System and method for monitoring manufactured pre-prepared meals

The invention relates to a system and to a method for monitoring pre-prepared meals which can be assembled as a plurality of portions.

In this context, the assembly takes place by means of tray-like containers (shelves) in which containers containing pre-prepared meals can be arranged in a locally defined manner and, where possible, can also be fixed against sliding by a corresponding design of the respective tray-like containers, which can be achieved by corresponding receivers for containers with meals on tray-like containers. However, similar containers can also be used, for example those which can also be closed by covers. A wireless and contactless transmission of information from, and optionally also to, data carriers should, however, remain ensured in this context. Further goods from

the catering sector can also be present in addition to meals and beverages.

Such a tray-like member element can be equipped solely for the assembly with containers containing meals which subsequently have to be heated before consumption. However, there is also the possibility to position containers with meals which can also be consumed cold on tray-like containers and, optionally, to include other articles or also beverages in such a tray-like container.

The assembly of the different meals and, optionally, also beverages usually takes place in centralized fashion at one position and subsequently a storage takes place and a transport, via a transport chain which can also be interrupted, up to the consumer.

Use is in particular provided for the provision of foodstuffs and beverages for consumption in means of transportation, very specifically preferably in aircraft.

However, problems occur in the known solutions since it is not possible, or is only insufficiently possible to achieve a record of the observation of a cold chain, the respective best-before date by which the meals may be consumed and also a record on the supply of the assembly from the caterer to the consumer.

Incorrect deliveries can thereby not be recognized or only recognized with an increased effort.

The observation of a set cold chain is moreover not possible and there is moreover the risk that meals

correspondingly assembled in this way will be consumed after the expiry of their shelf life and an impairment of the health of corresponding consumers can thus occur.

It is therefore the object of the invention to provide a system with which correspondingly assembled pre-prepared meals can be monitored starting from their assembly up to the ultimate consumption.

In accordance with the invention, this object is solved by a system having the features of claim 1. A method having the features of claim 17 can be used in this context.

Advantageous aspects and further developments of the invention can be achieved using features designated in the subordinate claims.

For this purpose, a data carrier should be attached to a tray-like container. In this connection, such a data carrier can be attached directly to the tray-like container, but also to at least one container for meals or beverages which is in turn received and held by means of a tray-shaped container. Similarly designed containers, for example box-shaped, can also be used.

Such a data carrier should be suitable to be able to read out the respective data.

The data should be able to be read out at at least one reading station, preferably two reading stations. The reading stations can also be designed such that in addition a transmission of data to the data carrier, that is a reading or a writing of data, is

possible.

The data stored on the data carrier can be the respective date of manufacture, assembly and/or of maximum shelf life. In addition, data on the quantity, mass or number can also be utilized. The maximum shelf life date should, however, mean the shelf life date of a meal or also of a beverage on a tray-like container having the shortest shelf life period.

Those data carriers are preferred which can store the corresponding data in electronic form and which can be read out in contactless manner by means of electromagnetic waves, which is e.g. possible with RFID technology known per se. In this case, a semiconductor circuit member with an antenna on a carrier suitable for the transmission of data is suitable. The reading out can take place over a distance of some centimeters up to several meters using suitable systems which likewise have an antenna. The transmission of the data takes place substantially inductively and/or capacitively, with the possibility also being able to be given in this case of subsequently storing corresponding data on such a data carrier.

This is e.g. advantageous when corresponding recording data should be stored during transportation and storage.

Corresponding data on the entry into a storage depot, a cooling depot, the placing into a meal trolley can thus be stored.

This relates to the respective location and in the

case of a cooling the respective times and storage temperatures can additionally be input. Data can be temporarily stored at the respective locations at which a reading of data from data carriers takes place and can subsequently or, optionally, simultaneously or in real time or almost real time be transmitted to a central data processing unit with which a monitoring of the respective logistics takes place.

For an uninterrupted monitoring of a set cooling chain to be observed, an additional temperature sensor can be used with the data carrier which transmits corresponding measured temperature signals to the data carrier as additional information continuously or also sequentially in specific settable time cycles. In this case, an additional element for the storage of electrical energy should be present which can advantageously be charged again or also rechargeable, with such charge procedures of such an electrical energy storage element being able to take place, where possible, in a wireless and contactless fashion in an inductive or capacitive manner.

Furthermore, other characteristic additional data can also be stored on a data carrier which can be utilized for the control of a unit for heating on the heating of corresponding meals. For example, different meals thus correspondingly require different heating conditions, which substantially relates to the respective temperatures, heating rates and the maximum heating time. In addition, data can be stored in the data carrier which reproduce the respective position of meals to be heated and of meals or beverages not to be heated on a tray-like

container so that when an assembled tray-like container is introduced into an oven unit in which an inductive heating is preferably to be carried out, the heating then only takes place locally specifically at locations at which meals to be heated are positioned.

Furthermore, at least one reading unit for corresponding data should also be present at such a unit/oven for the heating of meals and is then connected to the control of this unit/oven.

A possibility should advantageously be provided with which a warning signal is generated on a read-out of data which may occur, said data signaling the expiry of a maximum shelf life of meals or beverages and said warning signal then displaying this data visually and/or acoustically and warning the operator. A datum recognized in this matter can, however, also be evaluated in this manner and transmitted to the control of the unit/oven so that no heating of meals can take place in such a unit/oven after the expiry of the shelf life and a health risk can be prevented with almost 100% security.

The already mentioned reading and/or transmitting units for data of the data carriers can be arranged at respective gates through which the assembled meals and beverages can be introduced to and removed from storage and transportation units. This relates to gates or supply entrances of storage and cooling depots. Corresponding reading and transmitting units for the data can also be present on means of transportation such as trucks or rail vehicles on the respective doors or gates. The electrical energy

supply for the reading and/or transmitting units is possible without problem at such locations as a rule.

With mobile meal trolleys such as are frequently used in aircraft, however, corresponding reading and/or transmitting units for data should likewise preferably be attached in the region or proximity of doors. Such meal trolleys usually do not have their own electrical energy storage or connections for electrical energy. The latter are also frequently unfavorable since an electrical energy supply via leads is unfavorable in the utilization of meal transportation means.

Electrical energy storage elements can therefore be attached to the meal trolleys which can be charged inductively and/or capacitively, which is possible at corresponding charging stations. For this purpose, the meal trolleys only have to be positioned accordingly so that a contactless electrical energy transmission can take place inductively and/or capacitively on a correspondingly designed electrical energy store. Corresponding charge stations can be present at specific central points, also inside means of transportation, e.g. aircraft, so that a corresponding meal trolley only has to be positioned at a sufficient distance from such a charge station. It can then be used in a mobile manner with a charged electrical energy store.

An additional, readable intermediate store for data can be present on a meal trolley equipped in this manner and its intermediately stored data can be read out via optionally present connections and transmitted, as already discussed above, to a central data processing unit. The read-out of data of such an

intermediate store can likewise take place in a wireless manner via RFID technology.

Correspondingly suitable possibilities for the formation of corresponding antennas, data stores and electrical energy stores can also be retrofitted to meal trolleys. Coils can thus be installed at the housing of meal trolleys, for example, with corresponding joints preferably being cut out into which the individual windings of coils can be laid.

Such antennas should be present on the outer walls or also on all doors of meal trolleys since they can as a rule be applied on both sides and a removal is also possible from both sides.

Electronic display elements (displays) can also be installed at meal trolleys so that data on the contents can be obtained easily from the outside. The respectively displayed data can also be directly selected in this context, which is e.g. possible via an electronic unit with an input option via a keyboard or by means of touch screen technology. The respective destination can thus be visibly displayed from the outside on a corresponding selection. Display elements can be used which are also able to continue to display the data without a further connection or after a deactivation of electrical energy.

Receiving and transmitting elements such as already discussed above can, however, also be present in storage containers inside kitchens (galleys). The aforesaid statements on a possible intermediate storage and transmission of corresponding data to a central data processing unit also apply here. An

almost uninterrupted recording of the storage and transportation up to consumption can thus be made via the locally detected and read out data, with a record of the observation of a cooling chain also being possible in a preferred embodiment.

In addition, the corresponding identification data for the respective meal trolley can also be stored on meal trolleys so that there is at least a record with which the last detected location of the respective meal trolley is possible.

The system in accordance with the invention moreover simplifies the effort for inventories and for accounting, with the latter also applying to specific articles which do not necessarily have to be meals or beverages, but also articles sold inside means of transportation, for example duty free articles.

The system in accordance with the invention can not only be advantageously used for the catering for passengers in means of transportation, but also in other areas such as is the case in clinics or in large catering companies.

A complex monitoring of the most varied elements used, such as the assembled containers and meal trolleys with contents and respective location can take place with systems in accordance with the invention, with the latter applying at least to the location at which corresponding data were last read out from data carriers. In this context, the content data can also be utilized to obtain and process findings on the respective contents electronically, that is without any additional written documentation. This e.g. relates to the reordering or also to the

accounting of used or sold articles so that differences can be avoided in accounting or also in inventories and the administration effort can be reduced.

If such data are read out in a mobile means of transportation such as a rail vehicle or an aircraft, they can also be transmitted in a wireless manner by means of transmitting and receiving systems known per se, for example as GMS or UMTS signals, and can be supplied to a central data processing unit so that a real-time monitoring and control is thereby also possible.

With meals and beverages, an electronic detection, further processing and evaluation of HACCP data according to ISO 9000 can take place with the system in accordance with the invention so that paperless work is possible.

A storage and evaluation of detected information from data carriers can naturally not only take place at the central data processing unit already mentioned a plurality of time, but also at interposed data processing units alone or additionally.

The corresponding antennas or receivers for the detection of data transmitted wirelessly can be designed at the stations for the reading of data from the respective data carriers transmitted by means of electromagnetic waves, e.g. using RFID technology, such that the data carriers can be moved through the respective windings of corresponding coils and such that at least the reading out of data can be achieved, but preferably also the transmission of additional new information.

These data carriers, which can be operated in RFID technology, can, for example, be so-called "smart labels" in label form which can be fastened to the pre-assembled tray-like container relatively simply via an adhesive film. Operation can take place at a standardized transmission frequency for data, for example 13.56 MHz.

Specific data can then be stored at the place of assembly, which in particular applies to the identification data for an assembled tray-like or similarly made container.

Such a data carrier can be attached to the tray-like container at a protected location so that it is protected as much as possible from mechanical damage. The fastening of such data carriers, and also the writing of the respective data, can take place in automated fashion so that the costs can also hereby be reduced and errors prevented.

A plurality of antennas for the transmission of data can be present at reading and/or transmitting units for data and preferably realize the data transmission and storage via multiplexes. In this context, the antennas can also be configured for the different frequencies which are used for the transmission of data from and also to data carriers so that the different transmission systems can be taken into account.

Claims

1. A system for the monitoring of assembled pre-prepared meals which are arranged on tray-like containers and a data carrier is fastened there which contains meal-specific data which can be read out at at least one reading station so that a record can be achieved on conditions and locations of manufacture, storage and/or cooling.

2. A system in accordance with claim 1, characterized in that the data can be read into or out of the data carrier in a contactless manner by means of electromagnetic waves.

3. A system in accordance with either of claims 1 or 2, characterized in that the data can be read out from the data carrier in RFID technology.

4. A system in accordance with one of the preceding claims, characterized in that additional information on the storage and transportation are storable on the data carrier.

5. A system in accordance with one of the preceding claims, characterized in that a data carrier is applied directly to a tray-like container.

6. A system in accordance with one of the preceding claims, characterized in that a data carrier is applied

to a container for meals or beverages.

7. A system in accordance with one of the preceding claims,
characterized in that a temperature sensor is present whose measured temperature signals can be transmitted to the data carrier.

8. A system in accordance with one of the preceding claims,
characterized in that that an element for the storage of electrical energy is present.

9. A system in accordance with claim 8,
characterized in that the element for the storage of electrical energy can be charged in a wireless and contactless manner.

10. A system in accordance with one of the preceding claims,
characterized in that a reading unit for data stored on the data carrier is present on a unit for the heating of meals or beverages.

11. A system in accordance with claim 10,
characterized in that the reading unit of the unit is connected to its control.

12. A system in accordance with one of the preceding claims,
characterized in that reading and/or transmission units for data are attached in the region of doors.

13. A system in accordance with claim 12,
characterized in that inductively and/or capacitively chargeable storage elements for electrical energy are attached to meal trolleys.

14. A system in accordance with either of claims 12 or 13,
characterized in that antennas are installed in/on housings of the meal trolleys.

15. A system in accordance with claim 14,
characterized in that antennas are let into joints of housings.

16. A system in accordance with one of the claims 12 to 15,
characterized in that an intermediate storage for the reading out of data is present on meal trolleys.

17. A system in accordance with one of the claims 12 to 16,
characterized in that electronic display elements for the visual display of data present on data carriers and/or in the intermediate storage are attached to meal trolleys.

18. A system in accordance with one of the preceding claims,
characterized in that, a plurality of antennas for a data transmission are present on reading and transmitting units.

19. A method for monitoring assembled pre-prepared meals which are arranged on tray-like containers, wherein meal-specific data are stored on a data carrier which are read out for a record of conditions of manufacture, storage and/or cooling, as well as of locations of manufacture or storage, at at least one reading station.

20. A method in accordance with claim 19, characterized in that the data are stored as a record during transportation and storage.

21. A method in accordance with either of claims 18 or 19, characterized in that the data are stored in a wireless and contactless manner.

22. A method in accordance with any one of the claims 19 to 21, characterized in that temperature signals measured during transportation and storage are stored as data on the data carrier.

23. A method in accordance with any one of the claims 19 to 22, characterized in that a warning signal is generated on the recognition of an expiry of a maximum shelf life of meals or beverages.

24. A method in accordance with any one of the claims 19 to 23, characterized in that a unit for heating meals is controlled using data stored on data carriers and read out in a contactless manner.

25. A method in accordance with claim 24, characterized in that the respective position of meals or beverages on a tray-like container is taken into account in the control and a heating is only carried out locally specifically at locations at which meals to be heated are positioned.

26. A method in accordance with any one of the claims 19 to 25, characterized in that a wireless data transmis-

sion is carried out during the transportation in mobile means of transportation to a central data processing unit via transmission and reception systems.

27. A method in accordance with any one of the claims 19 to 26,
characterized in that the transmission of data to and/or from data carriers is carried out inductively or capacitively.

28. A method in accordance with any one of the claims 19 to 27,
characterized in that data stored on data carriers are made visually detectable from the outside on electronic display elements on meal trolleys in which meals and beverages are contained.

29. A method in accordance with claim 28,
characterized in that selected stored data are displayed.

30. A method in accordance with either of claims 28 or 29,
characterized in that data are also displayed on display elements after deactivation of electrical energy.

31. A method in accordance with any one of the claims 19 to 30,
characterized in that a multiplex data transmission and storage is realized at reading and/or transmitting units with a plurality of antennas for data.