the environment, and the logging and traceability of the processes.

2. Definitions

2.1 Cricket is an insect that belongs to the Gryllidae Order of Orthoptera. They include:

- *Gryllus bimaculatus*
- *Teleogryllus mitratus*
- *House Cricket* (scientifically known as *Acheta domesticus*)

2.2 The cricket farm includes the rearing pens, and the areas for storage, harvest and garbage collection.

2.3 Farm (rearing area) is represented by a construction with a roof and walls or a net all around.

2.4 Crickets are farmed in pens or pools usually made of concrete or plastic material.

3. Requirements

1. Farm preparation

1.1 Location

1.1.1 Located in the appropriate area, no risk of contamination or danger that will affect the safety of cricket and consumers.

The location of the farm is one of the important methods on managing cricket farming, and it has to be clean, safe, convenient, without risks of diseases or damages to the environment. Chemical substances and pollution such as trash, waste from industry and population, can cause illness and kill the crickets. Therefore, the location of a farm should be far from any dangerous zone. A farm should not be in a low land as it may be affected by flooding.

1. Farm preparation

1.2 Farm layout and characteristics.

1.2.1 The farm size is sufficient and suitable for farming.

A farm size is supposed to be proportional to the quantity of cricket reared. It should be not too crowded. It must be clean and not accessible by other animals.

1.2 Farm layout and characteristics.

1.2.2 Efficient layout and right proportion.

An efficient layout and right proportions help the staff to work better.

Crickets should be divided based on the species and generations.

The farm, food storage, medical supplies, garbage, and water tank should all be in different areas.

1.3 Rearing farm

1.3.1 Built with durable material, easy to clean, with good ventilation, protected from other animals.

A cricket's house should have strong structure, protection from sun and rain, good ventilation, and must be easy to clean.

It should include a net to avoid the risk of other animals accessing the farm.

1.3 Farm

1.3.2 Pen with sturdy materials, easy to maintain and clean.

Pens should be strong, kept in good condition, easy to be cleaned and maintained. Cricket's death rate and health conditions depends on the quality and cleanliness of the rearing pens.

2. Farm management

2.1 Operating guide.

To manage the farm, farmers should follow the operating guidelines, which covers:

1. Farm preparation
2. Pen preparation
3. Equipment preparation
4. Selective breeding
5. Placement crickets into pen
6. Food and water management
7. Spawning and collecting eggs
8. Cricket harvesting
9. Cleaning and maintenance
10. Diagnosis and Dead crickets management
11. Other insects and risks
12. Environment, ventilation and waste disposal management
13. Staff management

2.2 Cricket management.

2.2.1 Qualitative selection of crickets.

Farming using the eggs from the same colony for a large number of times could spread diseases and make the breed weak. Therefore, farmers need to consider the replacement of eggs for the reproduction and keep tracking of where each breed came from.

2.2 Cricket management.
2.2.2 Pen preparation.

A pen should be clean and safe before starting the cricket farming.

2.2 Cricket management.
2.2.3 Use hiding material

Hiding material must be clean, dry, and no impurities, in the case of reusing the same material, farmers have to wash it and dry in the sun for 1 -2 days before using it again.

2.2 Cricket management.
2.2.4 Containers and bedding materials shall be clean, free of any risk.

Containers must be washed often and sterilized. Egg containers must be clean and non-toxic. After crickets have laid eggs, the container should be separate from the pen and place in a good temperature area.

2.2 Cricket management.
2.2.5 Cricket collection.

Before distribution, farmers should collect the right ages for each breed. A pen that had been picked should be empty after the collection as crickets have to be collected. Before collecting crickets, food and water trays should be taken out, and separate egg containers away from dung.

2.3 Food and water management.
2.3.1 Food must be in a good quality and no effect to crickets' health.

Food is an important factor of crickets' growth. Food bags must be in a good condition, with expiration dates shown. They should not contain chemicals, and should be tested before giving to crickets.

If the food is vegetables, fruits, or weed. It must be clean and not rotten.

2.3 Food and water management.
2.3.2 Water sources must be clean and non-contaminated.

Water is a major factor in the production of cricket. The water must be of adequate quality and sufficient quantity.

Selection of good water source is important to reduce the impact and risk. The farms Water must be free from contamination such as waste from factories and communities.

2.3 Food and water management.
2.3.3 Use clean and hygienic food containers.

Containers must be clear and in the right design for cricket's food. The material must be safe without any damage or contaminants. Farmers should feed crickets with food and water in the right amount depending on age and type.

2.3 Feed and water management.
2.3.4 Feed storage.

Feed must be closed up in a bag in a dry spot, with material support under the bag to avoid potential contacts with liquids.

The feed storage must be clean, dry, and safe from other animals

2.4 Staff.
2.4.1 Staff responsibilities, knowledge and experience.

Managing the farm properly will ensure higher survival rate for crickets, create good yield and quality. Therefore, staff should be well trained.

Staff need to have knowledge, skills and continuous training and should be able to work in all area such as;

- Management of different cricket ages and generations
- Farm preparation/pen management/harvesting
- Hygienic rules
- Sanitation
- Cricket's health

2.4 Staff
2.4.2 Hygienic rules and health check

Healthy and hygienic conditions can decrease the risk of diseases.

Staff must do a check-up at least once a year, to make sure that they're not suffering from diseases that can be transmitted.

Staff with respiratory tract diseases such as a cough, sore throat, diarrhea, vomit, or fever should not work until back to good health.

2.5 Clean and maintenance.
2.5.1 Farm and equipments.

The farm and the equipment must be in a good condition, clean regularly.

2.5 Clean and maintain.
2.5.2 Disinfectant and chemicals.

Disinfectant, chemicals, and dangerous substances can be used in the farm only according to the rules of the Department of Livestock Development. Container must be properly labeled and stored. The staff need to know how to use the disinfectants, how to prevent chemical spills and trained in case of an accident.

3. Animal's health
3.1 Prevention and control.
3.1.1 Prevention and disinfection.

Prevention and disinfection are the standards used to reduce the risk of infection and diseases on the farm. Therefore, proper sterilization inside the farm is critical.

Staff

- Accesses to the farm must be recorded
- Hand wash before entering the farm, use specific shoes for the farm area only
- Clothes/uniforms must be washed regularly

Proper sterilization equipment before entering a farm

- It is not allowed to eat food inside the farm
- There must be a protection from other bugs and animals

3.1 Prevention and control
3.1.2 Epidemic risk

In case of suspect of an epidemic situation in a farm, farmers should notify the veterinarian to investigate the problem, and follow the advice from Department of Livestock.

3. Animal's health
3.2 Animal treatment.
3.2.1 Veterinary supervision.

The use of medications, and the methods of protection from diseases should be under the supervision of a veterinarian. Refer to the the Agricultural Standards of TAS. 9032, on the subject of the use of animal medicine and the rules on animal disease.

4. Environment
4.1 Waste.

Garbage and waste from cricket's farms may affect the environment and cause the contamination of the the ground, water, air.

A farm must dispose waste properly.

4.2 wastewater.

Discharging wastewater without treatment may cause environmental damages.

5. Recording

5.1 Record performance.

The farm must keep records of the activities and the respect of the procedures.

5.1.1 Personal management information.

A farm must have records of staff training, staff management, and health checks.

5.1.2 Production information.

A farm must keep records of the feed and water, mortality rate, and quantity of cricket.

5.1.3 Prevention and treatment of diseases.

A farm must have records for chemicals with the name of products, types, date of use.

5.2 Keep records for at least 3 years.

The records should be kept for at least three years.