

(19) World Intellectual Property Organization
International Bureau



(43) International Publication Date
12 September 2008 (12.09.2008)

PCT

(10) International Publication Number
WO 2008/108667 A1

(51) International Patent Classification:

G07C 1/10 (2006.01) **G01V 15/00** (2006.01)
A01K 1/12 (2006.01)

(21) International Application Number:

PCT/NZ2008/000041

(22) International Filing Date: 6 March 2008 (06.03.2008)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:

553617 6 March 2007 (06.03.2007) NZ

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(81) Designated States (unless otherwise indicated, for every

kind of national protection available): AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IS, JP, KE, KG, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LT, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RS, RU, SC, SD, SE, SG, SK, SL, SM, SV, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

(84) Designated States (unless otherwise indicated, for every

kind of regional protection available): ARIPO (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MT, NL, NO, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Published:

- with international search report
- before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments

(54) Title: IDENTIFICATION SYSTEM FOR MILKING PARLOUR

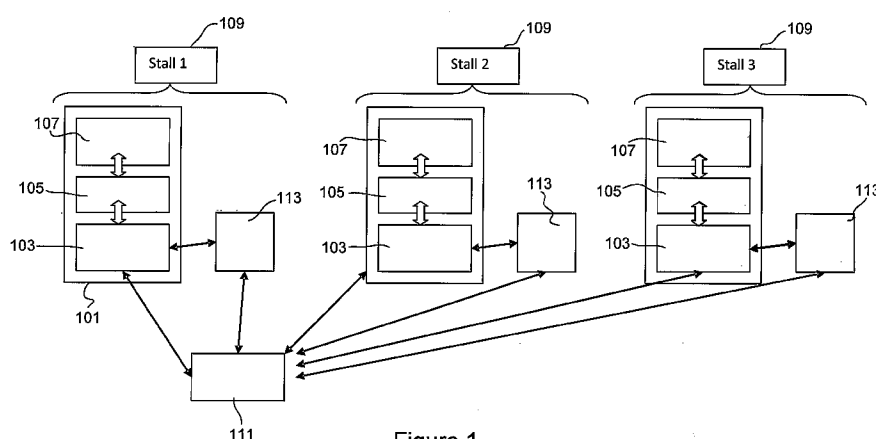


Figure 1

(57) Abstract: A method of correlating identification information received from a portable electronic identification module arranged to interrogate an electronic identification device with information obtained from a monitoring device, the method including the steps of: positioning the module in proximity to the monitoring device at a testing station, reading the identification information using the module, wirelessly transmitting the identification information from the module to a central electronic control device, and correlating data from the monitoring device that is entered into the central electronic control device with the identification information.

WO 2008/108667 A1

IDENTIFICATION SYSTEM FOR MILKING PARLOUR

FIELD OF THE INVENTION

5 The present invention relates to an identification system for a milking parlour. In particular, the present invention relates to a method and system for correlating information obtained from a monitoring device with identification information received from a portable electronic identification module arranged to interrogate an electronic identification device, and a method and system for correlating a
10 monitoring device with a portable electronic identification module arranged to interrogate electronic identification devices (EID), each of the module and monitoring devices having a unique identification.

BACKGROUND

15 When a mobile dairy herd testing service visits a dairy (cow, goat, sheep) farm, typically on an infrequent yet (semi-)regular basis, there is a need to associate each milking animal's milk yield and representative sub-sample with the identification (ID) of the milking animal. The advent of electronic identification
20 ("EID") devices and more particularly radio frequency identification (RFID) devices has permitted the automatic identification of animals that are in or approaching or leaving a milking parlour or shed, or are domiciled in a stanchion barn where they are also milked.

25 For the purpose of this disclosure, the term 'RFID tag' means an RFID transponder, which is typically 'passive' (i.e. is energised by way of an external magnetic or electromagnetic field) but may be 'active' (i.e. has its own energy source such as a cell or battery), together with a carrier for the transponder. The carrier is adapted for attachment at, or protection of the transponder and animal
30 within, the appropriate and chosen site on the animal.

Internationally, the most popular site of choice for a multi-purpose RFID tag, or the site that is mandated by a local or national authority, is the ear; hence the term 'ear tag'. This is the same for tags that are only coloured and/or printed with
35 the animal's ID. Typically a local or national authority mandates whether the ear tag is to be inserted in the left or right ear. Other sites for EID appropriate for a milking animal are on a pendant hung around the neck, on one or other of the

animal's hind legs (for accessibility with a mobile RFID 'reader' or 'antenna' during milking, whether the reader or antenna be hand held or attached to a per stall location or per stall equipment such as the milking claw) and in the animal's rumen (by way of a 'bolus' carrier that is forced down the animal's throat and then
5 resides within the rumen until intentionally dislodged).

This invention is most concerned with overcoming a problem that largely relates to the most popular form of animal RFID tag, the RFID ear tag. However, it can conceivably also apply to the other forms.

10

When milking animals enter a 'rotary' (i.e. a rotating) milking platform, it is typically possible to automatically identify each animal either as it approaches the platform, using a 'portal' antenna or using (a) side or overhead or floor mounted 'panel' reader antenna(e), each type being associated with a typically fixed-in-
15 place RFID reader. The animal's ID then needs to be associated with the stall on the rotating platform into which it then enters.

Alternatively, one or more 'panel' or other forms of antennae can be mounted above the path followed by the rotating stalls, to identify the animal in each stall
20 as it passes underneath. The animal's ID then also needs to be associated with the stall on the rotating platform within which it is held. This can be achieved or assisted using a means of automation, such as a separate (and preferably a different frequency) fixed-in-place RFID reader that reads a unique or counted transponder associated with each stall as it passes, or a coded and/or counted
25 interrupter or reflector associated with each stall as it passes a photoelectric sensor. The stall ID and the animal ID are then associated, typically by way of a time correlation. Any automated equipment associated with a particular stall can thereby be associated with the animal ID.

30 Alternatively the animal IDs, in Visual Identification (VID) format obtained by software look-up of a list of paired VID vs. EID (typically provided by an RFID tag), can present themselves in sequence to a human operator who can assign them to each stall using his/her own perception of the animal (VID) in that stall. Typically the assignment of animal ID to stall is at best semi-automated, because
35 there may be an animal in a stall that has lost its RFID tag or other form of EID or has not yet had one fitted, or an animal that has moved, stood or sat in such a

way that the RFID tag or other form of RFID has not been read. In this case the human operator needs to visually determine and manually enter the VID of the animal in that stall, to prevent it automatically being assigned the VID associated with the next EID provided by the EID (typically RFID) reader, thereby resulting in an offset of ID for each animal that follows.

The need for human intervention can be mitigated to an extent through the use of an ancillary or integrated 'animal absent or present' sensor such as the ultrasonic sensor described in our New Zealand patent 314425, which allows 'no EID/VID' to be allocated to a particular stall.

When milking animals enter a 'herringbone', 'parallel' or other form of essentially linear milking parlour or shed, it is sometimes possible to automatically identify each animal as it approaches or passes through the entrance, using a 'portal' antenna or using (a) side or overhead or floor mounted 'panel' reader antenna(e), each type being associated with a typically fixed-in-place RFID reader. However, in many instances there is insufficient space and/or distance to allow (a) parlour/shed entrance antenna(e) for an RFID reader to be installed so as to allow reliable EID identification of individual animals as they pass by or underneath or over it (or them).

One of the issues facing the reader/antenna(e) design is the range of heights and orientations with which an RFID ear tag can present itself as the animal walks by. Another is the need to ensure that no other animals' ears (and hence RFID ear tags) are within range of the antenna(e); this, for instance, means that other animals have to be excluded from the areas adjacent to the RFID reader antenna(e). Often there is little or no prospect of achieving this unless any 'holding/assembly' area immediately before the milking parlour/shed has been designed with this specifically in mind, or has been substantially remodelled.

A third, and perhaps the most significant, issue associated with a parlour/shed entrance RFID reader system (including antenna(e)) is that the absence of an RFID ear tag or failure to read a particular RFID ear tag results in fewer IDs being collected by the reader for that 'row' of animals than animals that have passed its antenna(e) and are subsequently in that milking 'row'. This results in the same 'offset of ID for each animal that follows' as described above for a rotary milking

platform entrance reader system, plus there will be at least one animal in each milking row that does not get automatically assigned an ID, whether it be incorrect or not. Again, this can be mitigated to an extent by the inclusion of an ancillary or integrated 'animal absent or present' sensor such as described above
5 for a rotary milking platform entrance reader system.

Finally, once past the reader, it is quite possible for one animal to pass another in a 'linear' format milking parlour or shed, prior to reaching and occupying the next vacant milking stall/position. This can result in the two animals' respective IDs
10 being swapped in milking or in-stall treatment or other in-stall records, save for human perception and intervention/correction.

Individual per stall/position RFID readers or multiplexed antenna(e) or one or more antennae, each connected directly or via a multiplexer to a reader and that
15 are automatically moved (repositioned) from stall to stall, have been contemplated, experimented with and perhaps even commercialised in milking parlours/sheds and on rotary milking platforms. This has largely or exclusively been implemented as part of fixed-in-place data collection and control systems that rely to a significant extent upon reliable RFID of animals at time of milking.
20 For the most part these appear to have been associated with individual feeding stations associated with milking stalls, wherein the value attributed to such a feeding regime and its impact on the animal's production and/or sale value can justify the extra expense of installing individual RFID readers or multiplexed antenna(e) or automatically moving antenna(e).

25 At present the practice of wiring and multiplexing of individual per stall/position RFID antennae or installing an automatically moving (repositioning) antenna(e) system appears to be preferred to that of additionally installing individual RFID reader and networking electronics for each stall/position, largely on account of
30 total installed cost, it seems. Nevertheless, the deployment of even per stall/position multiplexed antenna(e) or an automatically moving antenna(e) system in milking parlours/sheds and on rotary milking platforms is not nearly as high as that of RFID reader systems located at the entrance to a parlour/shed or rotary milking platform.

35

An object of the present invention is to overcome disadvantages arising from (i) an entrance RFID reader system and (ii) multiplexed antenna(e) or automatically moving antenna(e) by providing an individual per milking position RFID reader which enables effective correlation between the milking position and an animal at the milking position. This offers a novel solution to dairy herd testing organisations, in particular, faced with identifying animals on test day that carry an EID, and in particular an RFID ear tag, or at least provide the public with a useful choice.

10 SUMMARY OF THE INVENTION

According to one aspect, the present invention provides a method of correlating information obtained from a monitoring device with identification information received from a portable electronic identification module arranged to interrogate an electronic identification device, the method including the steps of: positioning the module in proximity to the monitoring device at a testing station, reading the identification information using the module, wirelessly transmitting the identification information from the module to a central electronic control device, and correlating data from the monitoring device that is entered into the central electronic control device with the identification information.

Further, the data from the monitoring device may be milking data.

The method preferably including the step of creating a data entry space on the central electronic control device for entering the milking data from the monitoring device.

The method preferably including the steps of allocating a testing station identification for the identification information received from the module, and creating a new data entry space associated with the testing station identification on the central electronic control device.

The method preferably including the step of allocating a new testing station identification for each set of new identification information received from the module.

The method preferably including the step of transmitting the identification information upon manually pressing a button on the module.

Further, the method may have a plurality of modules correlated with a plurality of
5 monitoring devices.

According to a further aspect, the present invention provides a method of correlating a monitoring device with a portable electronic identification module arranged to interrogate electronic identification devices (EID), each of the module
10 and monitoring devices having a unique identification, the method including the steps of: positioning the module in proximity to the monitoring device, wirelessly transmitting the module's unique identification to a central electronic control device, registering the unique identification of the module with the central electronic control device, registering the unique identification of the monitoring
15 device with the central electronic control device, and correlating the module with the monitoring device based on the unique identifications that the central electronic control device receives consecutively of in separate sequences.

Further, the method may have a plurality of modules correlated with a plurality of
20 monitoring devices.

Further, the method may have the module adapted to be temporarily installed as part of an animal testing system for testing a herd of animals while the animals are milked in one of a plurality of testing stations.
25

The method preferably including the steps of selecting a testing station on the central electronic control device, and determining the unique identification of the module associated with the testing station.

30 The method preferably including the steps of the central electronic control device providing a sequential identification for a testing station in which the module is positioned, and correlating an electronic identification received from the module with the sequential identification.

35 Further, the method may have the unique identification transmitted to the central electronic control device via the monitoring device.

The method preferably including the steps of activating the monitoring device to provide its unique identification and wait for a unique identification received from a module, and upon receipt of the unique identification received from the module,
5 the monitoring device forwarding the unique identification of the module and its own unique identification to the central electronic control device.

The method preferably including the steps of registering a sequential position of the module, and associating the unique identification of the module with the
10 position in the sequence.

The method preferably including the steps of repositioning the module and registering a further sequential position of the module.

15 The method preferably including the step of detaching from one and re-attaching the module to another fixed antenna.

The method preferably including the step of detaching and re-attaching the module next to another monitoring device.
20

Further, sequential registration may occur upon activation of a switch.

Further, sequential registration may occur upon power up of the module.

25 The method preferably including the step of registering a sequential position of the monitoring device with the central electronic control device.

Further, the central electronic control device may determine that the monitoring device is correlated with the module when the registered sequential positions of
30 the monitoring device and module are the same.

Further, the central electronic control device may compare the sequential position associated with the unique identification of the module with the sequential position associated with the monitoring device and upon determining a match,
35 correlates the module with the monitoring device.

The method preferably including the step of the module interrogating an EID device within a preset time slot.

5 Further, the method may have the preset time slot determined by the sequential position of the module.

The method preferably including the step of the module interrogating an EID device at preset time intervals.

10 The method preferably including the step of the module interrogating the EID device on a pseudo random basis.

The method preferably including the step of the module communicating with an antenna for reading an EID device.

15 The method preferably including the step of detachably connecting the module to the antenna.

20 Further, the method may have the antenna semi permanently installed in a testing station. Further, the antenna may be part of the module.

25 The method preferably including the steps of sending data received by either the module or the monitoring device to the central electronic control device from one of the module or monitoring device. Further, the decision to send data from the monitoring device or module may be based on the comparative signal transmission strength available to the module and monitoring device.

30 The method preferably including the steps of the monitoring device receiving the unique identification of the module it is correlated with and listening for transmissions from that module.

The method preferably including the steps of the monitoring device only acting upon transmissions from a module that it is correlated with.

The method preferably including the step of receiving the unique identification of the module it is correlated with from the central electronic control device during or after registration.

- 5 The method preferably including the step of receiving the unique identification of the module it is to be correlated with from the module during registration.

The method preferably including the step of wirelessly transmitting the unique identification of the monitoring device to the central electronic control device.

10

Further, the method may have the unique identification transmitted upon activation of a switch.

- Further, the method may have the unique identification transmitted upon power
15 up of the monitoring device.

The method preferably including the step of transmitting the module's unique identification to the monitoring device.

- 20 The method preferably including the step of wirelessly transmitting both the unique identification of the module and monitoring device from the monitoring device.

- The method preferably including the steps of reading electronic identification
25 (EID) data from the EID device, and transferring the EID to the central electronic control device.

The method preferably including the step of determining the most statistically correct identification of the animal under test.

30

The method preferably including the step of associating test data received from the monitoring device with the electronic identification data.

- The method preferably including the step of transferring the EID to the central
35 electronic control device upon request from the monitoring device.

The method preferably including the step of transferring the EID or a looked up visual identification (VID) to the central electronic control device via the monitoring device.

- 5 The method preferably including the step of the module receiving a master real time clock signal from the central electronic device.

Further, the master real time clock signal may be sent as part of the registration process. Further, the master real time clock signal may be used to determine a
10 relevant time slot in which the module can send and receive signals.

According to yet a further aspect, the present invention provides a system for correlating information obtained from a monitoring device with identification information received from a portable electronic identification module arranged to
15 interrogate an electronic identification device, the system including: the module positioned in proximity to the monitoring device at a testing station, the module arranged to read the identification information, and wirelessly transmit the identification information from the module to a central electronic control device, and the central electronic control device arranged to correlate data entered into
20 the central electronic control device with the identification information.

Further, the data entered into the central electronic control device may be milking data.

- 25 The system preferably including the central electronic control device.

Further, the system may have the central electronic control device arranged to create a data entry space for entering the milking data from the monitoring device.

30

Further, the system may have the central electronic control device arranged to allocate a testing station identification for the identification information received from the module, and create a new data entry space associated with the testing station identification.

35

Further, the system may have the central electronic control device arranged to allocate a new testing station identification for each set of new identification information received from the module.

- 5 Further, the system may have the module arranged to transmit the identification information upon manually pressing a button on the module.

According to yet a further aspect, the present invention provides a system for correlating a monitoring device with a portable electronic identification module, each of the module and monitoring devices having a unique identification, the system including a portable electronic identification module, the module including a transceiver and an electronic identification (EID) data reader arranged to interrogate an electronic identification devices (EID device), wherein: the transceiver includes a wireless communication device arranged to be in wireless communication with a central electronic control device, the module is arranged to register the unique identification of the module with the central electronic control device, the central electronic control device has a registered unique identification of the monitoring device, and is arranged to correlate the module with the monitoring device based on unique identifications received consecutively or in separate sequences.

The system preferably including a plurality of modules and a plurality of monitoring devices.

- 25 Further the module may be adapted to be temporarily installed as part of the system to test a herd of animals while the animals are milked in one of a plurality of testing stations.

The system preferably including the central electronic control device, wherein the central electronic control device is arranged to select a testing station, and determine the unique identification of the module associated with the testing station.

- 35 Further, the system may have the central electronic control device arranged to provide a sequential identification for a testing station in which the module is

positioned, and correlate an electronic identification received from the module with the sequential identification.

Further, the system may have the transceiver further arranged to wirelessly
5 transmit the unique identification to the central electronic control device.

Further, the system may have the transceiver further arranged to wirelessly transmit the unique identification to the central electronic control device via the monitoring device.

10

Further the system may have the monitoring device arranged to provide its unique identification upon activation and wait for a unique identification received from a module, and upon receipt of the unique identification received from the module, the monitoring device is further arranged to forward the unique
15 identification of the module and its own unique identification to the central electronic control device.

Further, the system may have the module further arranged to register its sequential position with the central electronic control device.

20

Further, the module may include a switch, and registration may occur upon activation of the switch. Further, registration may occur upon power up of the module.

25 The system preferably including the central electronic control device, wherein the monitoring device is arranged to register its sequential position with the central electronic control device.

Further, the central electronic control device may determine that the monitoring
30 device is correlated with the module when the registered sequential positions of the electronic collection device and module are the same.

Further, the central electronic control device may compare the sequential position associated with the unique identification of the module with the sequential
35 position associated with the monitoring device and upon determining a match, correlate the module with the electronic collection device.

Further, the system may have the transceiver arranged to be in wireless communication with the central electronic control device and the electronic collection device.

5

Further, the system may have the EID reader arranged to interrogate an EID device within a preset time slot.

Further, the system may have the preset time slot determined by the sequential position of the module.

10

Further, the system may have the EID reader arranged to interrogate an EID device at preset time intervals.

Further, the module may interrogate the EID device on a pseudo random basis.

15

Further, the system may include an antenna, and the EID reader may be arranged to be in communication with the antenna to read an EID device.

Further, the system may have the module arranged to be detachably connected to the antenna.

20

Further, the system may have the antenna semi permanently installed in a testing station.

25

Further, the module may include the antenna.

The system preferably including a single portable electronic identification module, wherein the module is arranged to be detached and re-attached to a fixed antenna located in proximity to one of a plurality of testing stations.

30

Further, the system may have the module arranged to be detached and re-attached to one of a plurality of testing stations.

Further, one of the module or the monitoring device may be arranged to send data received from either of the module or the monitoring device to the central electronic control device.

- 5 Further, the decision to send data from the monitoring device or module may be based on the comparative signal transmission strength available to the module and monitoring device.

- 10 Further, the system may have the monitoring device arranged to receive the unique identification of the module it is correlated with and listen for transmissions from that module.

Further, the system may have the monitoring device arranged to only act upon transmissions from a module that it is correlated with.

15

Further, the system may have the monitoring device arranged to receive the unique identification of the module it is correlated with from the central electronic control device during or after registration.

- 20 Further, the system may have the monitoring device arranged to receive the unique identification of the module it is to be correlated with from the module during registration.

- 25 Further, the system may have the monitoring device arranged to sequentially register with the central electronic control device.

Further, sequential registration may occur upon activation of a switch. Further, sequential registration may occur upon power up of the electronic monitoring device.

30

Further, the system may have the reader arranged to be interrogated by the monitoring device based on its unique identification.

- 35 Further, the system may have the reader arranged to register its unique identification with the monitoring device.

Further, the system may have the reader arranged to read electronic identification (EID) data from the EID device, and transfer the EID to the central electronic control device.

- 5 Further, the EID may be used to determine the most statistically correct identification of an animal under test.

Further, the system may have the central electronic control device arranged to correlate test data received from the monitoring device with the electronic
10 identification data.

Further, the system may have the reader arranged to transfer the EID to the central electronic control device upon request from the monitoring device.

- 15 Further, the system may have the reader arranged to transfer the EID or a looked up visual identification (VID) to the central electronic control device via the monitoring device.

Further, the module may be arranged to receive a master real time clock signal
20 from the central electronic device. Further, the system may have the master real time clock signal sent as part of the registration process. Further, the system may have the master real time clock signal used to determine a relevant time slot in which the module can send and receive signals.

- 25 According to various embodiments of the invention there is provided a portable electronic identification device reader, for temporary installation adjacent to a milking stall or milking 'position' wherein the reader incorporates wireless communication means to permit communication with other system components in a portable 'electronically enhanced' herd testing system.

30

In one form the electronically enhanced herd testing system can include but not be limited to a system which incorporates portable electronic milk meters.

- In another form the system can include mechanical milk meters used in
35 conjunction with a central electronic control device for processing data and into

which milk yields are manually entered but which can accept electronic identification data by wireless communication from the portable reader.

5 In a preferred form the central electronic control device is a hand held portable device.

In a preferred embodiment the portable reader has a predetermined unique ID (unique at least in the context of there being less than 100 readers present in the parlour/shed) which can be registered with the central electronic control device
10 prior to commencement of a milking session, or at least prior to having to provide an EID for the first animal that presents itself in a milking session at the stall or position with which the portable reader is associated. In a preferred form the reader ID is matched with a registered position of an already or subsequently registered electronic milk meter or other per stall electronic measurement or
15 sample or data collection device.

The unique ID of the reader can be pre-programmed, switch programmed or hard wire programmed.

20 The wireless transmission can be by radio frequency, infra red or other suitable wireless transmission technique.

The passage of the appropriate reader's unique ID from the central electronic control device to an associated electronic milk meter or other per stall electronic
25 measurement or sample or data collection device, allows the electronic milk meter or other per stall electronic measurement or sample or data collection device to interrogate only the appropriate reader for electronic identification data, or alternatively to only register and store the electronic identification data transmitted periodically or pseudo randomly by and received from the reader with
30 that unique ID.

In an alternative arrangement, the central device in the milking parlour/shed wirelessly interrogates only the appropriate reader for electronic identification data, given a stall/position selected on the central device. Alternatively the central
35 device might only register and store the electronic identification data transmitted

periodically or pseudo randomly by and received from a reader with that unique ID.

5 In a preferred embodiment the reader is arranged to interrogate for the presence of an RFID tag periodically or pseudo randomly, to minimise the possibility of two adjacent readers, or readers within a few positions of each other, interrogating for an RFID tag at the same time. This can be effected by, for instance, assigning a 'time slot' in a predetermined periodic cycle, the period of which may be determined by the central device once it knows how many stalls or positions
10 there are, and whether they are on one (and perhaps the only) or the other side of the parlour/shed. The period can then be communicated to each reader in the parlour/shed directly or via the reader's associated electronic milk meter or other per stall electronic measurement or sample or data collection device.

15 Alternatively, the reader may interrogate for an RFID tag using a pseudo random interval between interrogations, whereby the pseudo random sequence that determines the next interval is seeded using the unique (at least in context) ID of the reader and/or its assigned stall/position number.

20

BRIEF DESCRIPTION OF THE DRAWINGS

Embodiments of the present invention will now be described, by way of example only, with reference to the accompanying drawings, in which:

25

Figure 1 shows a system according to an embodiment of the present invention;

Figure 2 shows an alternative system according to an embodiment of the present invention;

Figure 3 shows another alternative system according to an embodiment of the
30 present invention;

DETAILED DESCRIPTION OF THE INVENTION

First Embodiment

35

In the following more detailed description of a preferred embodiment of the invention an RFID reader module that forms part of the electronic identification module will for convenience be referred to as a "reader".

Any references to a stall or bail are taken to include any milking position or testing station in the milking parlour.

- 5 The reader can be of a known construction whereby it can interrogate an electronic identification device (typically an RFID tag) and thereby obtain the unique identification data of the RFID tag.

10 Figure 1 shows a system set up for testing a herd of animals according to this embodiment.

An electronic identification module 101 includes a wireless transceiver 103, an RFID reader 105 and an antenna 107.

- 15 The electronic identification module is portable in nature so that it can be readily installed at one of a number of stalls 109 within a milking parlour for use in testing of a milking herd and subsequently removed from the milking parlour after testing.

- 20 In this embodiment a number of electronic identification modules are provided and installed in a number of stalls within the parlour, as shown in figure 1. That is, there is a plurality of electronic identification modules provided to the testing parties.

- 25 During testing, the electronic identification module will be positioned in proximity to the testing station. That is it will be located, or attached, adjacent, but typically above, the milking stall/bail and positioned so as to be able to obtain identification information by interrogating an RFID tag carried by an animal in the milking stall/bail or at the milking position. The electronic identification module could also
30 be in front of the milking stall/bail.

- In this embodiment, the electronic identification module is of a standalone form and has an internal battery. It will be understood that, as an alternative, the electronic identification module could have an external (individual or shared)
35 battery. The advantage of an external battery is that it can be easily removed (disconnected) for recharging and replacement. As a further alternative, a mains

operated power supply with its safety extra low voltage (SELV) output connected via a cable loom or separate cables to one or more of the electronic identification modules could be used in place of the internal or external battery(ies), or to charge any depleted internal battery during operation of the electronic
5 identification module in the milking parlour.

Further description of the construction and operation of the reader within the electronic identification module will not be required for the purposes of describing this embodiment of the present invention. As noted above the reader can be of a
10 known or conventional construction.

According to the present invention a transceiver module and antenna are combined with the reader to form the electronic identification module. The transceiver module can either be fitted internally or connected externally to the
15 reader. The transceiver module is of a type whereby it can be especially programmed and therefore will include "intelligence". Thus by way of example the transceiver module can be a 2.4 GHz transceiver module with the intelligence being in the form of software written to run on the microcontroller of the transceiver module. This microcontroller may also serve to provide "intelligent"
20 control of and communication with the RFID reader.

The electronic identification module as described operates with an electronic milk meter 113, which is used as a monitoring device and which may also control the dispensing of a representative sample for removal and subsequent analysis.
25 Further it can operate with a central electronic control device 111 in the form of a hand-held portable electronic data device, as well as with manual or mechanical herd testing devices other than or in conjunction with the electronic milk meter.

It is envisaged that as an alternative other types of monitoring device may be
30 used whether they are used to monitor samples or data from the herd, such as milk and/or blood samples, weight measurements etc.

In this embodiment of the invention, the electronic identification device is used in conjunction with the central control device (data handling device) and electronic
35 milk meter apparatus as described in and claimed in our New Zealand patent 507954. For the purposes of describing this embodiment of the present invention

it will thus be described in conjunction with the electronic milk meter apparatus of patent 507954. The content of NZ 507954 is thus incorporated herein by way of specific reference.

- 5 As disclosed in patent 507954 there is provided a central control device (data handling device), which as described in the patent specification is used to register each of the electronic milk meters 113 present in the milking parlour. Thus during this meter registration phase a press of the "select" key of each milk meter powers the milk meter up and registers it with the central device. Each milk
10 meter is assigned a stall/bail number in the order of registration of the milk meters.

- Immediately thereafter or subsequently, typically as a separate registration sequence for electronic identification modules, an electronic identification module
15 registration phase takes place during which a press of a "select" key on or attached by cable to, each electronic identification module registers its specifically programmed transceiver module with the central device. As part of this procedure each electronic identification module is assigned a stall/bail number in the central device, this assignment being once again in the order in
20 which the electronic identification modules are registered. Accordingly, the electronic identification modules will be registered in the same order as the meters were registered though it is envisaged that registration of meter and electronic identification module associated with a particular stall/bail could take place virtually simultaneously, one after the other or as separate sequences for
25 the electronic milk meters and the electronic identification modules.

- In an alternative arrangement each electronic identification module could simply be powered up (by connection to battery or operation of say a built-in or an in-line power switch), in turn, at which time (being the only time) the electronic
30 identification module will register with the central device. As described above the electronic identification module will be assigned a stall/bail number within the central device, in the order of registration.

- The central device now has the unique identification for each milk meter and for
35 its corresponding electronic identification module. The unique identification for each electronic identification module will be programmed into the transceiver

module at the time of manufacture or could be applied subsequent to manufacture.

5 In this embodiment, during the registration conversation with the electronic identification module, the central device will pass the master time to the transceiver module associated with the particular electronic identification module. In this way a (volatile) clock within each electronic identification module is synchronised across all electronic identification modules that are part of the system. It is believed that the synchronisation will remain within about 1-2
10 seconds throughout the milking session.

Following the registration procedure the transceiver module associated with each electronic identification module will:

- 15 (i) Only relate to messages at the required frequency (e.g. 2.4GHz for a 2.4GHz transceiver module) sent to its unique address.
- (ii) Command the reader into a read mode whereby it will read any RFID tag in range, for a period of, for example, between 0.5 and 5 seconds. The reading
20 will occur once only upon receipt of the "receive" command from the transceiver module.
- (iii) Send a receive command immediately and then once every predetermined period of time such as a time span of between 20 and 60
25 seconds. This sending of the receive command will only occur in the predetermined time slot of the reader as determined by its assigned stall/bail number. This will effectively prevent any two readers from transmitting power at the predetermined frequency to the RFID tags at the same time.
- 30 Step (iii) above takes advantage and makes use of the number of minutes available to establish the most (statistically) "correct" identification data that the reader sees during an animal's milking. This procedure may need to be balanced against the need and desire to display the animal's visual identification (usually carried on an ear tag) on the central device any time that the "select key" on the
35 milk meter is pressed during the animal's milking.

The microcontroller of the transceiver module ascertains (and updates, if necessary), the most statistically correct identification data from the RFID tag for the cow in the stall/bail at the time and transmits this to the milk meter upon request (see below).

5

The first time the Select (or End of Milking) key on a milk meter is pressed after registration, the central device will pass the unique identification of the transceiver module of the corresponding electronic identification module to the milk meter. The milk meter then requests "the most statistically correct"

10 identification data directly from the corresponding reader module. Upon receipt it provides this data from the RFID tag to the central device (provided that it is within range) for look-up and display of the visual identification data with the expectation that on occasions this may change to the more statistically correct visual identification data.

15

An advantage of arranging for the milk meter to communicate directly with the electronic identification module is that the distance and orientation between the two is relatively fixed and limited. This is contrary to the central device which when in a portable form (which will be typical) can be anywhere within the milking
20 parlour at any time.

On subsequent presses of the Select or End of Milking key on the milk meter the milk meter will already have the unique identification for the electronic identification module so this does not need to be transmitted each time by the
25 central device, though it could be if required. The milk meter requests the current/up-dated and most statistically correct identification data from the electronic identification module.

This repeated procedure traverses an animal's milking and all subsequent
30 animals milking in the session for each stall/bail.

In the event that a reader fails or loses power during a milking session it, or a replacement, will be need to be re-registered to the stall/bail above which it was installed.

35

A portable electronic identification module is thus provided which can be readily installed adjacent (e.g. above) a stall/bail or milking position in the milking parlour for use during a testing session of the milking herd. The electronic identification module can then be removed at the end of each testing session (or the end of the sessions if there are multiple sessions). The apparatus provides a means whereby the electronic identification data carried by the animal in the stall/bail can be automatically supplied to the electronic milk meter (or some other electronic device, e.g. sampler, associated with the stall/bail) thereby overcoming the need to specifically transfer the EID or VID data to the milk meter from the central device each time a new animal enters the stall/bail. The milk meter will automatically be supplied with the identity of each new animal entering the stall/bail.

For example, where an end of milking key is activated as with the arrangement as described in New Zealand patent 507954 this could instigate a signal to the reader such that the reader will clear its memory of the statistically correct identification data that it has secured for the animal having just been milked or completing milking (which may still be in the milking stall/bail) and await new identification data from the next incoming animal. The arrangement might be such that, after receiving the end of milking signal, the reader will ignore all the continued statistically correct identification data until new data is received, whereupon, once new statistically correct identification data is established (from the incoming cow) by the reader, this will be supplied to the milk meter.

Second Embodiment

Figure 2 shows a system set up for testing a herd of animals according to this embodiment.

According to this embodiment, the antenna of the electronic identification module is not fixed within the electronic identification module but is located and semi-permanently fixed in position within the testing station, or stall.

That is the electronic identification module 201 includes a wireless transceiver 203 and a RFID reader 205.

The antenna 207 is fixed in position in one of the plurality of stalls 209 in the region where the cow's RFID tag is expected to present itself during milking. In this embodiment, it is envisaged that the electronic identification modules, along with milk meters 213, whether electronic or mechanical, and a central controller 211 are provided in order to test the herd as the antenna are already fixed in place.

A milking parlour or some other arrangement of milking plant has the antennae (semi)permanently installed, such that each antenna, or perhaps an arrangement of antennae, is associated with a particular position, whether it be a milking stall, bail or cluster. The purpose of this arrangement of antennae is to allow a per-stall radio frequency identification (RFID) of a cow or other milked animal whilst it is being milked, or whilst it is located in its identified position in order to have the milking cluster attached.

This arrangement provides at least the following advantages over a portable antenna system as described in the first embodiment:

- (i) the preparation involved in setting up the equipment on test days becomes less onerous and less prone to malfunction, since the antennae do not need to be temporarily fitted at each position, and in particular adjacent to, and typically above, where the cow's RFID tag will be during milking,
- (ii) the positions of the antennae can be optimised when they are fixed on a (semi) permanent basis. That is, the position and any individual tuning allowed for in the antenna assembly can be optimised at installation, as well as during subsequent milking sessions in order to effect maximum RFID performance, and
- (iii) less investment and operating expense is required on the part of the herd testing organisation, as it is only required to provide and set up the electronic identification modules and milk meters, without the need to supply and set up the associated antennae. Further, as the owners of milking parlours will lease or own the installed antennae, they can use the antennae for their own purposes over and above testing purposes, such as in conjunction with a permanently installed herd management (measurement, information, control) system.

In this embodiment, each of the 'wirelessly linked' electronic identification modules (one per antenna or per-stall arrangement of antennae) would be installed or temporarily mounted, preferably where they can be easily reached by
5 an operator of the milk meters. This would typically be at the rear end of the milking animal. The electronic identification module may be connected to the antenna(e) via a connecting lead.

Each electronic identification module is supported during the testing on one or
10 more spigots or a bracket. The bracket may incorporate quick and automated connections to the connecting cable of the antenna associated with that testing station.

In this embodiment, each electronic identification module would include an
15 internal battery. However, it will be understood that the electronic identification module may be connected to an external battery or distributed power supply for operation. The connection between the electronic identification module and the antenna is a wired connection in this embodiment. However, it will be understood that the electronic identification module may be inductively coupled to the
20 antenna, which may offer some potential benefit in terms of corrosion/reliability of connection and cost.

Third Embodiment

25 Figure 3 shows a system set up for testing a herd of animals according to this embodiment.

In this embodiment it is envisaged that a single electronic identification module 301 is provided as part of the herd testing equipment. Further, the electronic
30 identification module includes the wireless transceiver 303 and RF reader 305 as described above in the second embodiment, where an antenna 307 is fixed in position, semi-permanently in each of the stalls 309 where the milking, and testing, occurs.

The system further includes a monitoring device in the form of a milk meter 313 (whether electrical or mechanical) in each of the stalls and a central controller 311.

- 5 According to the arrangement shown in figure 3, each antenna's position is fixed in place, for example by semi-permanently installing the antenna in the milking parlour or shed, in the region where the cow's RFID tag presents itself during milking of a cow in that stall.
- 10 The purpose and reasons for having the semi-permanently installed antenna are the same as discussed above.

- The monitoring devices, whether electronic or mechanical milk meters or the like, are temporarily installed in line with the milking clusters on the day that the
- 15 animals are to be tested at each, and typically all, of the milking points.

- A single electronic identification module, which can be mounted at, or associated with, the stall position is provided. The electronic identification module includes the necessary electronics and battery. The electronics and battery may be
- 20 provided in a waterproof housing.

- The electronic identification module has the ability to wirelessly communicate with the central control device, which may be handheld and/or portable, as well as the monitoring devices, if electronic and equipped with appropriate wireless
- 25 transceivers.

- Prior to or during a particular cow's milking in a testing station, which in this case is the milking stall, the electronic identification module is connected to an antenna located in the testing station. It will be understood that the antenna may be part
- 30 of an arrangement of antennae.

- The single electronic identification module is supported during the testing on one or more spigots or a bracket. The bracket may incorporate quick and automated connections to the connecting cable of the antenna associated with that testing
- 35 station. In this way the electronic identification module can be connected to each antenna in each of the stalls as it is moved by the operator.

- In herringbone style, and in some parallel arranged stall milking parlours, a 'row' of cows is typically admitted to all the milking stations on one side of the parlour at the same time. These cows are then milked together over roughly the same period, and then released together when the last cow has finished milking and the milking clusters are all removed from the cows. In this typical situation the single electronic identification module is moved from one milking station to another, typically an adjacent one, during the milking of all cows in that 'row'. Once the electronic identification module has acquired and, if required, validated the cow's ID, the electronic identification module passes this information to the central controller. As an alternative the electronic identification module can send the information to the monitoring device, such as an electronic milk meter (EMM), associated with that same stall, using wireless communication.
- 15 The operator of the monitoring devices repeatedly repositions the electronic identification module in the stalls, as indicated by the arrows in figure 3, and subsequently interacts with the electronic identification module at each milking position during the milking of each 'row' of cows.
- 20 Further, the single electronic identification module validates, albeit within tighter time constraints than the earlier embodiments, that an RFID tag detected is the correct one for that milking position. For example, if there are six stalls and the cows are held in them for six minutes while they are milked, the repositioning of the electronic identification module during the six minutes means that there is on average less than one minute during which the electronic identification module is installed and connected to the antenna(e) at each milking position.
- 25
- The advantage offered by having a short range wireless data link between the electronic identification module and the central controller or EMM (where used), is that the operator of the central controller is free to move away from the electronic identification module and around the parlour with the central controller whilst the electronic identification module is acquiring and, at least to a degree, validating the cow's EID associated with a particular testing station. The operator may wish to freely move around to re-attach one or more of the teat cups of a cluster on another cow that have fallen, or been kicked, off the teat/s during
- 30
- 35

milking. For example, this may apply when either mechanical or electrical milk meters are used.

Similarly the operator may wish to move away from the single electronic
5 identification module to respond to an alert such as an 'Attention Required' alert from other monitoring devices. For example the monitoring device may require the operator to press the SELECT key on that device whilst the central controller is within wireless communication range in order to see what attention is required. One example of the type of action required may be the need to fit a sub-sample
10 vial, which will be displayed on the central controller.

Typically the central controller, or monitoring device where used and this communication flow option is chosen (see below), and the electronic identification module need not be any closer than approximately one metre and may be up to
15 five or ten metres apart when required to communicate.

In this arrangement the wireless transfer of the EID from the electronic identification module is preferably to the central control device and is preferably initiated by operating or pressing, a key, button or similar activating mechanism to
20 close or open an electrical contact or to activate a solid-state sensor in the electronic identification module in order to initiate the transfer of the EID.

The central control device will be able to determine that the data stream being received that includes the EID is from an electronic identification module. For
25 example, this may be by virtue of a device type identification in the header of the message received.

Further, the central controller is also pre-programmed for a particular farm's herd test such that the controller is aware that there is only one electronic identification
30 module present. Therefore, the central controller will accept a pre-validated (to an extent) EID from an electronic identification module as valid and will typically display its associated VID that is preloaded into the central controller prior to the herd test milking session commencing. The VID may be determined by virtue of an EID to VID look-up table stored within the central controller.

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Alternatively, by virtue of the fact that in this arrangement and mode of operation

there is known to be only one portable electronic identification module present during the herd test milking session, or at least only one electronic identification module powered up and within range of the central controller, the central controller can request the EID from a device with type = 'portable electronic
5 identification module' and/or with a request type = 'EID (of animal)'. This would typically be achieved by a key press or sequence of key presses on the central controller.

Fourth Embodiment

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In this fourth embodiment, the monitoring devices include electronic milk meters.

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Upon pressing the SELECT key on the electronic milk meter associated (by the human operator) with the current position of a single electronic identification module elicits the wireless transfer of the EID from the electronic identification module directly to the central controller. Alternatively, the EID may be transferred to the electronic milk meter and then the EID or a looked up VID in the electronic milk meter sent on to the central controller, by virtue of a wireless request for the EID sent by the electronic milk meter and received by the electronic identification
20 module.

The following advantages of this arrangement include:

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(i) lowering the amount of investment required on the part of the herd testing organisation in automatic identification (typically RFID) equipment, to only one portable electronic identification module per central controller and set of monitoring devices, such as electronic and mechanical milk meters associated with each central controller, and

30

(ii) reducing the set-up time and complexity prior to commencement of the first 'test day' milking session.

Further Embodiments

It will be understood that the embodiments of the present invention described herein are by way of example only, and that various changes and modifications
5 may be made without departing from the scope of invention.

The invention is open to modification as will be appreciated by those skilled in the art. For example, the system as described herein is intended for herd testing. However, in some milking parlours a fixed in place network of reader/antenna
10 modules may exist and might be connected to an embedded controller or control PC for daily animal/herd management purposes. The especially programmed transceiver module as discussed above could still be incorporated with or attached to each of the readers but only be invoked or attached i.e. become operative, during milking sessions on herd test day(s), each month or at the
15 intervals at which testing takes place.

In the embodiment described above where mechanical milk meters are used, it is envisaged that the EID may be transferred into the central controller in order to enable milking information to be inserted and correlated with the EID or VID. For
20 example the milking information may include the yield of the animal. In this case the yield is typically read off the scale on the mechanical milk meter's flask and keyed into the central controller. A data entry space may be provided on the central controller in which the data can be entered. Further, a milking position identification number can be provided by the central controller for each new EID it
25 receives. The EID associated with the cow about to be, being, or having been milked through that milk meter is obtained from the associated (by human operator) electronic identification module.

The operation of the transceiver module could be invoked by a select key on or
30 attached by cable to each reader or transceiver module, if detachable. This would only be operated at the beginning of herd test milking sessions. Alternatively, in the case of a detachable transceiver module, the act of attaching it could invoke its operation.

35 Alternatively, the transceiver module could be infrequently invoked to commence operation by a command received from the reader/antenna module itself which in

turn would receive a command from the embedded controller or control PC on test day(s) only.

5 In an alternative arrangement the electronic identification modules could be mounted adjacent each stall/bail and connect to an embedded controller or control PC via a multi-drop bus and employ an appropriate wired multi-drop bus communications protocol. As alternatives to this modified form of the invention the electronic identification modules mounted adjacent each stall/bail could connect to an embedded controller or control PC via a single-point-to-single-point
10 (nominally RS232 or RS422) connection and a discrete or incorporated RS232 or RS422 data multiplexer.

In yet a further form passive 134 kHz antennae could connect to the reader of the electronic identification module via a discrete or incorporated antenna
15 multiplexer.

According to the foregoing modified form of the invention a UART (or USB or other, as appropriate)-to-Bluetooth (class 1) module would be incorporated inside or attached to the embedded controller or control PC or reader. Data packets of
20 bail/EID pairings will be sent regularly (or upon request) to a Bluetooth-enabled central device or data handling device.

The Bluetooth-enabled data handling device will ascertain (and up-date if necessary) the most statistically "correct" EID for the cow at the stall/bail at any
25 time based on regular receipt of bail/EID pairings. Upon request (e.g. press of a Select key or End of Milking key on the electronic milk meter) the data handling device will transmit the VID to the electronic milk meter, get the current yield/flow values etc. from the electronic milk meter and display appropriate information.

CLAIMS:

1. A method of correlating information obtained from a monitoring device with identification information received from a portable electronic identification module arranged to interrogate an electronic identification device, the method including the steps of:
positioning the module in proximity to the monitoring device at a testing station, reading the identification information using the module,
wirelessly transmitting the identification information from the module to a central electronic control device, and
correlating data from the monitoring device that is entered into the central electronic control device with the identification information.
2. The method of claim 1 wherein the data from the monitoring device is milking data.
3. The method of claim 1, further including the step of creating a data entry space on the central electronic control device for entering the milking data from the monitoring device.
4. The method of claim 1 further including the steps of allocating a testing station identification for the identification information received from the module, and creating a new data entry space associated with the testing station identification on the central electronic control device.
5. The method of claim 4 further including the step of allocating a new testing station identification for each set of new identification information received from the module.
6. The method of claim 1 further including the step of transmitting the identification information upon manually pressing a button on the module.
7. The method of claim 1, wherein a plurality of modules are correlated with a plurality of monitoring devices.

8. A method of correlating a monitoring device with a portable electronic identification module arranged to interrogate electronic identification (EID) devices, each of the module and monitoring devices having a unique identification, the method including the steps of:
- 5 positioning the module in proximity to the monitoring device,
wirelessly transmitting the module's unique identification to a central electronic control device,
registering the unique identification of the module with the central electronic control device,
- 10 registering the unique identification of the monitoring device with the central electronic control device, and
correlating the module with the monitoring device based on the unique identifications that the central electronic control device receives consecutively or in separate sequences.
- 15
9. The method of claim 8, wherein a plurality of modules are correlated with a plurality of monitoring devices.
10. The method of claim 8, wherein the module is adapted to be temporarily
- 20 installed as part of an animal testing system for testing a herd of animals while the animals are milked in one of a plurality of testing stations.
11. The method of claim 10 further including the steps of selecting a testing station on the central electronic control device, and determining the unique
- 25 identification of the module associated with the testing station.
12. The method of claim 10 further including the steps of the central electronic control device providing a sequential identification for a testing station in which the module is positioned, and correlating an electronic identification received from
- 30 the module with the sequential identification.
13. The method of claim 8, wherein the unique identification is transmitted to the central electronic control device via the monitoring device.
- 35 14. The method of claim 13 further including the steps of activating the monitoring device to provide its unique identification and wait for a unique

identification received from a module, and upon receipt of the unique identification received from the module, the monitoring device forwarding the unique identification of the module and its own unique identification to the central electronic control device.

5

15. The method of claim 8 further including the steps of registering a sequential position of the module, and associating the unique identification of the module with the position in the sequence.

10 16. The method of claim 15 further including the steps of repositioning the module and registering a further sequential position of the module.

17. The method of claim 8 further including the step of detaching from one and re-attaching the module to another fixed antenna.

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18. The method of claim 8 further including the step of detaching and re-attaching the module next to another monitoring device.

19. The method of claim 8, wherein sequential registration occurs upon
20 activation of a switch.

20. The method of claim 8, wherein sequential registration occurs upon power up of the module.

25 21. The method of claim 8 further including the step of registering a sequential position of the monitoring device with the central electronic control device.

22. The method of claim 21, wherein the central electronic control device
30 determines that the monitoring device is correlated with the module when the registered sequential positions of the monitoring device and module are the same.

23. The method of claim 22, wherein the central electronic control device
35 compares the sequential position associated with the unique identification of the

module with the sequential position associated with the monitoring device and upon determining a match, correlates the module with the monitoring device.

24. The method of claim 8 further including the step of the module
5 interrogating an EID device within a preset time slot.

25. The method of claim 24, wherein the preset time slot is determined by the sequential position of the module.

10 26. The method of claim 8 further including the step of the module interrogating an EID device at preset time intervals.

27. The method of claim 8 further including the step of the module interrogating the EID device on a pseudo random basis.

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28. The method of claim 8 further including the step of the module communicating with an antenna for reading an EID device.

29. The method of claim 28 further including the step of detachably
20 connecting the module to the antenna.

30. The method of claim 29, wherein the antenna is semi permanently installed in a testing station.

25 31. The method of claim 28, wherein the antenna is part of the module.

32. The method of claim 8 further including the steps of sending data received by either the module or the monitoring device to the central electronic control device from one of the module or monitoring device.

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33. The method of claim 32 wherein the decision to send data from the monitoring device or module is based on the comparative signal transmission strength available to the module and monitoring device.

34. The method of claim 8 further including the steps of the monitoring device receiving the unique identification of the module it is correlated with and listening for transmissions from that module.

5 35. The method of claim 34, further including the steps of the monitoring device only acting upon transmissions from a module that it is correlated with.

36. The method of claim 34 further including the step of receiving the unique identification of the module it is correlated with from the central electronic control
10 device during or after registration.

37. The method of claim 34 further including the step of receiving the unique identification of the module it is to be correlated with from the module during registration.
15

38. The method of claim 8 further including the step of wirelessly transmitting the unique identification of the monitoring device to the central electronic control device.

20 39. The method of claim 38, wherein the unique identification is transmitted upon activation of a switch.

40. The method of claim 38, wherein the unique identification is transmitted upon power up of the monitoring device.

25 41. The method of claim 38 further including the step of transmitting the module's unique identification to the monitoring device.

42. The method of claim 41 further including the step of wirelessly
30 transmitting both the unique identification of the module and monitoring device from the monitoring device.

43. The method of claim 8 further including the steps of reading electronic identification (EID) data from the EID device, and transferring the EID to the
35 central electronic control device.

44. The method of claim 43 further including the step of determining the most statistically correct identification of the animal under test.
45. The method of claim 43 further including the step of associating test data
5 received from the monitoring device with the electronic identification data.
46. The method of claim 43 further including the step of transferring the EID to the central electronic control device upon request from the monitoring device.
- 10 47. The method of claim 43 further including the step of transferring the EID or a looked up visual identification (VID) to the central electronic control device via the monitoring device.
48. The method of claim 8 further including the step of the module receiving a
15 master real time clock signal from the central electronic device.
49. The method of claim 48 wherein the master real time clock signal is sent as part of the registration process.
- 20 50. The method of claim 48 wherein the master real time clock signal is used to determine a relevant time slot in which the module can send and receive signals.
51. A system for correlating identification information obtained from a
25 monitoring device received from a portable electronic identification module arranged to interrogate an electronic identification device with information, the system including:
the module positioned in proximity to the monitoring device at a testing station,
the module arranged to read the identification information, and
30 wirelessly transmit the identification information from the module to a central electronic control device, and
the central electronic control device arranged to correlate data entered into the central electronic control device with the identification information.
- 35 52. The system of claim 51, wherein the data entered into the central electronic control device is milking data.

53. The system of claim 51, further including the central electronic control device.

5 54. The system of claim 51, wherein the central electronic control device is arranged to create a data entry space for entering the milking data from the monitoring device.

55. The system of claim 51 wherein the central electronic control device is
10 arranged to allocate a testing station identification for the identification information received from the module, and create a new data entry space associated with the testing station identification.

56. The system of claim 55 wherein the central electronic control device is
15 arranged to allocate a new testing station identification for each set of new identification information received from the module.

57. The system of claim 51 wherein the module is arranged to transmit the identification information upon manually pressing a button on the module.

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58. A system for correlating a monitoring device with a portable electronic identification module, each of the module and monitoring devices having a unique identification,
the system including a portable electronic identification module,
25 the module including a transceiver and an electronic identification data (EID) reader arranged to interrogate an electronic identification devices (EID device), wherein:
the transceiver includes a wireless communication device arranged to be in wireless communication with a central electronic control device,
30 the module is arranged to register the unique identification of the module with the central electronic control device,
the central electronic control device has a registered unique identification of the monitoring device, and is arranged to correlate the module with the monitoring device based on unique identifications received consecutively or in separate
35 sequences.

59. The system of claim 58 further including a plurality of modules and a plurality of monitoring devices.

60. The system of claim 58, wherein the module is adapted to be temporarily
5 installed as part of the system to test a herd of animals while the animals are milked in one of a plurality of testing stations.

61. The system of claim 60 further including the central electronic control device, wherein the central electronic control device is arranged to select a
10 testing station, and determine the unique identification of the module associated with the testing station.

62. The system of claim 60 wherein the central electronic control device is arranged to provide a sequential identification for a testing station in which the
15 module is positioned, and correlate an electronic identification received from the module with the sequential identification.

63. The system of claim 58, wherein the transceiver is further arranged to wirelessly transmit the unique identification to the central electronic control
20 device.

64. The system of claim 63, wherein the transceiver is further arranged to wirelessly transmit the unique identification to the central electronic control device via the monitoring device.

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65. The system of claim 63 wherein the monitoring device is arranged to provide its unique identification upon activation and wait for a unique identification received from a module, and upon receipt of the unique identification received from the module, the monitoring device is further arranged
30 to forward the unique identification of the module and its own unique identification to the central electronic control device.

66. The system of claim 58 wherein the module is further arranged to register its sequential position with the central electronic control device.

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67. The system of claim 58, wherein the module further includes a switch, and registration occurs upon activation of the switch.

5 68. The system of claim 58, wherein registration occurs upon power up of the module.

69. The system of claim 58 further including the central electronic control device, wherein the monitoring device is arranged to register its sequential position with the central electronic control device.
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70. The system of claim 69, wherein the central electronic control device determines that the monitoring device is correlated with the module when the registered sequential positions of the electronic collection device and module are the same.
15

71. The system of claim 70, wherein the central electronic control device compares the sequential position associated with the unique identification of the module with the sequential position associated with the monitoring device and upon determining a match, correlates the module with the electronic collection device.
20

72. The system of claim 58, wherein the transceiver is arranged to be in wireless communication with the central electronic control device and the electronic collection device.
25

73. The system of claim 58, wherein the EID reader is arranged to interrogate an EID device within a preset time slot.

74. The system of claim 73, wherein the preset time slot is determined by the sequential position of the module.
30

75. The system of claim 58, wherein the EID reader is arranged to interrogate an EID device at preset time intervals.

35 76. The system of claim 58 wherein the module is arranged to interrogate the EID device on a pseudo random basis.

77. The system of claim 58, wherein the system includes an antenna, and the EID reader is arranged to be in communication with the antenna to read an EID device.

5

78. The system of claim 77, wherein the module is arranged to be detachably connected to the antenna.

79. The system of claim 78, wherein the antenna is semi permanently installed in a testing station.

10

80. The system of claim 77, wherein the module includes the antenna.

81. The system of claim 58 including a single portable electronic identification module, wherein the module is arranged to be detached and re-attached to a fixed antenna located in proximity to one of a plurality of testing stations.

15

82. The system of claim 58 wherein the module is arranged to be detached and re-attached to one of a plurality of testing stations.

20

83. The system of claim 58 wherein one of the module or the monitoring device is arranged to send data received from either of the module or the monitoring device to the central electronic control device.

84. The system of claim 83 wherein the decision to send data from the monitoring device or module is based on the comparative signal transmission strength available to the module and monitoring device.

25

85. The system of claim 58 wherein the monitoring device is arranged to receive the unique identification of the module it is correlated with and listen for transmissions from that module.

30

86. The system of claim 85, wherein the monitoring device is arranged to only act upon transmissions from a module that it is correlated with.

35

87. The system of claim 85 wherein the monitoring device is arranged to receive the unique identification of the module it is correlated with from the central electronic control device during or after registration.
- 5 88. The system of claim 85 wherein the monitoring device is arranged to receive the unique identification of the module it is to be correlated with from the module during registration.
89. The system of claim 58, wherein the monitoring device is arranged to
10 sequentially register with the central electronic control device.
90. The system of claim 89 wherein sequential registration occurs upon activation of a switch.
- 15 91. The system of claim 89, wherein sequential registration occurs upon power up of the electronic monitoring device.
92. The system of claim 89, wherein the reader is arranged to be interrogated by the monitoring device based on its unique identification.
20
93. The system of claim 89, wherein the reader is arranged to register its unique identification with the monitoring device.
94. The system of claim 58, wherein the reader is arranged to read electronic
25 identification (EID) data from the EID device, and transfer the EID to the central electronic control device.
95. The system of claim 94, wherein the EID is used to determine the most statistically correct identification of an animal under test.
30
96. The system of claim 94 wherein the central electronic control device is arranged to correlate test data received from the monitoring device with the electronic identification data.

97. The system of claim 94, wherein the reader is arranged to transfer the EID to the central electronic control device upon request from the monitoring device.

- 5 98. The system of claim 94, wherein the reader is arranged to transfer the EID or a looked up visual identification to the central electronic control device via the monitoring device.

99. The system of claim 58, wherein the module is arranged to receive a
10 master real time clock signal from the central electronic device.

100. The system of claim 99 wherein the master real time clock signal is sent as part of the registration process.

- 15 101. The system of claim 99 wherein the master real time clock signal is used to determine a relevant time slot in which the module can send and receive signals.

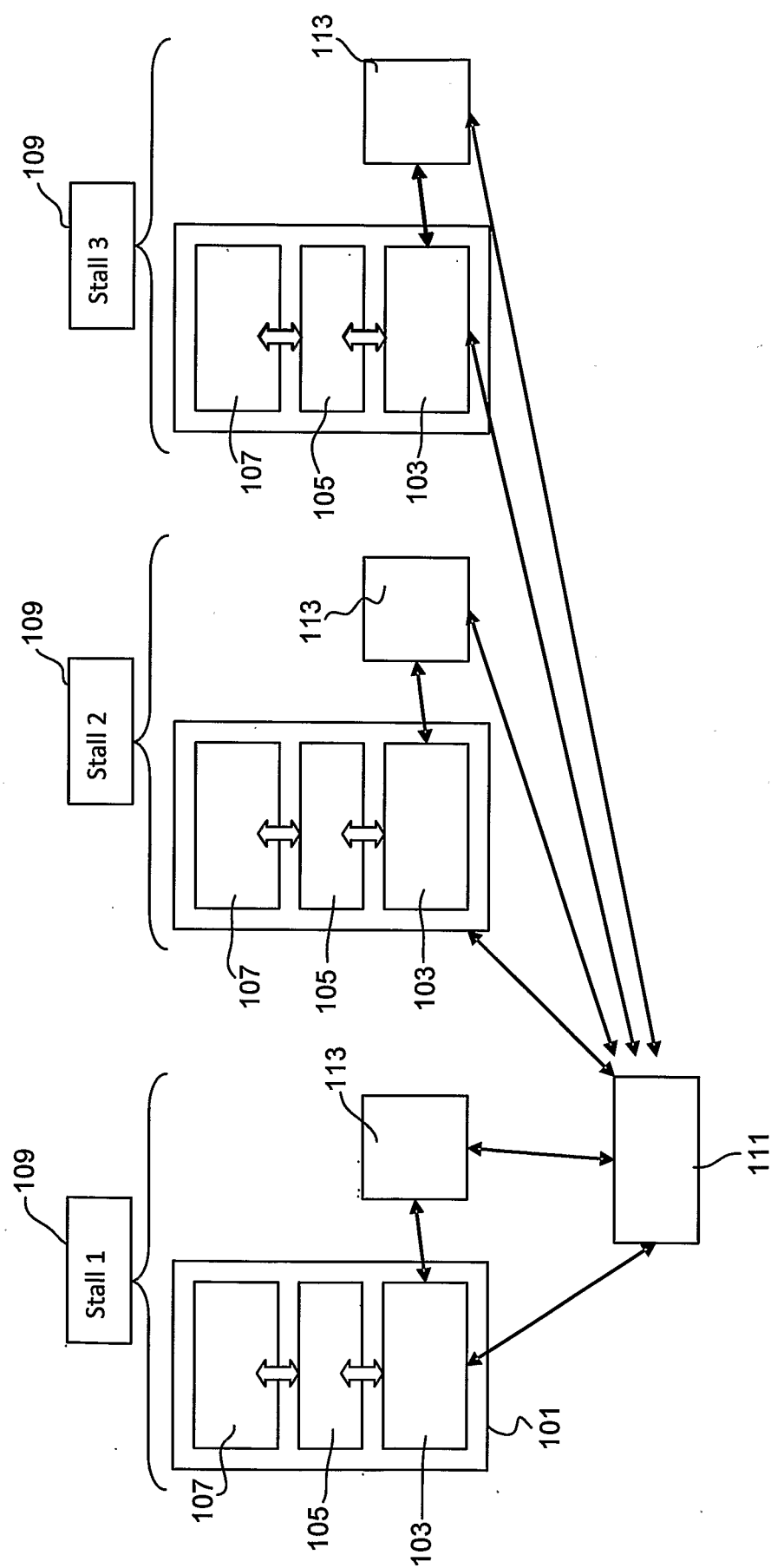


Figure 1

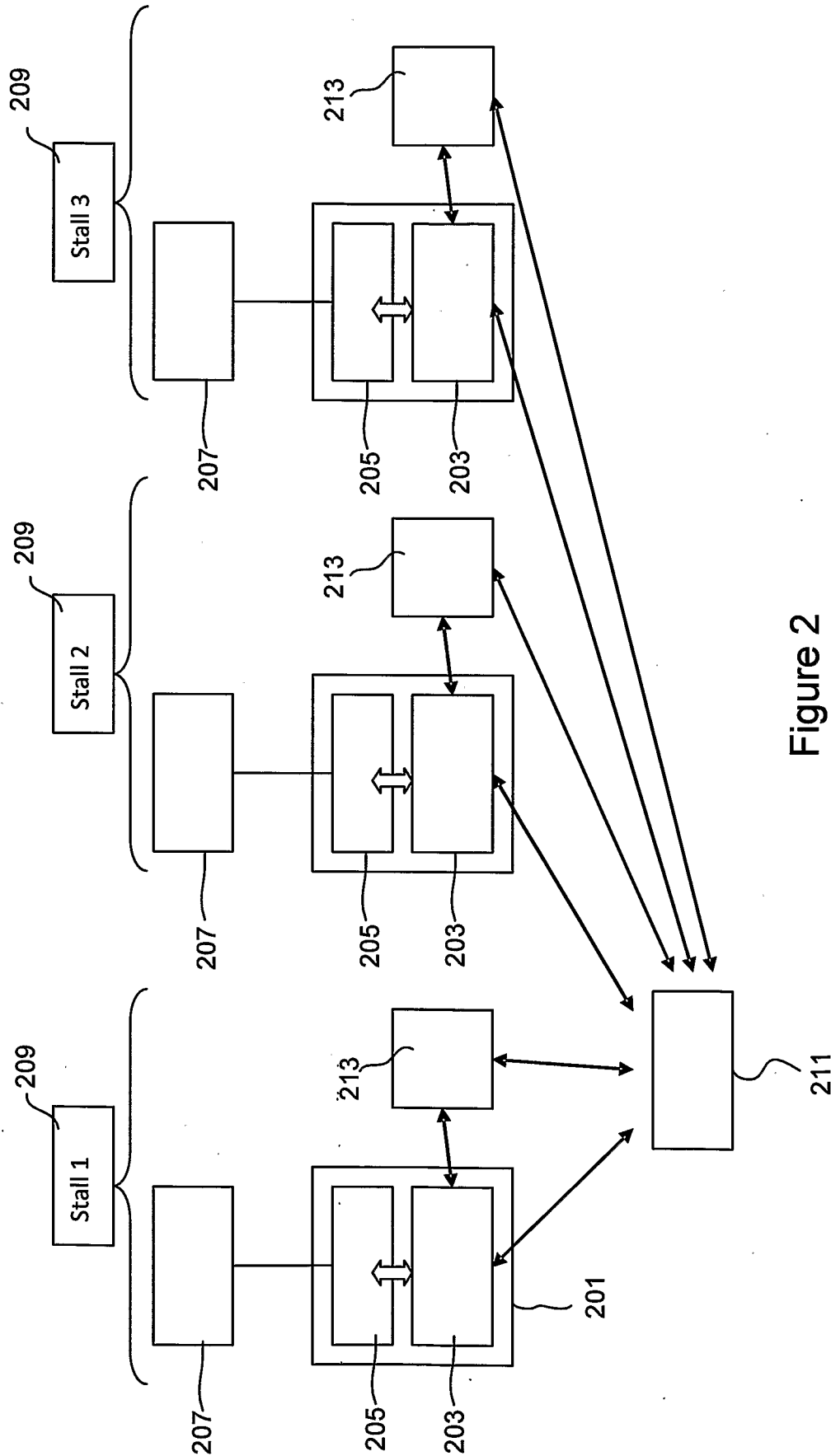


Figure 2

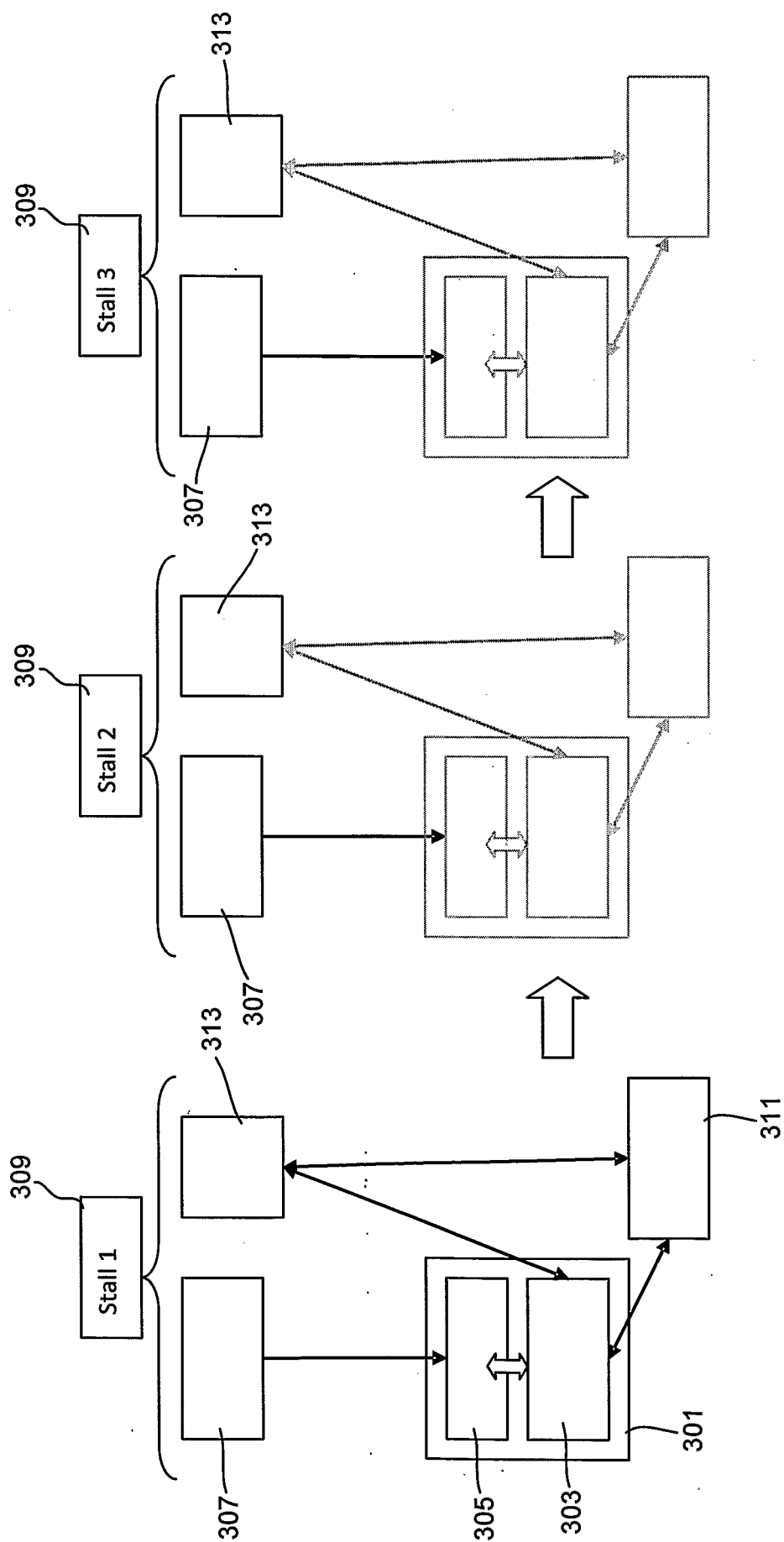


Figure 3

INTERNATIONAL SEARCH REPORT

International application No.

PCT/NZ2008/000041

A. CLASSIFICATION OF SUBJECT MATTER		
Int. Cl.	G07C 1/10 (2006.01)	A01K 1/12 (2006.01) G01V 15/00 (2006.01)
According to International Patent Classification (IPC) or to both national classification and IPC		
B. FIELDS SEARCHED		
Minimum documentation searched (classification system followed by classification symbols)		
Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched		
Electronic data base consulted during the international search (name of data base and, where practicable, search terms used) DWPI, PatentLens, Esp@cenet etc. "dairy, rfid etc."		
C. DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 2006/090390 A1 (E.N.G.S. SYSTEMS LTD.) 31 August 2006 Entire document.	1-7,51-57
X	US 2005/0261794 A1 (ENEAU et al.) 24 November 2005 Entire document.	1,4-7,51,53,55-57
X	US 6958677 B1 (CARTER) 25 October 2005 Entire document.	8,9,13-16,18-21,24,26-29 31-35,37-43,45-47
X	EP 1722322 A2 (UNITED PARCEL SERVICE OF AMERICA, INC.) 15 November 2006. Entire document.	8,9,13,14,24,27,28,31-35 37-43,45-47,58,59,63-65 67,68,72,73,76,77,80 83-86,88-91,93,94,96-98
<input type="checkbox"/> Further documents are listed in the continuation of Box C <input checked="" type="checkbox"/> See patent family annex		
<p>* Special categories of cited documents:</p> <p>"A" document defining the general state of the art which is not considered to be of particular relevance</p> <p>"E" earlier application or patent but published on or after the international filing date</p> <p>"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)</p> <p>"O" document referring to an oral disclosure, use, exhibition or other means</p> <p>"P" document published prior to the international filing date but later than the priority date claimed</p> <p>"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention</p> <p>"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone</p> <p>"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art</p> <p>"&" document member of the same patent family</p>		
Date of the actual completion of the international search 28 July 2008		Date of mailing of the international search report 31 JUL 2008
Name and mailing address of the ISA/AU AUSTRALIAN PATENT OFFICE PO BOX 200, WODEN ACT 2606, AUSTRALIA E-mail address: pct@ipaustalia.gov.au Facsimile No. +61 2 6283 7999		Authorized officer PETER THONG AUSTRALIAN PATENT OFFICE (ISO 9001 Quality Certified Service) Telephone No : (02) 6283 2128

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.

PCT/NZ2008/000041

This Annex lists the known "A" publication level patent family members relating to the patent documents cited in the above-mentioned international search report. The Australian Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

Patent Document Cited in Search Report		Patent Family Member			
WO	2006/090390	EP	1851687		
US	2005/0261794	EP	1398730	FR	2843816
US	6958677	NONE		US	7031803
EP	1722322	CA	2531851	CN	1846225
		EP	1652142	CN	1991892
		WO	2005008554	MX	PA06000456
				US	2005006469
Due to data integration issues this family listing may not include 10 digit Australian applications filed since May 2001.					
END OF ANNEX					