



AFDC 22 (748) DTZS

**DRAFT TANZANIA STANDARDS**

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**Production and handling of insects for food and feed — Code of Practice**

**TANZANIA BUREAU OF STANDARDS**

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### 0 Foreword

Assurance of food and nutrition security from traditional plant and animal sources is increasingly becoming a challenge, partly due to the growing population, reduced agricultural land productivity and the ever-changing climatic conditions. This has resulted to exploration of alternative relatively cheap sources of food for human consumption and animal feed.

Insect farming and production is one of the novel options that has been refocused with tremendous effort being put in place to enhance production of edible insects and insects that may be used in food and animal feed as a substitute for nutrients such as protein.

Given that this is a new area and the fact that uncontrolled farming of insect may itself negate gains achieved in relation to food safety and security, there is need to have the practice guided so as to produce safe products while effectively controlling any undesirable outcome. It is against this understanding that this code of practice was developed to guide farmers in Tanzania on both confined and semi cultivation of insect.

In the preparation of this code assistance was derived from: DKS 2921:2020 Production and handling of insects for food and feed— Code of Practice, published by the Kenya Bureau of Standards

### 1 Scope

This draft Tanzania code of practice provides the requirements for sustainable establishment and operation of wild harvested or domesticated insect production, harvesting and post harvesting handling i.e., Processing, storage, packaging, labelling and transport of insects for human consumption and feed industry.

### 2 Normative references

The following standard, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies:

*TZS 1770 Hazard Analysis Critical Control Points (HACCP).*

### 3 Terms and definitions

For the purposes of this document, the following terms and definitions apply:

#### 3.1

##### **Domestication**

farming of insects in established farms where the insects are held in confinement

#### 3.2

##### **Production**

insect farming activities at the farm level and harvesting from the wild

#### 3.3

##### **Insect farming**

Is rearing of insects which includes feeding, growth phase, harvesting



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### 3.4

#### **Semi cultivation of insects**

domestication of insects in their natural environment which is manipulated to some degree to produce the edible insects

### 3.5

#### **Wild harvesting**

harvesting of edible insects in their natural environment without any modification

### 3.6

#### **Waste**

any substance which constitutes scrap material, an effluent, unwanted surplus substance, article which requires disposing off as being broken, worn out, contaminated or otherwise spoiled

### 3.7

#### **Insect waste products**

include parts from insects that are not necessarily needed in a food or feed products as well as Insects that have died naturally, pupae and larvae exuviae, excrement (residue or frass), egg shell that have to be discarded.

### 3.8

#### **Post harvesting handling**

include processing, storage, packaging, labelling and transport.

## 4 General Requirements

Operators of insect farms for food and feed should ensure that

- a) The farms and/or harvesting sites are legally established and in compliance with applicable laws and regulations of the country such as the Wildlife Conservation and Management regulations related to the production of the insects
- b) Sustainability of their production is in guaranteed
- c) Welfare of the insect is guaranteed

## 5 Specific Requirements

### 5.1 Personnel

Operators of insect farm should ensure that any person (s) involved in the insect farming is given information, instruction, training and guidance as well as provided with necessary equipment including personal protective equipment so as to carry out their work efficiently

#### 5.1.1 Training of personnel

- a) All personnel should be aware of their role and responsibility in protecting the insects from contamination or deterioration.
- b) Any person deployed in an insect farm should be equipped with basic training or awareness on food safety and to the minimum on the principles of Hazard Analysis Critical Control Points as outlined in TZS 1770.



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c) Business operators or their farm supervisors should have sufficient knowledge and training in the following aspects:

- i). Behaviour of insects;
- ii). Food and feed safety principles
- iii). Ability to identify species of insects;
- iv). Farmed insect's species life cycle;
- v). Handling of insects; and
- vi). How to prevent farmed insects from escaping

d) To ensure smooth operation and management of all personnel, the business operator shall ensure that a farm for insects has a person who is overall in charge of the farm and who has specialized training and is able to:

- i). Ensure critical control points are established, implemented, maintained and updated;
- ii). Establish Good Agricultural and/or Manufacturing practices in the farm;
- iii). Identify emerging issues within the farm and establish both correction and corrective actions;
- iv). Coordinate and facilitate continuous/induction trainings of staff working in the farm

e) In-house continuous training programs should be specific to improve the knowledge of staff and should at least improve knowledge and skills related to:

- i). the nature of the insects, in particular their ability to be infected or carryover pathogenic or spoilage micro-organisms;
- ii). the manner in which the insects are handled and packed, including the probability of contamination;
- iii). the extent and nature of processing or further preparation before consumption;
- iv). the conditions under which the insects will be stored; and
- v). the expected shelf life of the different forms (dry or wet) of the insects

### 5.1.2 Personnel hygiene

5.1.2.1 People are a potential source of pathogens. Prevention of contamination of insects by personnel depends on everyone being aware of the potential risks associated with bad hygiene practices and behaving in a manner that will prevent these risks. Management of farms have specific responsibility for developing good hygiene practices in the workforce which can be achieved by interventions such as the provision of good personnel facilities and constant vigilance

5.1.2.2 To achieve high standards of personnel hygiene in the farm, personnel hygiene facilities should be available to ensure that an appropriate degree of personnel hygiene can be maintained and to avoid contaminating the insects. The management should ensure that:



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- a) All persons entering insect farming and processing areas including visitors and sub-contractors shall wear appropriate protective gears that shall only be used at the farm premises;
- b) All persons suffering from any illness or injury should not be permitted to access the production area
- c) Adequate toilet facilities and associated hand washing facilities shall be provided in accordance with relevant standards or regulation of the competent authority;
- d) Smoking should only be permitted in clearly designated areas which shall not include production areas. Chewing gum, eating sweets or food should be discouraged in production areas
- e) The operator should ensure that the farm has a provision for basic first aid facilities and trained personnel on first aid administration

### 5.2 Infrastructure

#### 5.2.1 Establishment: Design and facilities

5.2.1.1 The operator in designing the insect farming facilities should pay special attention to good hygienic design and construction, appropriate location, and the provision of adequate facilities, which are necessary to enable hazards to be effectively controlled.

5.2.1.2 The layout of the premises should be designed to ensure a safe environment and prevent contamination, allow maintenance and minimise deterioration

5.2.1.3 The operator should in particular consider the following:

a) The insect farms should be located away from:

- i). environmentally polluted areas and industrial activities which may pose a serious threat of contaminating farmed insects
- ii). areas subject to flooding unless sufficient safeguards are provided;
- iii). areas prone to infestations by pests;
- iv). areas where waste, either solid or liquid, cannot be removed effectively; and
- v). loud external noise that could disturb the rearing of specific insect species.

b) The selected design, layout, construction, siting, and size should:

- i). Permit adequate maintenance, cleaning and/or disinfection such as use of foot bath, avoid or minimize airborne contaminant;
- ii). Prevent contamination, and provide adequate working space to allow for the hygienic performance of all operations;
- iii). Ensure production units in which insects are reared are closed or fitted with nets or grids or any other appropriate means to exclude other pests, or the contamination with other insects, and prevent the presence of rodents;
- iv). Have adequate natural and/or artificial light and a controlled environment if necessary;



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- v). be designed to avoid accidental release of insects from the production facilities;
- vi). provide a different room for storing/holding processed insects, in case the operator produces both types of products
- vii). provide adequate drainage and waste disposal systems and facilities;
- viii). ensure that access to the storage, breeding and rearing areas is restricted to the authorized staff;
- ix). provide a mechanism for proper ventilation system (mechanical or natural) so as to maintain appropriate temperature and humidity as required by insects and staff working in the farm; and
- x). where necessary provide for proper zoning and appropriate controls/segregations to avoid any possible cross contaminations.

### 5.2.2 Equipment

5.2.2.1 Any machine or equipment used in insect farming should not introduce or increase any hazard either to the live insects or insect which have been harvested and processed

5.2.2.2 All machines or equipment deployed should be fit for purpose, installed and maintained such that they:

- i). permit adequate maintenance and cleaning;
- ii). function in accordance with their intended use;
- iii). facilitate good hygiene practices;
- iv). Can be properly maintained.

5.2.2.3 Where containers for waste and inedible or hazardous substances are provided, they should be

- i clearly identified for their intended purpose;
- ii constructed of impervious material which can be readily cleaned and disinfected;
- iii closed, when not in immediate use; and
- iv preferably fitted with a foot-operated lid or other suitable means to minimize contamination by hands.

### 5.2.3 Pest Control management

5.2.3.1 Pests pose a major threat to the safety and suitability of food derived from insects. Pest infestations can occur where there are breeding sites and a supply of food. Good hygiene practices should be employed to avoid creating an environment conducive to pests.

5.2.3.2 The operator should develop and implement a pest management program including such things as baits, use of chemicals and pesticides as appropriate.

5.2.3.3 The pest management program should be monitored and improved where necessary for effectiveness

### 5.2.4 Waste Management

In addition to Environmental Management Standards the operator should ensure that:



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- a) Suitable provision should be made for the removal and storage of waste. Waste should not be allowed to accumulate in insect farming area, insect storage, and other working areas and the adjoining environment except so far as is unavoidable for the proper functioning of the business. Waste stores must be kept appropriately clean.
- b) The waste must be disposed off in an appropriate way to prevent the contamination of the rearing environment, the substrates used to feed the insects and the insects themselves.
- c) Insect waste products should be properly treated before disposing to prevent any further contamination to the environment.

### 5.3 Insect farming

#### 5.3.1 Insect flock

- a) Flock management: Operators of confined farms should use breeding flocks of a known and traceable origin. The operator should also maintain consistent population density at each developmental stage;  
and
- b) The operator should ensure that the insects are farmed in a controlled growing environment designed and maintained as guided by this code;

#### 5.3.2 Rearing of insects

5.3.2.1 Rearing of the insect is the most critical aspect in entire insect farming. Operators are required to apply Good Agricultural and Manufacturing practices as appropriate and ensure sustainability of operations.

5.3.2.2 Insect farming for purpose of this code is divided into 4 stages namely:

- a) Feeding of insects;
- b) Growth phases;
- c) Harvesting phase; and
- d) Primary processing

#### a) Feeding of insect

Operators should ensure that insects are provided with sufficient substrate and water to ensure optimal growth of the insects being farmed. The operator should apply any technical or organizational measures that they deem necessary to prevent any risk of contamination of the substrate.

An operator should apply the following principle directly or modified to ensure good nutrition and safety of the insect:

- i). The substrate should be selected by taking into consideration the chosen insect species, based on its mycotic, bacterial and viral disease resistance
- ii). Substrate delivering equipment should not introduce any hazard to the insects
- iii). boxes/cages containing insects and equipment destined to provide the substrate and/or water to insects between each batch of production should be thoroughly cleaned.



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iv). The operator should put in place a traceability record for substrate used in feeding the insect. They should to the minimum be able to identify the source and time the substrate was fed. Where an operator is using crops to feed the insects, they shall ensure that any pesticide residue on the crops shall be in accordance to the Codex Alimentarius Commission for that crop.

### **b) Growth phase**

i). The operator or their management staff should have a good understanding of the main insect species (including their different life cycles) which is necessary for the development of suitable rearing methods

ii). As a general rule, the operator should control the following aspects as appropriate depending on the insect at the farm

a. The temperature: insect growth rate is heavily influenced by temperature levels.

Temperatures between 20°C and 50°C are most beneficial for the growth of majority of insects.

b. Operators should ensure adequate lighting depending on the insects

c. Humidity: temperatures must correlate with a specific level of relative humidity, depending on the phase of development. The operator should be aware of the appropriate humidity requirement for their insects;

d. Enclosed space: the insect colony should be enclosed and secured to facilitate pest control and prevent insect stock escape. To achieve this, it is recommended to use multiple self-contained spaces, each with its own population, water supply and food sources. In the event of escape, the operator should notify the relevant government authority.

e. Ventilation: proper ventilation of the premises is required and must be suited to the species characteristics and projected temperature/humidity levels. This ensures clean rearing conditions and avoids cross-contamination through the air.

Note: Each producer should optimize and tailor the rearing conditions according to the specific insect species to ensure that risks are minimized

### **C) Harvesting phase**

No fresh substrate should be added prior to harvesting: in some cases, insects should be removed from the growing substrate several hours before harvesting.

Harvesting techniques differ from insect to another and therefore the operator should be familiar with the harvesting requirements of their flock. For example, holometabolic insects (i.e. mealworms, black soldier fly, housefly) fully grown larvae are harvested, whereas in hemimetabolous insects (e.g. crickets and grasshoppers) are harvested at young nymphaea or adult stage. Adults cricket is often collected by sieving from the growing substrate or by insect collecting nets while Black soldier fly larvae may naturally (at a mature level) migrate from the moist substrate to a dry environment, where they can be easily sieved manually or mechanically.

Note: For semi-cultivation and wild harvesting see annex A

### **d) Post harvest handling**

Post-harvest handling should be managed in a way that ensures the harvested insects are not exposed to possible contamination. Post-harvest processing such as drying of insects should be done within a short time after harvesting and stored in a cool, dry place.

The processing objective should be to:





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- i). avoid the use of areas where the environment poses a threat to the safety of food;
- ii). control contaminants, pests and diseases of animals and plants in such a way as not to pose a threat to food safety; and
- iii). adopting practices and measures to ensure products are produced under appropriately hygienic conditions

### 5.5 Storage

The operator should ensure that there are measures in place to:

- a) sort the harvested insects from materials which are evidently unfit for human consumption;
- b) dispose off any rejected material in a hygienic manner and in accordance to the guidance of this code; and
- c) Protect harvested insects from contamination by pests, or by chemical, physical or microbiological contaminants or other objectionable substances during handling, storage and transport.

### 5.6 Packaging and Labelling

#### 5.6.1 Packaging

Harvested and processed insects should be packaged in appropriate food grade packaging material that should protect and safeguard the integrity of the processed insects.

#### 5.6.2 Labelling

The packages should contain the following information:

- i). Name of the insect;
- ii). Form of processing e.g. dried
- iii). Name of the packer/producer/ processor
- iv) net weight in metric unit
- iv). Date of post harvesting processing
- v). Expiry date/best before date
- vi). Where the insect was fed with a substrate known to contain any allergen, the statement, 'Insect fed with substrate containing XXX, which is a known allergen', where XXX will be the specific material
- vii). Storage instructions
- viii) end use of product i.e. food or feed

### 5.7 Records

The business operator should maintain records of his activities including but not limited to

- i). Staff training;
- ii). Substrate used in each flock and its source;
- iii). Source of flock or flock data



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- iv). Production capacities;
- v). Corrections and Corrective measures undertaken during farming;
- vi). Non complying products and how they were handled
- vii). Disposal of any waste and insect waste products

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## Annex A

### (Informative)

#### Semi-cultivation of insects and wild harvesting

##### General principles

In recognizing the traditional farming and harvesting of edible insects in Tanzania which is largely seasonal and given that the practice rarely involves the tending of insects thus not isolated from their wild populations, operators opting to enhance this farming and wild harvesting should ensure that:

Harvested insects are of the same species;

Post-harvest handling should be done in accordance with this code;

The insect harvesting zones should be located away from:

- i). environmentally polluted areas and industrial activities which pose a serious threat of contaminating insects;
- ii). areas prone to infestations of pests; and
- iii). areas with other solid or liquid wastes

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