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Experimental breeding station for edible insects

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Annotation:
The task of this work is to introduce the possibilities and conditions of breeding edible insects. The goal was to design an experimental device enabling the measurement and regulation of breeding conditions, namely temperature and humidity in the breeding environment and the supply of feed and fluids. This device was assembled and functionality verified by experimental measurements by meeting various parameters.

Anotace:
Práce má za úkol seznámit o možnostech a podmínkách chovu jedlého hmyzu. Cílem bylo navrhnout experimentální zařízení umožňující měření a regulaci chovných podmínek jmenovitě teploty a vlhkosti v chovném prostředí a přísun krmiva a tekutin. Toto zařízení bylo sestaveno a experimentálními měřeními ověřena funkčnost splněním různých parametrů.

Abstrakt

Nowadays, is a big trend to search for and creation of food from alternative sources. In the edible insect sector, the trend is to create food in the most economical spaces possible with regard to the highest yield. This sector is characterized by low costs of breeding in terms of feed supply, energy consumption, dimensions of the breeding environment and the generation of waste compared to the breeding of large animal farms. To determine breeding parameters for the highest yield of a given breeding product, it is necessary to determine the conditions of temperature, humidity of breeding, intake of feed and fluids depending on the obtained final product.

The work was created for the need of measuring different procedures of breeding of edible insects. To ensure a separate breeding area, the breeding is placed in an experimental box. Breeding is placed in a standardized food container of type E2. This food crate is placed in an experimental breeding environment that is found inside the box. This box contains inlet and outlet openings with a fan that brings fresh air into the rearing area and discharges waste gases to the area behind the experimental box, where it is ideal to place a fume hood to remove the waste gas from the room.

This box enables regulation of the temperature of the breeding substrate using a heating pad with a power of 14 W with a maximum temperature reached in the space of 42 °C. This mat and the entire space of the experimental box must meet the safety of work, easy handling for cleaning and disinfection. The heating is realized by a terrarium pad intended for heating by infrared radiation due to the unevenness of the food crate. The box also enables humidity regulation by supplying water to the breeding area and its spontaneous evaporation. With the help of humidity and temperature sensors located in the box, the current value determined the regulation feedback. The temperature sensors for the breeding box are located in the holders holding the transport box for easy handling.

Figure 1 shows a test measurement of temperature regulation in the breeding environment, when the temperature on the reference sensor was increased by 1 °C witch was located in breeding area (green curve, sensor located at the bottom of the breeding box). The response of this temperature for feedback control (sensors located in the holders) is shown by a dark blue curve. Due to the heat capacity of used material and slow heat conduction, the measured temperature is lower and gradually copies the reference temperature. Here is promoted the great effect of the temperature in the room environment.

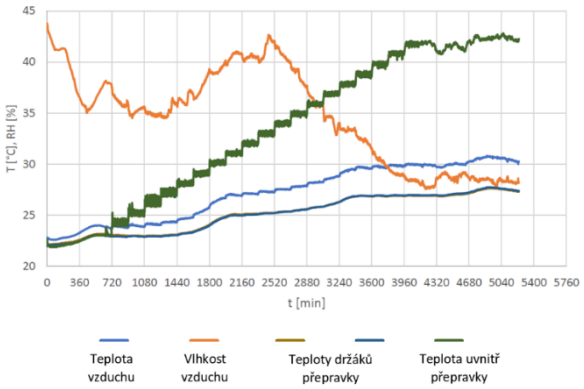

Figure 1: Test measurement of temperature control

Filing of fluids for animals consumption is realized by supplying water to the breeding environment. In the box, there must be a porous stone under the outlet of the water supply, which has the task of eliminating the drowning of breeding individuals. The supply of feed is implemented using a feed dispenser designed again for terrarium needs and aquaristics.

The control unit records any changes in the environment and stores the data in its memory, which can be downloaded from the control panel or by connecting to a WIFI network.

The development and tests during the construction of this device verified the functionality of the chosen solution and the box was prepared for experimental measurements of the effectiveness of individual breeding processes on the resulting product.

Figure 2: Visualization of the experimental breeding station

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