CLAIMS

1. A device (1) for breeding, in particular of insects, comprising a plurality of individual boxes (2) which are to be arranged in a stack (3) comprising a plurality of planes of boxes (2), said boxes (2) each being filled with larvae and a substrate which contains inter alia food, and comprising an observation system by means of which information relating to the substrate and the status of the insects in each individual box (2) can be obtained, such that instructions, in the form of further breeding, harvest or disposal of the insects in the individual boxes (2), can be output on the basis of said information, and comprising a food dispensing system which is adapted such that the food can be dispensed automatically and individually into the relevant box (2),

characterized in that the device (1) comprises at least one stack (3) of boxes (2), which is located on a chassis (4, 5), and a gantry (6), the gantry (6) at least having a supply module (10), a cleaning module (11), an upward vertical transporter (12), a downward vertical transporter (13), an upper transverse transporter (14) and a lower transverse transporter (15), and in that a guide system, in particular a rail guide (7), is provided for the gantry (6) such that the gantry (6) can be moved to the at least two stacks (3) of boxes (2), and in that a conveying system is provided, in particular a conveyor belt (8), it being possible to convey boxes (2) from and to the at least one stack (3) of boxes (2) by means of the conveying system such that, by means of the gantry (6), cyclical restacking, and supplying and cleaning of the insects within the boxes (2), within the at least one stack (3) of boxes (2), is made possible, and in that boxes (2) can be loaded into and unloaded from the at least one stack (3) of boxes (2) by means of the conveying system and the gantry (6), the supply module (10) being divided into at least two containers (35, 36), said containers each being equipped individually with at least one metering roller (37), at least one container (35) being filled with the substrate and at least one other container (36) being filled with the food, such that in the event of transport by the upper transverse transporter (14) first substrate and subsequently the food can be dispensed into the box (2), in the amount required in each case, by the adjustable advancement of the metering rollers (37).

2. The device (1) according to claim 1, **characterized in that** the gantry (6) is

constructed from a profile system (9), in particular a profile system (9) made of aluminum, and/or from a welded structure.

3. The device (1) according to claim 1, **characterized in that** the upward vertical transporter (12) of the gantry (6) comprises opposingly, individually in each case, at least two drive units containing at least two linear belt drives (16) and at least two lifting fingers (17) on each drive, the lifting fingers (17) being loadable in the case of an upward movement, achieved by the drive, of the upward vertical transporter (12),and thus a weight, in particular a weight of the box (2), can be absorbed, and in that the lifting fingers (17) can be deflected outwards by means of insertion of the box (2) from the conveyor belt (8) through a passive chassis (4) from below, as a result ofwhich the hooking and unhooking for the transport of the boxes (2), by the upward vertical transporter (12), can be performed passively.

4. The device (1) according to claims 1 to 3, **characterized in that** the downward vertical transporter (13) of the gantry (6) opposingly, individually in each case, at least two drive units containing at least two linear belt drives (16) and at least two lifting pin arms (18) having at least two lifting pins (19) connected to a roller (22), anda roller guide (20) comprising deflection rockers (23), such that the lifting pins (19) ofthe lifting pin arm (18), connected to at least one roller (22), can be deflected by the roller guide (20) in the case of a downward movement of the downward vertical transporter (13) such that one box (2) can be held by the lifting pins (19) in each case, and said box (2) can be transported downward, in the case of the upward movement of the downward vertical transporter (13), the lifting pins (19) connected to the roller (22) being deflectable by the deflection rocker (23) in the roller guide (20) such that the downward vertical transporter (13) can be moved upward, without the lifting pins (19) being extended, and thus no box (2) can be grasped, such that a further box (2) can be received by the linear belt drive (16), for the purpose of the downward movement of the downward vertical transporter (13), by means of the lifting pin arms (18) and the lifting pins (19) thereof that are connected to the roller(22), using the roller guide (20) and the deflection rockers (23) thereof.

5. The device (1) according to claims 1 to 4, **characterized in that** the upper

transverse transporter (14) of the gantry (6) comprises opposingly, individually in each case, at least one drive unit which the linear belt drive (16), a lifting arm (24) having at least two lifting receptacles (25), the roller (22) on the lifting arm (24) which iscoupled by means of a linear shaft (21), and a roller guide (20) comprising at least two rockers (26), such that in the case of a movement of the lifting arm (24) by the linear belt drive (16) having the roller (22) coupled via the linear shaft (21), along the roller guide (20), the lifting arm (24) can be pivoted out by the rocker (26) on the rollerguide (20) such that the box (2) can be received and can be moved from left to right and/or from right to left, such that at a further rocker (26) of the roller guide (20) the box (2), a lifting arm (24) can be deflected by the roller (22) fastened to the lifting arm (24) by means of the linear shaft (21), such that the box (2) can be deposited.

6. The device (1) according to one or more of the preceding claims, **characterized in that** the lower transverse transporter (15) of the gantry (6) contains opposingly, individually in each case, a vertically oriented asymmetrical belt (27) which can be moved vertically by means of a horizontally oriented drive (28), the asymmetrical belt (27) being of such a thickness, on one side, that the box (2) can be grasped and moved from left to right and/or from right to left by means of a horizontally oriented drive (28), on account of the vertical movement of the asymmetrical belt (27).

7. The device (1) according to claim 3, **characterized in that** the gantry (6) comprises servomotors (29), and in that an active chassis (5) contains a connection element, in particular a web (38), which is fastened to Bowden cables (30) fastened to the lifting fingers (17), the connection element being actuatable by the servomotors (29) on the gantry (6) such that the lifting fingers (17) of the active chassis (5) can be deflected outwards by means of actuating the servomotors (29), as a result of which the box (2) that is ready for harvest can beunloaded downward onto a conveyor belt (8), through the active chassis (5), by means of the downward vertical transporter (13).

8. The device (1) according to one or more of the preceding claims, **characterized in that** a detection unit is provided in the gantry (6), which unit comprises sensors, in particular heat sensors and humidity sensors, and/or a camera, it being possible to determine parameters required for insect breeding, in particular humidity and

temperature, inside the box (2) by means of said sensors, and in that images acquired by the camera, which reproduce state of the insects with supply materials in the box (2), can be compared, by a database, with reference data, such that it is possible, in each case, to determine relevant supply state of the insects inside the box (2), and the information thus obtained can be used for machine learning.

9. The device (1) according to one or more of the preceding claims, **characterized in that** the boxes (2) in each case comprise a double base and at least one suction opening between the bases, upper base of the double base being constructed as a grating-like base, such that in particular waste inside the box (2), in particular feces of the larvae, falls through said grating-like base, and said waste can be removed by the cleaning module (11), through the suction opening between the double base.

10. The device (1) according to claim 9, **characterized in that** the cleaning module (11) comprises at least two suction devices (34), it being possible for the waste to be suctioned through the suction opening of the box (2), between the double base, by means of at least one suction device (34), and in that skins of the larvae as well as any food residues and other waste present inside the box (2) can be suctioned out during the transport by the upper transverse transporter (14), and/or taken up bymeans of electrostatics, and/or removed by means of air separation, by means of at least one second suction device (34).

11. The device (1) according to claim 10, **characterized in that** the boxes (2) comprise an RFID chip or another passive electronic chip, and/or a barcode, and/ora 2D matrix, such that data, in particular state data of the boxes (2), can be stored and retrieved, as a result of which it is possible to carry out instructions on basis of the storable and retrievable data.

12. The device (1) according to one or more of the preceding claims, **characterized in that** a station is present for the gantry (6), in which the cleaning module (11) can optionally be emptied, and in that the containers (35, 36) of the supply module (10) can be refilled with materials required in each case, in particular the substrate and/or the

food.

13. The device (1) according to one or more of the preceding claims, **characterized in that** the stacks (3) of boxes (2) can be lined up one behind the other, lengthways, as often as desired, and in that said stacks (3) of boxes (2) lined up lengthways can be lined up side-by-side, such that the device (1) can be optimally adapted to the local conditions, in particular length, width and height of an industrial building, and thus optimum use can be made of local conditions.

14. The device (1) according to claim 13, **characterized in that** at least one conveyorbelt (8) is arranged orthogonally to the stacks (3) of boxes (2) described in claim 13, such that said stacks (3) of the boxes (2) according to claim 13 can be supplied with new boxes (2) comprising insects and supply materials from a store, by means of said orthogonal conveyor belt (8), and in that boxes (2) ready for harvest can be transported away from the stacks (3) of the boxes (2) and into a store, by means of said at least one conveyor belt (8) which is directed orthogonally with respect to the stacks (3) of the boxes (2) according to claim 13.

15. A method having a device according to one or more of the preceding claims, **characterized in that** the lowest box (2) of the stack (3), in each case, which is located on a passive chassis (4), is raised, by at least one box height, by means of the upward vertical transporter (12), at the same time, in the case of the downward vertical transporter (13), the second box (2) from the bottom, from the stack (3) of an active chassis (5), being raised, such that the bottom box (2) of the stack (3) on the active chassis (5) is brought, by means of the lower transverse transporter (15), under the stack (3) raised by the upward vertical transporter (12), and in that the second from bottom raised box (2) is moved downward by the downward vertical transporter (13) by at least one box height, the uppermost box (2) of the stack (3), which is raised by one box height, by means of the upward vertical transporter (12), likewise being brought over the stack (3) of the boxes (2), located on the active chassis (5), by means of an upper transverse transporter (14), during the transport of the box (2) by means of the upper transverse transporter (14), the box (2) comprising insects and supply materials thereof being cleaned, and optionally equipped with corresponding supply materials, by means of a cleaning (11) and supply module (10), and described

transport procedure being performed until all the boxes (2) ofthe at least two stacks (3) are cleaned and optionally equipped with the corresponding supply materials, by means of the cleaning (11) and supply module (10), and in that the box (2) ready for harvest, the readiness of the box (2) for harvest being determined by means of the detection unit, during the cleaning and equipping with the supply materials, is conveyed through the stack (3) of boxes (2), located on the active chassis (5), by means of the downward vertical transporter (13), until it reaches the active chassis (5), the active chassis (5) being deflected outwards, such that the box (2) ready for harvest is unloaded onto the conveyor belt (8), through the active chassis (5), by means of the downward vertical transporter (13), and in that a new box (2) comprising insects and the supply materials, which is conveyed under the passive chassis (4) by means of the conveyor belt (8), is loaded through the passive chassis (4) by means of the upward vertical transporter (12), the passive chassis (4) being deflected outwards by means of the box (2), upon loading, into the stack (3) of the boxes (2) located on the passive chassis (4), such that automated insect breeding is carried out.