



Getting started Realtime Heat Detection with Health monitoring

User manual
for operation and maintenance

Article number
11 - 2016 / Manual version 1.9



Nedap Dairy
and beef farming

 Vital
element
for
growth





Version overview

Manual version 1.0 / 08 - 2011	First release.
Manual version 1.1 / 10 - 2011	RealTime FCC and IC warning
Manual version 1.2 / 03 - 2012	Updated for Velos 3.00
Manual version 1.3 / 10 - 2012	Updated for Velos 3.50 and new VPU LAN connection.
Manual version 1.4 / 06 - 2013	Update for Eating monitoring
Manual version 1.5 / 04 - 2014	Updated for Velos version 2014.1
Manual version 1.6 / 10 - 2014	Updated for Velos version 2014.2
Manual version 1.7 / 12 - 2015	Clarified optimum insemination moment in heat detection.
Manual version 1.8 / 06 - 2016	Updated for Velos 2016.1
Manual version 1.9 / 11 - 2016	Added extra information for Velos version 2016.2

FCC ID: CGDRTLACT / CGDRTLACTN
IC: 1444A-RTLACT / 1444A-RTLACTN

Compliance statements (part15.19)

This device complies with part 15 of the FCC Rules and to RSS210 of Industry Canada.

Operation is subject to the following two conditions:

- (1) this device may not cause harmful interference, and
- (2) this device must accept any interference received, including interference that may cause undesired operation.

Cet appareil se conforme aux normes RSS210 exemptés de licence du Industry Canada. L'opération est soumise aux deux conditions suivantes:

- (1) cet appareil ne doit causer aucune interférence, et
- (2) cet appareil doit accepter n'importe quelle interférence, y compris l'interférence qui peut causer une opération non prévue de cet appareil.

Warning (part15.21)

Changes or modifications not expressly approved by party responsible for compliance could void the user's authority to operate the equipment.

This in particular is applicable for the antenna which can be delivered with the System.



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Preface

This manual describes the implementation of the Nedap Velos Livestock Management System. Following up the Getting started manual guides through the complete installation and starting up of the system.

Conventions

Abbreviations used in this manual:

BC	Behaviour Component.
VP	V-pack
EID	Electronic Identification

Pictograms



Please pay extra attention here. This pictogram indicates an important subject.

Additional information

Updated versions of this document will be posted to the Nedap Livestock Business Portal, as required. Please visit our website (<http://www.nedap.com/livestockmanagement-portal>) for more information or to find supplemented and related manuals.

For questions or for further information, please contact your dealer or Nedap Livestock Management.



Instructions for Nedap Realtime Heat Detection when using Velos 2016.2

Working with the new interface of Velos

A new look and feel for the Velos interface was released with the Velos 2016.2 software. Velos looks different than is described in the current manuals. However, the menu options are still the same. Therefore the instructions in the manuals for configuring Velos are still applicable.

Since there are some major changes in the interface for the Heat Detection system, this document describes how the system works, and how to configure Velos for optimal use of the system.

Working with tables and graphs

There is a big improvement in the interface that is not described in the current manuals. This contains working with the tables in Velos. From the 2016.2 update the tables are sortable. When clicking on the  icon, the data in the table can be sorted from high to low, or from low to high.

When checking tables, e.g. an attention list, the animal data can directly be opened. Click on the  icon to see the individual animal data.

Put the cursor on a bar in the graph to see the details of that day:

- At the top the day total of the animal and the data are displayed. For example '6:33 10-10' for Eating means the animal has eaten 6 hours and 33 minutes in total on October 10.
- **Animal**
 - **Average:** The average of the animal of the last 10 days. For example, '6.25h' means the average eating time of the animal over the last 10 days is 6 hours and 25 minutes.
- **Group**
 - **Location:** The location of the animal.
 - **Average:** The average of all animals of the same location for the last 10 days.
- The line graph indicates the average of all animals of the same location for the current day.

Group monitoring

The behaviour of a group of cows shows us the stability and consistence of the farm management. The Heat Detection system offers different ways to monitor this group behaviour, in order to be able to find possible health and/or productivity issues. In this context, a group is a group of animals that always stays together on a certain location in the barn. To monitor the group behaviour, these groups must be defined in the 'Locations' in Velos (see chapter 'Locations').

Velos shows the group behaviour in 3 different ways:

- With group day values
- With a 48-hour-overview
- With group notifications

See the next sections for an explanation of how to use these data.



Group day values

The group day values show how much the whole group has eaten, lied, ruminated etc. on a specific day. It depends on the kind of Smarttag which values are displayed.

When one or more bars in the graph are much higher or lower than previous days, there might be a possible health or productivity risk.

To see the group day values, follow the next steps.

1. In Velos, go to **Farm** and select a group for which the data must be shown.
2. On the tab *Health and Management*, the graphs with the group values are shown.
3. Put the cursor at a bar to see the details of that day. A pop up window appears:
 - At the top of the window the value of that day and the date are displayed.
 - **Herd Average:** The average of all animals of all locations for the last 10 days.

The values are shown for the last 60 days. The line indicates the herd average value of the last 10 days.

48-hour-overview (Smarttag Neck ☰ only)

The 48-hour-overview shows an area graph of the group behaviour per 15 minutes. Use this graph to see the pattern of the group behaviour. Results of the farm management can directly be seen in the graph, e.g. eating behaviour after feed distribution. When the graph shows unexpected behaviour, there might be a possible health or productivity risk.

To see the 48-hour-overview, follow the next steps.

1. In Velos, go to **Farm** and select a group for which the overview must be shown. The graph will be shown at the top of the page. For large groups it can take a few moments before the graph is displayed.
2. The overview graph is shown at the top of the tab *Health and Management*.
3. Put the cursor on a place in the graph to see the details. A pop up window appears:
 - At the top of the window the value of that moment and the time are displayed.
 - **Number of animals:** The total number of animals in the group.

Group notifications

This notification type appears when several animals in the same group have the same unusual behaviour. For example, several animals in the same group have decreased lying times. The notification indicates that there is an external factor that influences the group behaviour, which might become a health or productivity risk.

See chapter 'Group notifications' for more information about the group notification and how to set the notifications, and see chapter 7.3.3 of the Service manual 'Heat Detection and Health Monitoring' for more information about how to act after receiving a group notification. The manual can be accessed online: <http://www.nedap.com/livestockmanagement-portal>.

No mobile interface of Velos

The mobile interface of Velos is no longer used. Since the software is responsive, this is no longer necessary. Velos adjusts the screens to the used device (PC, tablet, smartphone) automatically. This means Velos always looks the same on all devices.

Locations

For good group monitoring, locations must be set up. This is instead of setting up the housing type as is described in the Service manual 'Heat Detection and Health Monitoring'. These locations represent the location in the barn where the animals usually stay. Velos uses these locations to detect unusual group behaviour and, if applicable, to calculate group correction (see chapter 6.4.1 of the Service manual 'Heat Detection and Health Monitoring' for more information about group correction). Besides, all data of the animals is displayed in these groups.

First determine the locations of the farm. After that, assign the locations to the animals.



Determine the locations

1. In Velos, go to *Settings > Farm > Locations*.
2. Click on **Add locations**.
3. Fill in all fields.
4. Click on **Save**.
5. Repeat steps 2 – 4 for all locations on the farm.

Assign the locations to the animals

Velos can change the animal location automatically. This can be done in two ways. When the animals on the farm are located based on the production state, use the production based housing. When the groups from the management software are the real locations in the barn, use the groups.

Production based housing

1. In Velos, go to *Settings > Calendar > Production based housing*.
2. Select a location for each production state where the animals should move to when they are in that production state.
3. Click on **Submit**.

Velos now automatically moves an animal to another location when the production state of that animal changes.

Groups from management software

1. In Velos, go to *Settings > Farm > Groups*.
2. Click on the first group.
3. In the field **Location**, select the location where the animals should move to when they are in that group.
4. Click on **Submit**.

Velos now automatically moves an animal to another location when the group of the animal changes.

Measuring Health Monitoring

When an animal is ill, she shows different behaviour than usual. For example, she eats less or lies more. The Health Monitoring system uses the movements of the cow to indicate (possible) health issues. Depending on the kind of Smarttag, the neck or leg movements are measured.

Smarttag Neck ☰	Smarttag Neck ☰	Smarttag Leg
Eating time	Eating time	Step count
Number of meals	Number of meals	Lying time
	Rumination time	Standing time
	Inactive time	Walking time
	Other active behaviour	Stand up count

Possible health issues are indicated in three different ways:

1. Urgent attentions
2. Animals to check today
3. Group notification



Urgent attentions

These attentions appear when unusual behaviour of an animal is detected that needs immediate action. This can be the case when the animal has not eaten for a certain period, or when she has been lying too long for one period. Depending on the kind of Smarttag, the neck or leg movements are measured.

Smarttag Neck	Smarttag Neck	Smarttag Leg
Animal has not eaten since last XX hours.	Animal is inactive more than XX hours.	Animal is lying more than XX hours.

Animals to check today

The Health Monitoring system compares the behaviour of an individual cow to her behaviour of the previous 10 days. An animal is shown on the list *Animals to check today* when unusual behaviour is detected on the previous day. The unusual behaviour can indicate possible illness or a risk of illness. Depending on the kind of Smarttag, the neck or leg movements are measured.

Smarttag Neck	Smarttag Neck	Smarttag Leg
Animal has a decreased eating time.	Animal has an increased inactive time.	Animal has: <ul style="list-style-type: none"> a decreased step count, or a decreased lying time, or an increased lying time

Group notification

This notification appears when the same unusual behaviour is detected for multiple animals in the same group. It indicates a possible management or group issue. For example, decreased lying times of the animals because of a lack of clean drinking water. Depending on the kind of Smarttag, the neck or leg movements are measured.

Smarttag Neck	Smarttag Neck	Smarttag Leg
Multiple animals in the same group have a decreased eating time.	Multiple animals in the same group have: <ul style="list-style-type: none"> a decreased eating time, and/or a decreased rumination time, and/or an increased inactive time 	Multiple animals in the same group have: <ul style="list-style-type: none"> a decreased step count, or a decreased lying time, or an increased lying time

Health and management settings

In order to be able to detect possible health issues, it is necessary to define when the attentions should be created. By defining this time period the sensitivity of the system can be influenced. When shortening the time, the system is more sensitive and generates attentions earlier. Note that the more sensitive the system is, the greater the risk is for false attentions. When lengthening the time period, the system is less sensitive and generates less attentions, later.

Defining the time period can be done per type of attention: urgent attentions, group notifications and animals to check today. Depending on the kind of Smarttag (Neck or Leg), the appropriate settings per attention type are displayed in Velos.



Urgent attentions

These attentions appear when unusual behaviour of an animal is detected that needs immediate action.

1. Go to *Settings > Health and management – Attentions*.
2. Click on the location for which the settings must be done.
3. For the Smarttag Neck , in the field *Animal has not eaten since last XX hours*, fill in the period after which an attention should be created.
4. For the Smarttag Neck , in the field *Animal is inactive more than XX hours*, fill in the period after which an attention should be created.
5. For the Smarttag Leg, in the field *Animal is lying more than*, fill in the period after which an attention should be created.
6. Click on *Submit*.
7. Repeat these steps for all locations.

Behaviour notifications

The notifications for groups and individual animals are generated based on unusual behaviour of the animals. Define this unusual behaviour in the behaviour notifications. Depending on the kind of Smarttag, the appropriate settings are displayed in Velos.

1. Go to *Settings > Health and management – Attentions*.
2. Select a group in the drop down menu.
3. For both Smarttags Neck, in the field *Eating time has decreased more than XX %*, fill in the minimum changed eating time for an attention in %. For example, when 30% is filled in, it means that a cow will be put on the list when she eats minimally 30% less than usual.
4. For the Smarttag Neck , in the field *Rumination time has decreased more than XX %*, fill in the minimum changed rumination time for an attention in %. For example, when 30% is filled in, it means that a cow will be put on the list when she ruminates minimally 30% less than usual.
5. For the Smarttag Neck , in the field *Inactive time has increased more than XX %*, fill in the minimum changed inactive time for an attention in %. For example, when 50% is filled in, it means that a cow will be put on the list when she is minimally 50% less active than usual.
6. In the field *Step count has decreased more than XX %*, fill in the minimum changed step count for an attention in %. For example, when 30% is filled in, it means that a cow will be put on the list when she has minimally 30% less step counts than usual.
7. In the field *Lying time has decreased more than XX %*, fill in the minimum changed lying time for an attention in %. For example, when 30% is filled in, it means that a cow will be put on the list when she has been lying minimally 30% less than usual.
8. In the field *Lying time has increased more than XX %*, fill in the minimum changed lying time for an attention in %. For example, when 30% is filled in, it means that the cow will be put on the list when she has lied minimally 30% more than usual.
9. Click on *Submit*.
10. Repeat these steps for all locations.

Group notification

A group notification appears when the same unusual behaviour is detected for multiple animals in the same group. It indicates a possible management or group issue. In the behaviour notifications is defined which behaviour is used for the group notification.

1. Go to *Settings > Health and management – Attentions*.
2. Select a group in the drop down menu.
3. In the field *Percentage of animals in the group with the same behaviour notification is more than*, fill in how many animals in the same group should show the same unusual behaviour for a notification. For example, when 30% is filled in, it means that a group notification will be created when 30% of the cows in the group show the same unusual behaviour.
4. Click on *Submit*.



Animals to check today

1. Go to *Settings > Health and management – Attentions*.
2. Select a group in the drop down menu.
3. In the field *Animals with decreased step count*, select *Yes* if animals with decreased step count should be put on the list. Otherwise, select *No*.
4. In the field *Animal recently been in heat*, select *Yes* if animals in heat should be put on the list. Otherwise, select *No*.
5. In the field *During entire lactation*, select *Yes* if animals during the entire lactation cycle should be put on the list. Otherwise, select *No*.
6. Click on *Submit*.



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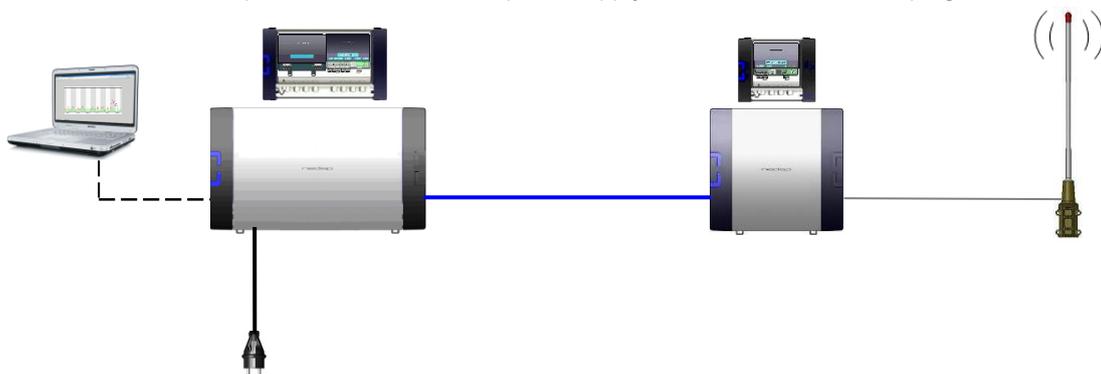
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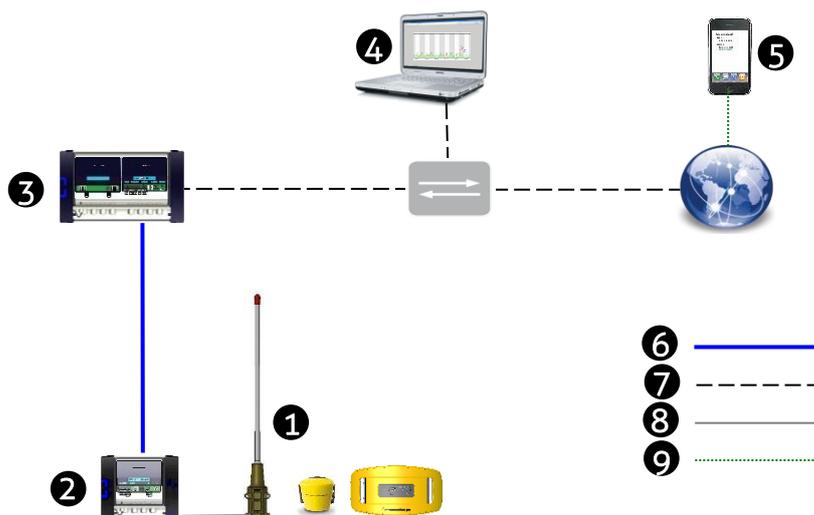
1. Introduction and description

In a stable barn environment, animals normally show similar behaviour every day. The heat detection and health monitoring system measures the behaviour of the animals. Changes in the behaviour of an animal can indicate heat, health or management issues.

The RealTime heat detection system consists of one or more antennas and antenna readers, and a process unit connected to a PC or network. The process unit consists of a power supply and a VPU with the Velos program.



The RealTime system overview with cable types used:



1. Antenna for reading RT
Activity data

2. Reader

3. Velos Process Unit (VPU)

4. PC connection or Network
connection via LAN
network

5. Mobile phone with
Internet connection

6. Communication cable

7. Ethernet cable

8. Antenna cable

9. Mobile Internet
connection



The behaviour of the animals can be measured with Smarttags type heat detection. The RealTime heat detection system works with RealTime Smarttags only. There are two types of Smarttags available. Smarttag neck and Smarttag leg.

Smarttag Neck



- Smarttag neck with ISO identification (UHF+ISO ID)
- Smarttag neck without ISO identification (UHF ID)
- Smarttag neck type ID (Identification)
- Smarttag neck type HD **Heat detection** (+ ID)
- Smarttag neck type CP Cow Positioning + HD (+ ID)

Smarttag Leg



- Smarttag leg with ISO identification (UHF+ISO ID)
- Smarttag leg without ISO identification (UHF ID)
- Smarttag leg type HD **Heat detection** (+ ID)

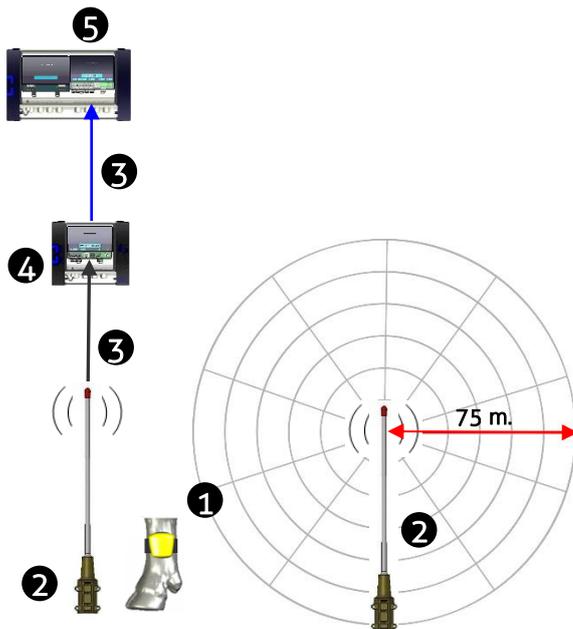
No symbol is a 434 Mhz Smarttag and a sign is a 922 MHz Smarttag.



2. Working

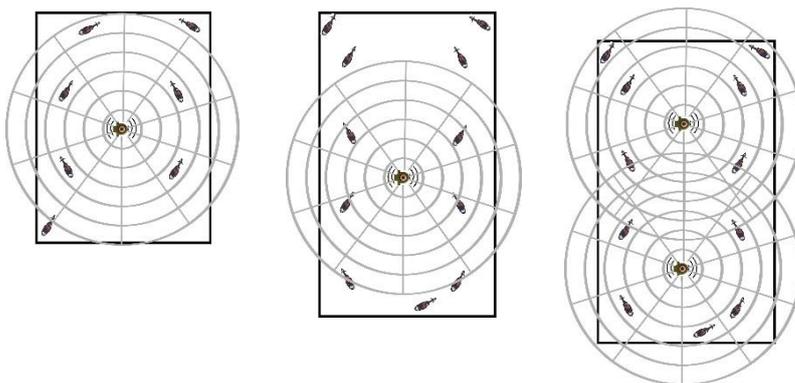
2.1 General

The VP4102 antenna reader collects the activity information and the animal responder number from every RealTime Smarttag in the antenna reception field and sends it to the Velos VPU controller program. The RT Tag keeps the information from the last 24 hours so the Tag should be in range of the antenna field at least once every 24 hours to collect all the activity data, but more frequent is advisable for accurate real time attentions. The reception range of the antenna field is at least 75 meters depending on the housing environment materials.



1. Smarttag RT Neck or Leg
2. Antenna
3. Smarttag info with responder number and activity data
4. Reader
5. VPU controller with Velos program

More than one antenna can be used to reach a larger reception area.



The antenna in the barn receives the RealTime information from the Smarttag attached to the individual animals. The Velos program determines the behaviour change of an animal.

The system needs a few days minimum to determine the normal behaviour of an animal. When starting up the system, the first few days no attentions are available.



2.2 Heat Detection

During heat, a cow shows specific behaviour like sniffing and chin resting, mounting behaviour or standing heat. This means that a cow in heat moves more and differently than usual. The Heat Detection system uses these movements to detect heat. Depending on the kind of Smarttag, the neck or leg movements are measured. When a cow is in heat, she is shown on a list in Velos that shows all cows that are in heat. At the same time the VPU shows a red light that indicates that there is a cow in heat.

2.3 Health Monitoring

When an animal is ill, she shows different behaviour than usual. For example, she eats less or lies more. The Health Monitoring system uses the movements of the cow to indicate (possible) health issues. Depending on the kind of Smarttag, the neck or leg movements are measured.

Smarttag Neck	Smarttag Leg
<ul style="list-style-type: none"> Eating time Number of meals 	<ul style="list-style-type: none"> Step count Lying time Standing time Walking time Stand up count

Possible health issues are indicated in three different ways:

- Urgent attentions
- Animals to check today
- Group notification

When unusual behaviour is detected, the system creates an attention, and the cow or group is shown on a list in Velos.

2.3.1 Urgent attentions

These attentions appear when unusual behaviour of an animal is detected that needs immediate action. This can be the case when the animal has not eaten for a certain period, or when she has been lying too long for one period. Depending on the kind of Smarttag, the neck or leg movements are measured.

Smarttag Neck	Smarttag Leg
Animal has not eaten too long.	Animal has been lying too long.

2.3.2 Animals to check today

The Health Monitoring system compares the behaviour of an individual cow to her behaviour of the previous 10 days. An animal is shown on the list *Animals to check today* when unusual behaviour is detected on the previous day. The unusual behaviour can indicate possible illness or a risk of illness. Depending on the kind of Smarttag, the neck or leg movements are measured.

Smarttag Neck	Smarttag Leg
Animal has a decreased eating time.	Animal has: <ul style="list-style-type: none"> a decreased step count, or a decreased lying time, or an increased lying time



2.3.3 Group notification

This notification appears when the same unusual behaviour is detected for multiple animals in the same group. It indicates a possible management or group issue. For example, decreased lying times of the animals because of a lack of clean drinking water. Depending on the kind of Smarttag, the neck or leg movements are measured.

Smarttag Neck	Smarttag Leg
Multiple animals in the same group have a decreased eating time.	Multiple animals in the same group have:
	<ul style="list-style-type: none">• a decreased step count, or• a decreased lying time, or• an increased lying time



3. Safety

3.1 Safety warnings

Possible dangerous places or situations are marked with safety warning stickers.

- Pay attention to all safety warnings on the devices.



Danger due to electromagnetic fields.

People with pacemakers, metallic implants or hearing aids may experience complications. Such people should consult their doctor before entering a site with inverters.



Make sure all safety warnings remain visible.

3.2 Animal welfare and safety

The automated actions of the Nedap Velos Livestock Management System do never discharge the user of the system from his/her responsibility to assure **and** to take care of the well-being of the animals.



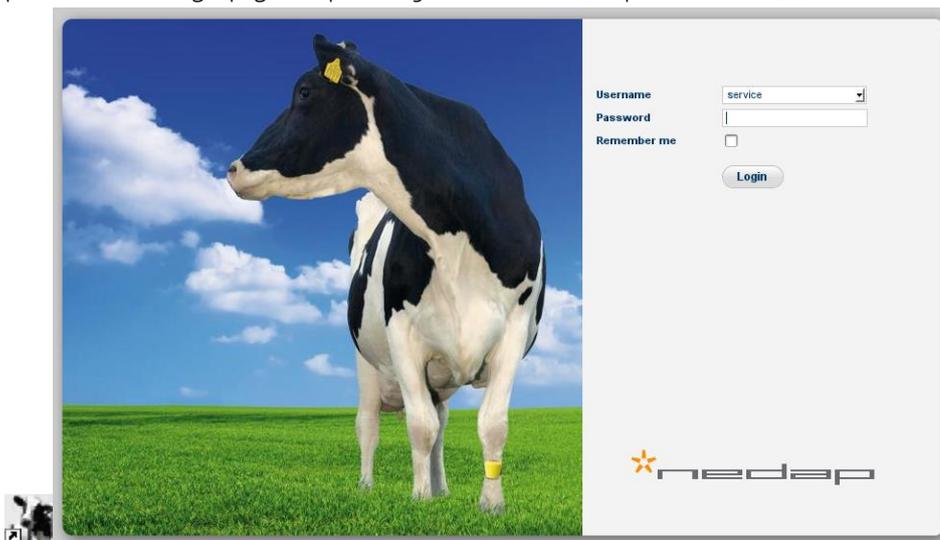
4. Start up operation VPU program

Enter the animal and responder numbers and the heat detection settings.

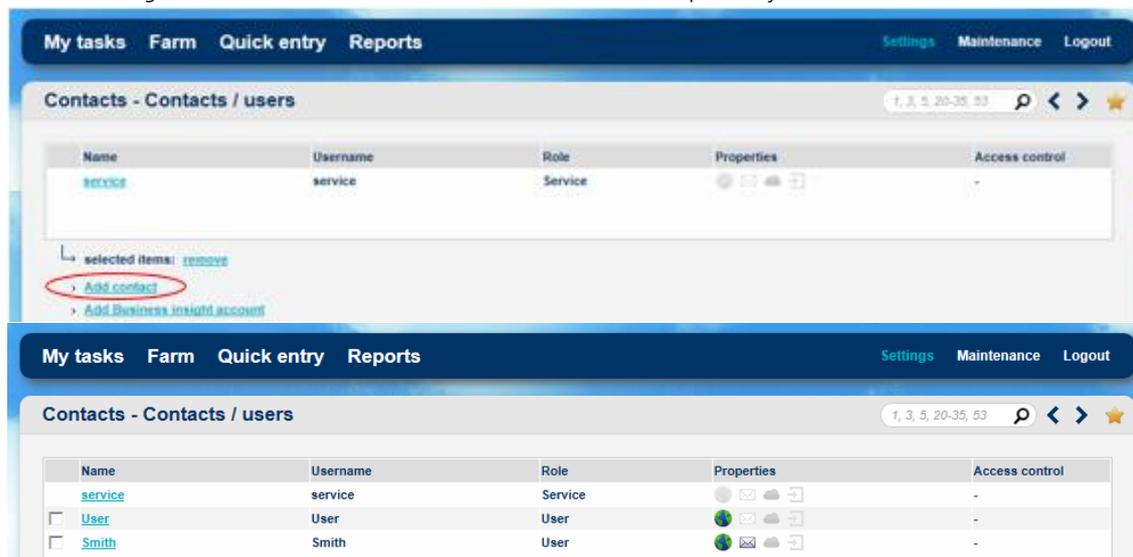
4.1 First settings

Enter the password and make the first settings.

1. Click on the VPU program shortcut on the desktop to start the program on the VPU controller. Enter the user password in the login page and press *Login*. The default *User* password is 1234.



1. Enter a unique user password in the English page *Settings > Contacts – Contacts / users*. Click on the top of the page on *Settings* and then on *Contacts* and then on *Contact / users*. Optionally use the link *Add contact* to add more users.



Optionally change the language from English to another **language**.



My tasks Farm Quick entry Reports Settings Maintenance Logout

Contacts - Add contact 1, 3, 5, 20-35, 53

Name

Address

Zip code

City

Phone

E-mail

Language English

Date format DD-MM-YYYY

Calendar Gregorian (default)

User

My tasks Farm Quick entry Reports Settings Maintenance Logout

Contacts - Add contact 1, 3, 5, 20-35, 53

Name

Address

Zip code

City

Phone

E-mail

Language English

Date format DD-MM-YYYY

Calendar Gregorian (default)

User

User settings

Username

Role User

Password

Verify password

Password strength

Internet access

Submit

1. Enter the *name*, select the *User* box to enter a *user name* and select the role (user or service).
2. Enter a password of at least 4 characters. The length and colour (red or green) of the bar shows the strength of the password.
3. Switch on the *Internet access* box to log in on the VPU through Internet. The password has to be strong (green colour) otherwise the box is not active.



4.2 Entering new animal numbers/data and groups

4.2.1 Entering new animal numbers in the system with management software

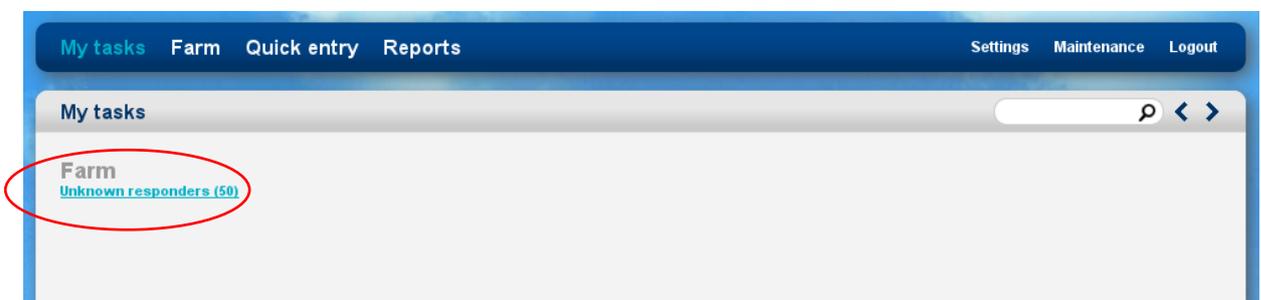
Make a list of the animal number and the responder number from each animal when attaching the responders.

4.2.1.1 Entering animal numbers with management software

1. Enter the responder numbers and cow numbers in the management software.
2. Run a synchronization to load the responder and cow numbers in Velos.

4.2.1.2 Entering animal numbers without management software

Responders that are identified at an antenna for the first time appear in the Velos program as **unknown responders** in the page *My tasks > Farm – Unknown responders*.



The identified unknown animals are set in default group 99.



Click on a responder number to enter the animal number from this Smarttag.

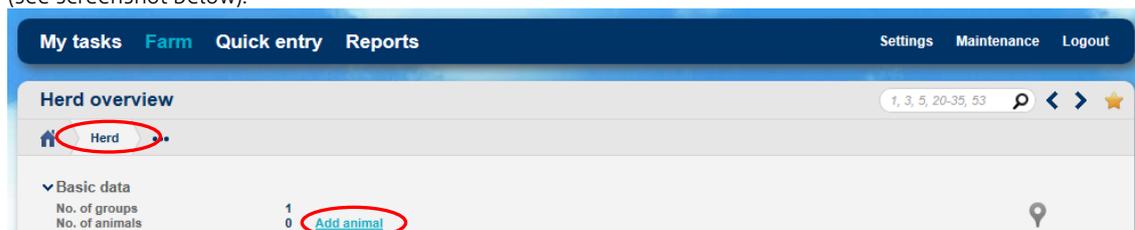
Enter the animal numbers and other data from the animals with the unknown responder numbers in the page *My tasks > Farm – Unknown responders*. Click on Submit to store the data. Use the option **Fixed** if a date should keep this same value when entering the data for the next responder.

4.2.2 Changing the responder number and/or basic data



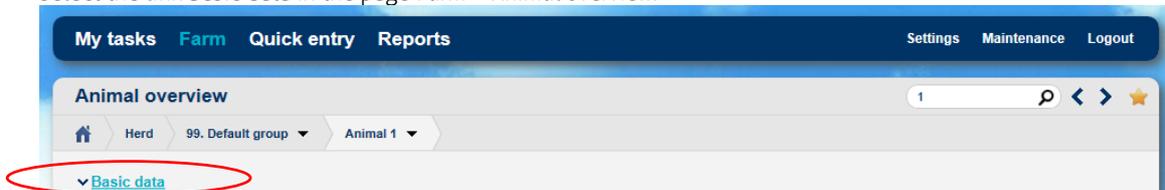
When using management software, check if changing responder numbers and other basic data should be done in the management software or in Velos.

Adding a responder number and data from new animals manually is possible in the page *Farm > Herd or Group overview* (see screenshot below).





To change the responder number or to add or change other basic data after an animal was entered for the first time, select the link **Basic data** in the page *Farm > Animal overview*.



Enter the heat dates, insemination dates and calving dates in this page later on also or use the *Farm > Quick entry* page. See chapter 4.3.2. for more information about this.

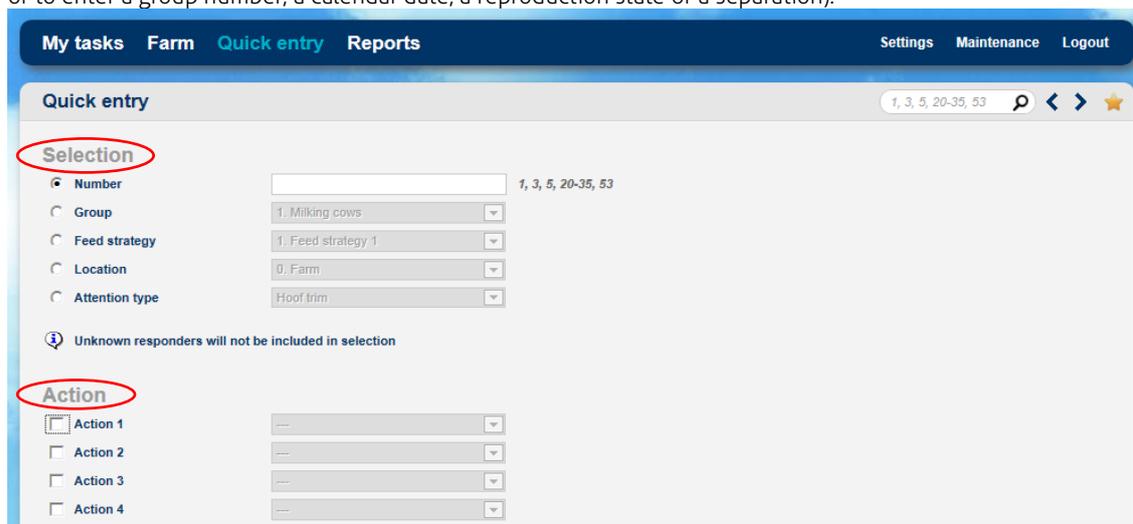
Use the magnifying glass  to search for one or more animals.

4.2.3 Changing animal data in the Quick entry



When using a management system, check if changing animal data should be done in the management system or in Velos.

Use the page *Quick Entry* to enter actions. Enter the Animal number(s) under *Selection* and select an *Action* (e.g. to change or to enter a group number, a calendar date, a reproduction state or a separation).



↳ selected items: [quick entry](#)

Use the *quick entry* link in other parts of the program e.g. *My tasks* to get to the *Quick Entry* page with the preselected animal selection to enter e.g. a separation for these animals.

Number

1, 3, 5, 20-35, 53

Enter one or more numbers to search for animals. Search for more animals with individual numbers with a comma in between like 1, 3, 5, 53 and/or a range of numbers 20 – 35.



4.3 Heat detection settings

In order to be able to detect heat, it is necessary to define when the attentions should be created. Depending on the kind of Smarttag (Neck or Leg), the appropriate settings per attention type are displayed.

1. Go to *Settings > Heat detection – Attentions*.
2. Select a group in the dropdown menu.
Adjust the sensitivity of the heat detection attentions if necessary. Animals will get an attention when the activity for several following 2-hour periods is higher than the level set. In case of a lower sensitivity less animals will get an attention.



Less attentions

More attentions

3. In the field *Type*, select the type of Smarttag that is used on the farm.
4. If necessary, in the field *Days no attention after calving*, adjust the amount of days after calving that attentions should not be shown.
5. If necessary, in the field *Days no attention after insemin.*, adjust the amount of days after insemination that attentions should not be shown.
6. If necessary, in the field *Show attentions*, adjust the amount of hours that an attention is visible in Velos.
7. Turn off the *Show pregnant animals* check box to ignore the heat detection attentions of animals with state pregnant.
8. Click on *Apply to all* to save the changes for all groups, or repeat steps 2 – 8 for all groups individually and click on *Submit*.



Use e-mail notification so that immediate action can be taken if necessary. For more information about e-mail notification see chapter 5.4.



4.4 Health and management settings

In order to be able to detect possible health issues, it is necessary to define when the attentions should be created. This can be done per type of attention: urgent attentions, group notifications and animals to check today. Depending on the kind of Smarttag (Neck or Leg), the appropriate settings per attention type are displayed.

4.4.1 Urgent attentions

Urgent attentions appear when unusual behaviour of an animal is detected that needs immediate action. For the Smarttag Neck, the unusual behaviour means that the cow has not eaten for a certain period. For the Smarttag Leg, the unusual behaviour means that the cow is lying for a certain period. In the settings, this period must be set.

The default period is 8 hours. It depends on the management of the farm if this period must be changed. It is important that the period is set in a way that no false attentions will be created. For example, on a farm where the Smarttag Neck is used, and the animals are not fed during the night, there will be attentions every morning for all animals because they have not eaten for more than 8 hours. In this case, this is not desired and the period should be changed, e.g. to 10 hours. Note that the period should be as short as possible in order to take immediate action.

1. Go to *Settings > Health and management – Attentions*.
2. Select a group in the drop down menu.
3. For the Smarttag Neck, in the field *Animal has not eaten more than*, fill in the period after which an attention should be created.
4. For the Smarttag Leg, in the field *Animal is lying more than*, fill in the period after which an attention should be created.
5. Click on *Submit*.



Use an e-mail notification so that immediate action can be taken if necessary. For more information about e-mail notification see chapter 5.4.

4.4.2 Behaviour notifications

The notifications for groups and individual animals are based on the same unusual behaviour of the animals. Define this unusual behaviour in the behaviour notifications. Depending on the kind of Smarttag, the appropriate settings are displayed.

1. Go to *Settings > Health and management – Attentions*.
2. Select a group in the drop down menu.
3. In the field *Eating time has decreased more than*, fill in the minimum changed eating time for an attention in %. For example, when 30% is filled in, it means that a cow will be put on the list when she eats minimum 30% less than usual.
4. In the field *Step count has decreased more than*, fill in the minimum changed step count for an attention in %. For example, when 30% is filled in, it means that a cow will be put on the list when she has minimum 30% less step counts than usual.
5. In the field *Lying time has decreased more than*, fill in the minimum changed lying time for an attention in %. For example, when 30% is filled in, it means that a cow will be put on the list when she has been lying minimum 30% less than usual.
6. In the field *Lying time has increased more than*, fill in the minimum changed lying time for an attention in %. For example, when 30% is filled in, it means that the cow will be put on the list when she has lied minimum 30% more than usual.
7. Click on *Submit*.



4.4.3 Group notifications

A group notification appears when the same unusual behaviour is detected for multiple animals in the same group. It indicates a possible management or group issue. In the behaviour notifications is defined which behaviour is used for the group notification (see chapter 4.4.2). In the field *Group notification* define when a group notification should be shown.

1. Go to *Settings > Health and management – Attentions*.
2. Select a group in the drop down menu.
3. In the field *Percentage of animals in the group with the same behaviour notification is more than*, fill in how many animals in the same group should show the same unusual behaviour for a notification. For example, when 30% is filled in, it means that a group notification will be created when 30% of the cows in the group show the same unusual behaviour.
4. Click on *Submit*.

4.4.4 Animals to check today

An animal is shown on the *Animals to check today* list when unusual behaviour is detected and the cow needs to be checked the same day. In this case a possible (risk of) illness is detected. In the behaviour notifications is defined which behaviour is used for the notification (see chapter 4.4.2). In the field *Animals to check today*, define when a cow should be shown on the list. Depending on the kind of Smarttag, the appropriate settings are displayed.

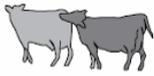
1. Go to *Settings > Health and management – Attentions*.
2. Select a group in the drop down menu.
3. In the field *Animals with decreased step count*, select *Yes* if animals with decreased step count should be put on the list. Otherwise, select *No*.
4. In the field *Animal recently been in heat*, select *Yes* if animals in heat should be put on the list. Otherwise, select *No*.
5. In the field *During entire lactation*, select *Yes* if animals during the entire lactation cycle should be put on the list. Otherwise, select *No*.
6. Click on *Submit*.



5. Operation VPU program

5.1 Viewing animals in heat

The behaviour of an animal in heat is quite different from her normal behaviour. She is restless, tries to mount other animals, gets mounted by other animals and shows a standing reflex.



sniffing, chin resting / \pm 12 hours



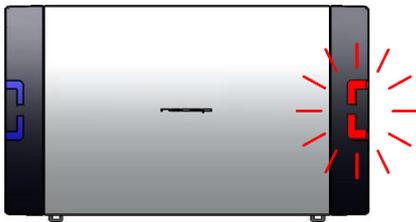
mounting other cows (attempt) / \pm 8 hours



standing heat / \pm 5 hours

The antenna will often receive the activity information and the animal responder number from every RT Smarttag in the antenna field. The antenna reader collects these data and sends them to the Velos program every 2 hours. An animal does not need to be in the antenna field all the time, at least once every 24 hours is the minimum to store the complete 24 hour activity data but more frequent readings is necessary for real time attentions.

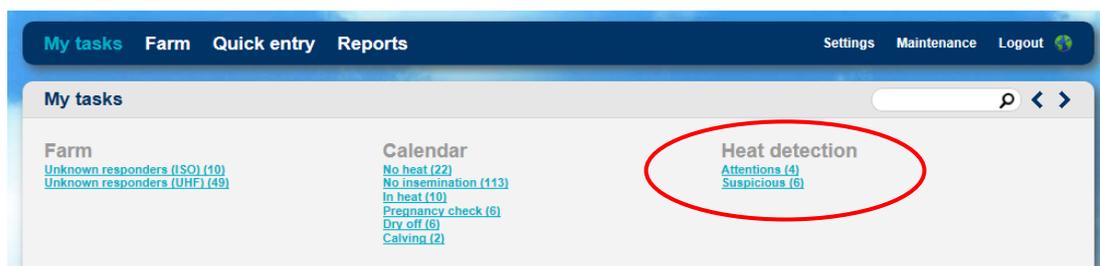
The activity measurement monitors the changes in the activity of the individual animals because the activity in a period is compared to the activity in the same period on the previous days. An heat detection attention is generated if necessary. The program displays overviews of animals with an heat detection attention on a PC screen or on a mobile phone.



The red attention light of the process unit will warn if there is an heat detection attention.

There are 2 types of heat detection attentions: **Heat detection - Attention animals** that are most likely in heat and **Heat detection - Suspicious animals** that may be in heat but do not have an attention (yet).

Highly increased activity	Suspicious	Attention
Nr. of following 2-hour periods	2	3 or more
In Heat	Maybe	Probably



View animals with an heat detection attention in the page *My tasks > Heat detection - Attentions*. View suspicious animals in the page *My tasks > Heat detection - Suspicious*.

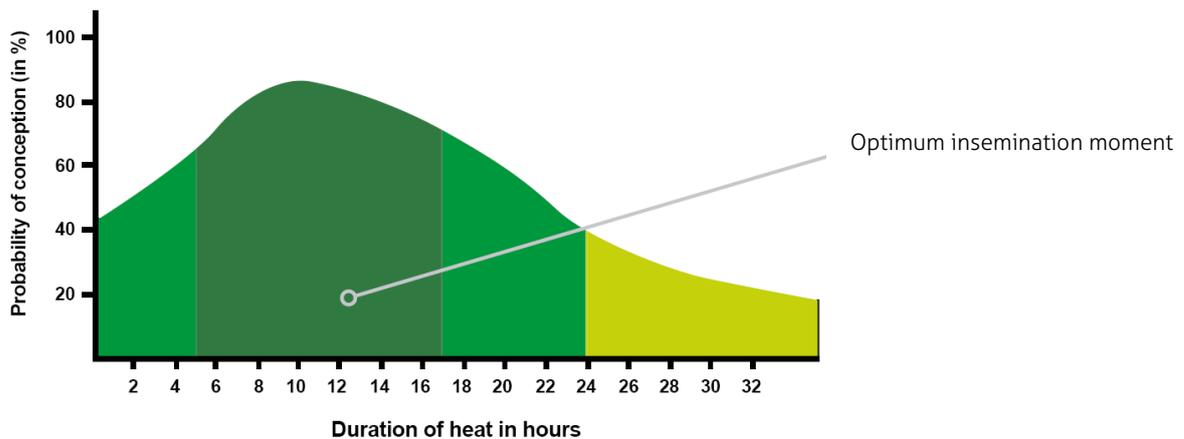


Check animals with a clear heat detection attention in the page *My Tasks > Heat detection - Attentions*. Check the optimum insemination moment, the number of days in lactation, the number of days since the last heat and the number of days since the last insemination. The dark green colour in the coloured bar indicates the optimum insemination moment. **Click on an animal number to view the activity details** from the past days.

Animal	Group	Lact. days	Heat days	Insem. days	Pregnant	Attention time	Optimal insemination moment	Add event
<input type="checkbox"/> 140	Seen	8	196	111	23	12:59 (23 hours)		<input type="button" value="H"/> <input type="button" value="I"/>
<input type="checkbox"/> 48	Seen	8	172		37	18:59 (17 hours)		<input type="button" value="H"/> <input type="button" value="I"/>
<input type="checkbox"/> 91	Seen	8	249		47	20:59 (15 hours)		<input type="button" value="H"/> <input type="button" value="I"/>
<input type="checkbox"/> 141		8	150		44	00:59 (11 hours)		<input type="button" value="H"/> <input type="button" value="I"/>
<input type="checkbox"/> 92		8	199		21	04:59 (7 hours)		<input type="button" value="H"/> <input type="button" value="I"/>
<input type="checkbox"/> 146		5	42			04:59 (7 hours)		<input type="button" value="H"/> <input type="button" value="I"/>

Tick off the checkbox for the attention animals that were seen or checked and press **no heat / seen / quick entry** to mark the animals as not in heat or seen in heat or to put the animals on the Quick entry page. The red attention light of the process unit will be off when all animals are marked as seen or as no heat. Use the button H under *Add event* to enter a heat and the button I to enter an insemination.

The green coloured bar is shown for animals with a heat detection attention. The optimum insemination moment depends on the starting point of the increased activity of an animal. In the picture below, this optimum moment is coloured dark green. Try to inseminate the animal within this period of time to increase the chances of gestation.



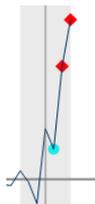
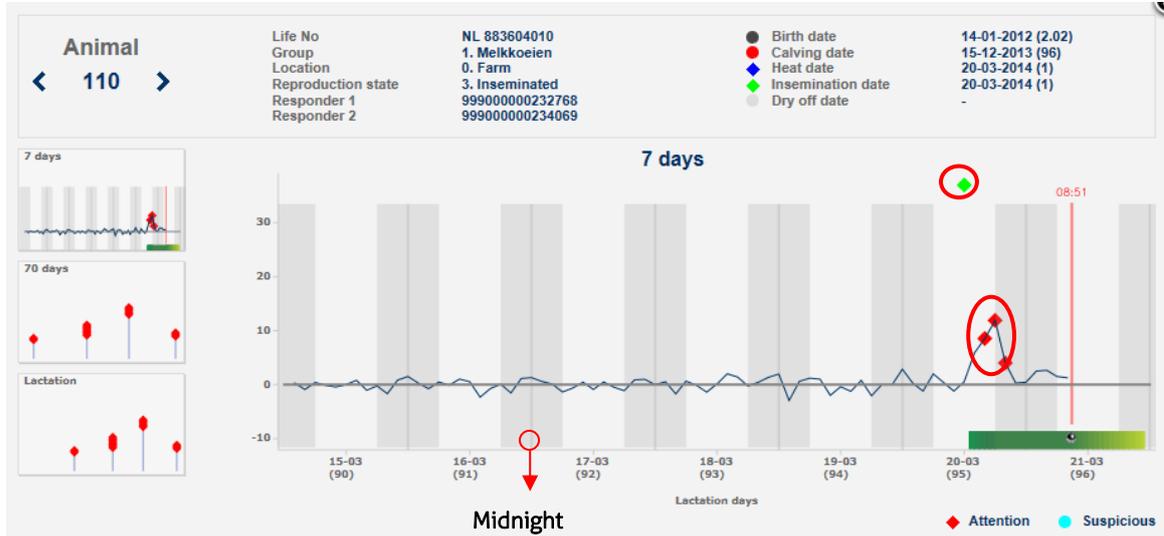
Inseminate directly after the first heat detection attention or the first standing heat.



Night Day

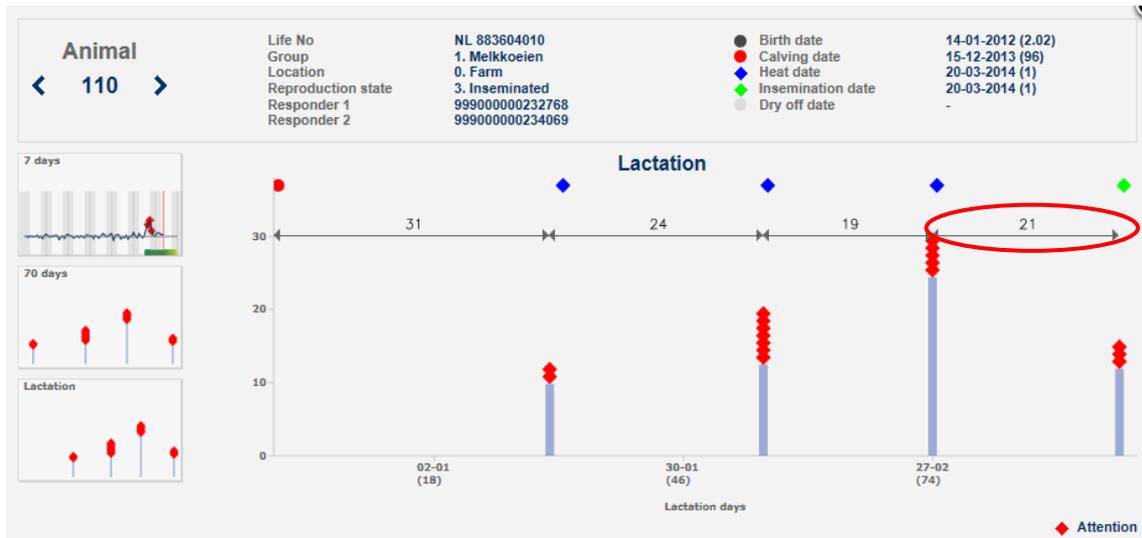


View the animal activity details from the past days (light column with noon in the centre) and nights (dark column with midnight in the centre). The diamonds in the activity line indicate the heat detection attentions.



A light blue dot ● is a suspicious high 4 hour activity and a red colour diamond ◆ is a clear 6 hour heat detection attention. The activity line shows the measured activity compared to the activity in the same period on the previous days.

Select the 70 day or the lactation graph to view the interval since last heat detection attention(s) (e.g. 21 day heat cycle).



Put the mouse cursor on ● ● ◆ ◆ to view the exact calendar date entered by the farmer.

◆ Increased act. ◆ Increased act. (No heat)

A red or grey colour diamond is an increased activity attention. A grey colour diamond indicates that the increased activity is not caused by a heat.



It is also possible to view animals with an heat detection attention in the Heat detection attentions report in the page *Reports > Heat detection - Attentions*.

The screenshot shows the Nedap software interface. At the top, there is a navigation bar with 'My tasks', 'Farm', 'Quick entry', and 'Reports' (highlighted in blue). To the right of the navigation bar are 'Settings', 'Maintenance', and 'Logout' with a globe icon. Below the navigation bar is a 'Reports' section with a search bar and navigation arrows. Under 'Reports', there is a 'Farm' section with links for 'Animals', 'Calendar dates', 'Custom attentions', 'Tag statistics', and 'Calendar attentions'. A red circle highlights the 'Heat detection Attentions' link. Below this is a table header for 'Activity - attentions' with the Nedap logo. The table has columns for 'Number', 'Group', 'Lact. days', 'Pregnant', 'Heat days', 'Insem. days', and 'Date'.

Activity - attentions							
Number	Group	Lact. days	Pregnant	Heat days	Insem. days	Date	



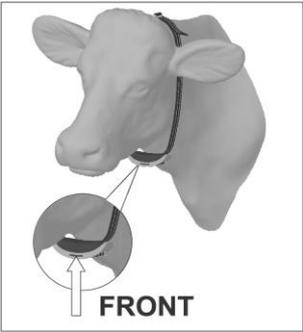
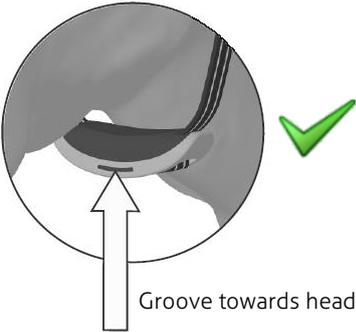
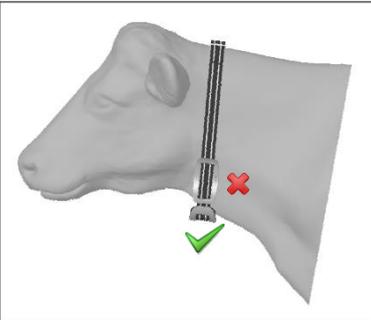
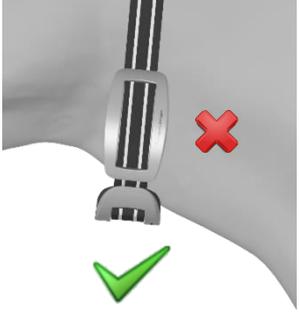
5.2 Tag monitoring

When a problem occurs with a Smarttag, it is important that this is noticed in order to solve the problem. Therefore the tags are monitored by the Heat Detection system. When there is a problem with a Smarttag, the tag will be placed on a list where is indicated what is wrong with the Smarttag. The list can be found via *My tasks > Tags – Smarttag notifications*.

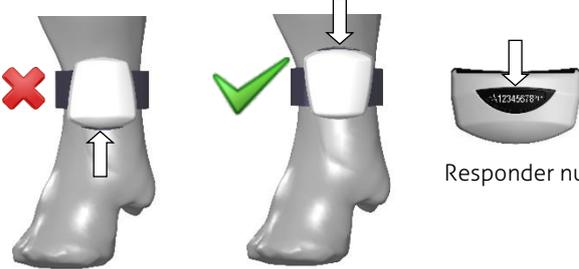
There can be three reasons why a Smarttag is placed on the list:

1. Incorrect position. The Smarttags that appear on the list because of an incorrect position, are neck labels that are attached in a backwards or sideways position, or leg labels that are attached upside down.
2. No data in last 24 hours. The Smarttag is out of the antenna range, a typo in the Smarttag number has been made, the Smarttag is taken off but still sending some data (sleep mode), or the Smarttag is broken.
3. Not enough measurements. The Smarttag is taken off the cow but still sending some data (sleep mode), or the Smarttag is broken.

Check the following table for possible problems with the Smarttag and the solutions.

Smarttag attention	Solution
Incorrect position Smarttag is attached back to front	The Smarttag Neck is attached backwards. The groove (and the arrow on the back of the Smarttag) is pointing towards the cows body instead of the cows head. <div style="display: flex; justify-content: space-around; align-items: center;">   </div>
Incorrect position Position of the Smarttag	The Smarttag Neck is in a wrong position. It is turned sideways on the neck or twisted on the collar. <div style="display: flex; justify-content: space-around; align-items: center;">   </div>



<p>Incorrect position</p> <p>Smarttag Leg – Upside down</p>	<p>The Smarttag Leg is attached upside down. The responder number is at the bottom of the Smarttag near the cows claw instead of at the top of the Smarttag.</p>  <p>Responder number on top side = OK</p>
<p>No data in last 24 hours</p>	<ul style="list-style-type: none"> • The Smarttag is out of the antenna range. This can be the case when the cow is grazing. In Velos can be defined that the cow is out of the antenna range. When the cow is back in the antenna range, it automatically disappears from the list. <ol style="list-style-type: none"> 1. Go to <i>My tasks > Tags – Smarttag notifications</i>. 2. Find the Smarttag in the list. 3. Check the box <i>Out of range</i>. • The Smarttag number is not correct. Check the Smarttag number and change it. <ol style="list-style-type: none"> 1. Go to <i>My tasks > Tags – Smarttag notifications</i>. 2. Find the Smarttag in the list. 3. Click on <i>Edit</i>. 4. In the field <i>New</i>, fill in the right Smarttag number. 5. Click on <i>Ok</i>. • The Smarttag is taken off the cow but still sending some data. A Smarttag goes into sleep mode when it is not moving for longer than 8 hours. When the Smarttag is not in use, but it is moving (e.g. when it is lying in a closet against which is pushed) it still sends some data. Remove the Smarttag number in Velos: <ol style="list-style-type: none"> 1. Go to <i>My tasks > Tags – Smarttag notifications</i>. 2. Find the Smarttag in the list. 3. Click on <i>Remove</i>. 4. Click on <i>OK</i>. • When the problem cannot be solved with the solutions mentioned above, please contact your dealer.



Not enough measurements	<ul style="list-style-type: none">• The Smarttag is taken off the cow but still sending some data. A Smarttag goes into sleep mode when it is not moving for longer than 8 hours. When the Smarttag is not in use, but it is moving (e.g. when it is lying in a closet against which is pushed) it still sends some data. Remove the Smarttag number in Velos:<ol style="list-style-type: none">1. Go to <i>My tasks > Tags – Smarttag notifications</i>.2. Find the Smarttag in the list.3. Click on <i>Remove</i>.4. Click on <i>OK</i>.• When the problem cannot be solved with the solution mentioned above, please contact your dealer.
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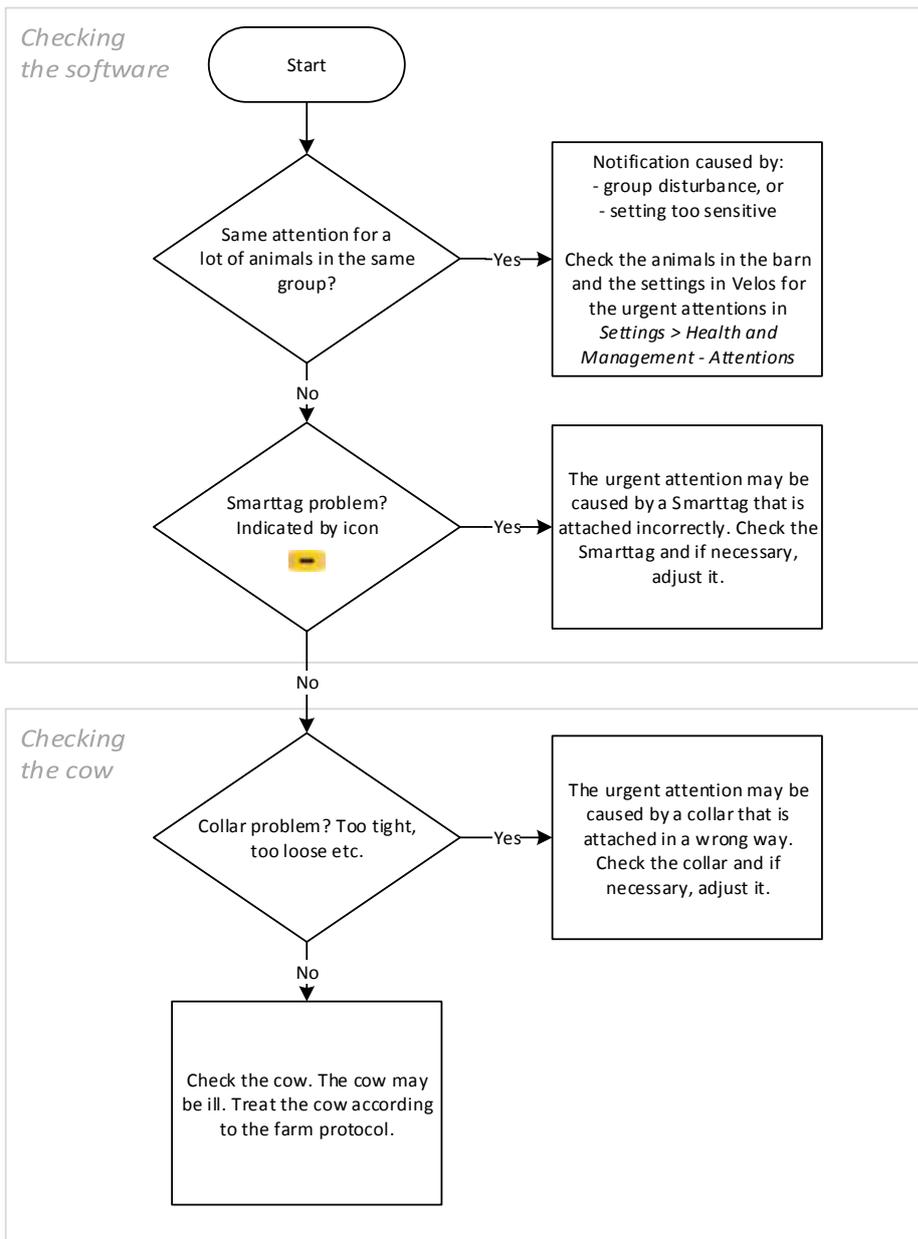


5.3 Checking for (possible) health and management issues

When receiving a health and management attention, it is important to take the right action to solve the problem. In this chapter the instructions for following up the different types of attentions are explained.

5.3.1 Urgent attentions

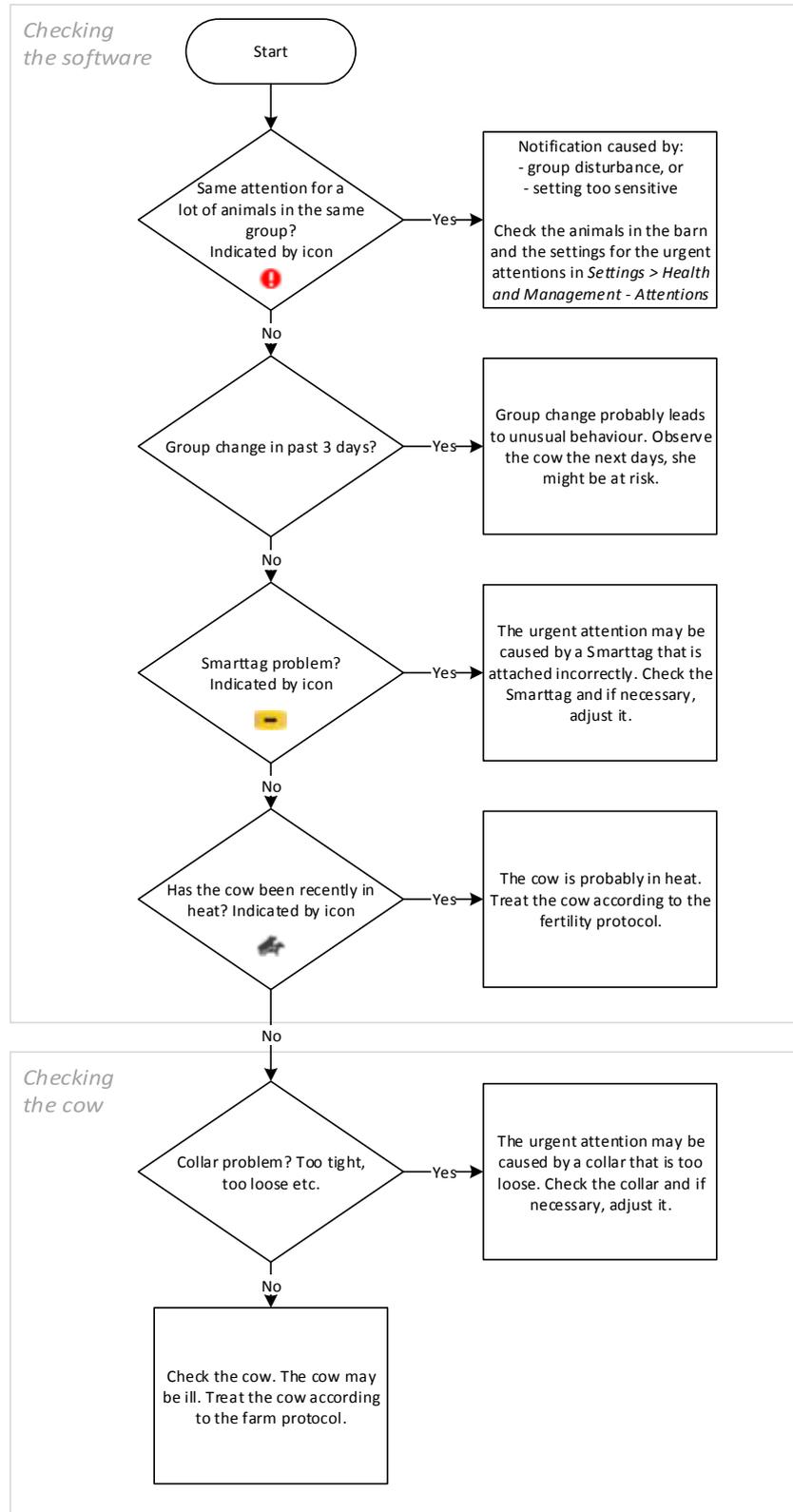
After receiving an urgent attention, it is important to act immediately. It indicates a (possible) serious health or management issue. Follow the next guidelines to find out what is going on with the cow.





5.3.2 Animals to check today

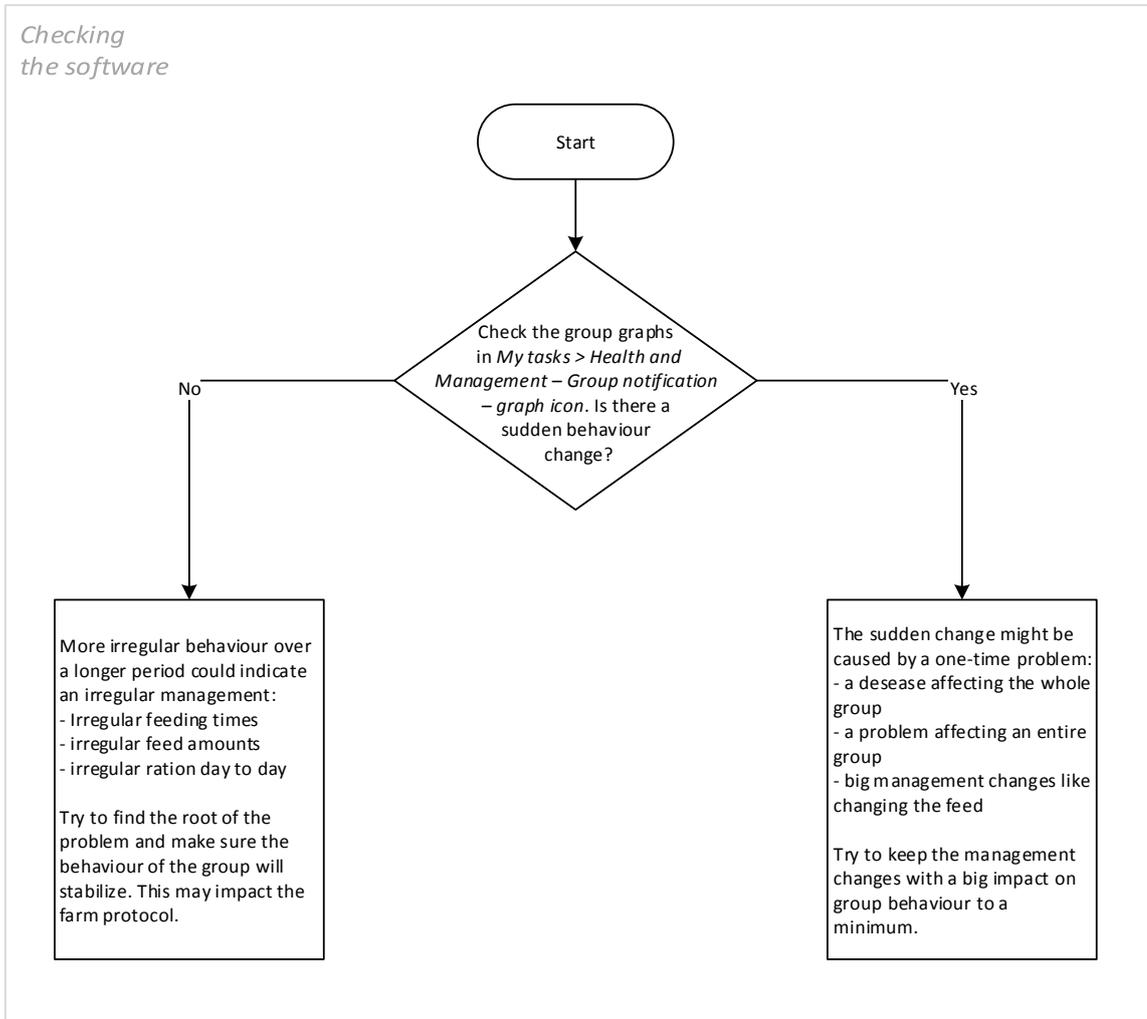
Check the list *Animals to check today* once a day in *My tasks > Health and Management – Animals to check today*. When an animal is put on this list, a possible health issue has been detected. Follow the next guidelines to find out what is going on with the cow.





5.3.3 Group notification

Check for a group notification once a day in *My tasks > Health and Management – Group notification*. Follow the next guidelines to find out what is going on with the group.



Try to achieve a stable and good management by reducing stress of the animals. This leads to improvements of the health, fertility and milk production, and to less health and management attentions.

5.4 Using e-mail notification

Use the e-mail notification to get a message if desired e.g. for heat detection attentions, health and management attentions and/or system attentions. Immediate action can be taken if necessary after an e-mail notification. Make sure an e-mail address is registered in the page *Settings > Contacts – contact/users (edit contact)*.



My tasks Farm Quick entry Reports Settings Maintenance Logout

Contacts - Edit contact 1, 3, 5, 20-35, 53

Name	Smith
Address	
Zip code	
City	
Phone	
E-mail	mr.smith@farm.com Send test email
Language	English
Date format	DD-MM-YYYY
Calendar	Gregorian (default)
User	<input checked="" type="checkbox"/>

Enter what type of attentions should be send in the page *Settings > Contacts – email notification*.

My tasks Farm Quick entry Reports Settings Maintenance Logout

Contacts - Email notification 1, 3, 5, 20-35, 53

Attention	Contacts
System	
System attentions	Smith
Update license	-
V-pack firmware	-
Renew online backup license	-
Online backup	-

5.5 Using a mobile phone with Internet connection

The Velos mobile program is available in the Velos program. The network settings of the VPU for mobile access are made in the page *Settings – System – Network*.

System - Network

Local network

IP Address 10.10.10.250

Subnet mask 255.255.0.0

Gateway 10.8.1.1

DNS

Primary DNS server

Secondary DNS server

Internet

Connection

VPU-online [Register vpu-online.com account](#)

Default network settings of the VPU (without an Internet connection) in page *Settings – System – Network*.



System - Network

Local network

IP Address 1 192.168.1.20

Subnet mask 255.255.255.0

Gateway 2 192.168.1.1

DNS

Primary DNS server 2 192.168.1.1

Secondary DNS server

Internet

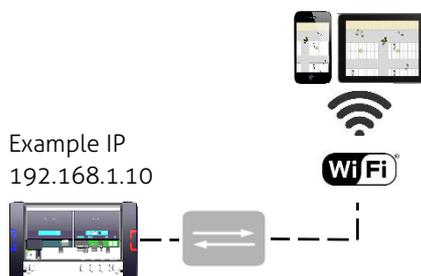
Connection ✓

VPU-online 3 [http\(s\)://smith.vpu-online.com](http(s)://smith.vpu-online.com)

Network settings of the VPU for mobile access (with an Internet connection and domain name registration) in page Settings – System – Network.

1. Change the IP address of the VPU so it is in the same range as the local network.*
2. Fill in the default gateway, normally this is the IP address of the router. Normally the default gateway = primary DNS server.*
3. Enter any domain name. This is a free choice.*

Connect the Tablet or Smartphone to the system. Enter the IP address (the IP address should be in range of VPU IP address) for LAN (local network) communication.



Method 1. Connect locally: Make sure you are in the same LAN network as the VPU. Then make a shortcut to the IP address of the VPU on the device.

Example for Smartphone.



Press Enter

Advice: Use LAN (method 1) instead of Internet communication (method 2). This is a faster connection. Internet communication through VPU on line is slower because it takes a detour.

Method 2. Connect via Internet: Use your VPU-online address to connect via Internet.

Enter a domain name e.g. of the farm called Smith **[http\(s\)://smith.vpu-online.com/mobile](http(s)://smith.vpu-online.com/mobile)**. This is the link to the Smartphone.



5.6 Setting up the calendar attentions

With calendar settings you can change the days that are used in the calendar calculation.

Click on the item to change, change the item and press submit to save

Dry off	Expected Dry off date xx days after insemination.
Gestation	Expected Calving date xx days after insemination.
Heat cycle	The interval when to expect a heat.
Automatic pregnant	Automatically xx days after last insemination.

Attentions	
No Heat	No heat/insemination registered within xx days after calving.
No Insemination	No insemination registered within xx days after calving.
Heat	An animal expected to be in heat xx days after an heat or insemination. This attention is given for 5 cycles in a row, if no other calendar event is entered.
Pregnancy check	No pregnancy check and the last insemination more than xx days ago.
Dry off	Animal is pregnant and expected to be dried off xx days before the expected calving date.
Calving	Animal is pregnant and expected calving in xx days.



Create your own attentions

1. Click Settings – Calendar – Custom attentions
2. Click “Add” and enter the new attention.
3. Select the parameters, enter a name and press Ok to save.

Name	Event	Attention	Duration	Lactation
<input type="checkbox"/> vaccination	Birth date	After 10 days	1 day	All

selected items: [remove](#)

[Add attention](#) [Cancel](#) [Ok](#)

Attention will be shown at My tasks.

My tasks

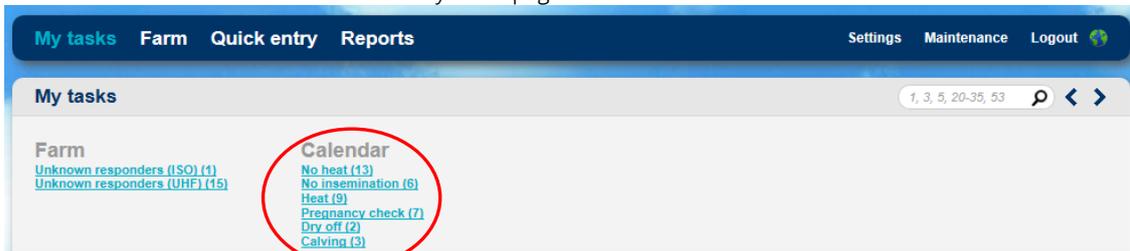
Farm [Unknown responders \(UHF\) \(16\)](#)

Calendar
[vaccination \(1\)](#)

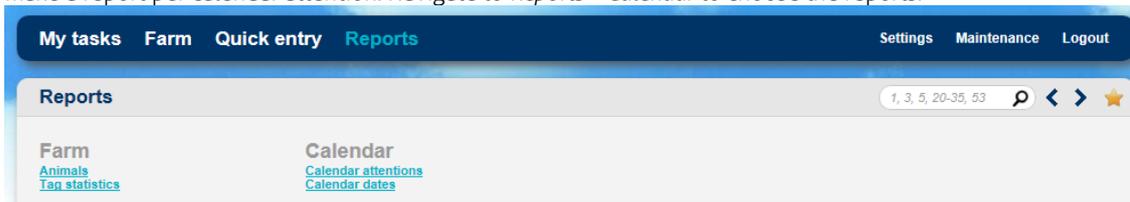


5.7 Viewing calendar attentions

All Calendar attentions are shown in the *My tasks* page under *Calendar*. Also custom calendar attentions show up here.



Two reports are available with calendar items. A report with all standard calendar events is available and it is possible to make a report per calendar attention. Navigate to *Reports – Calendar* to choose the reports.

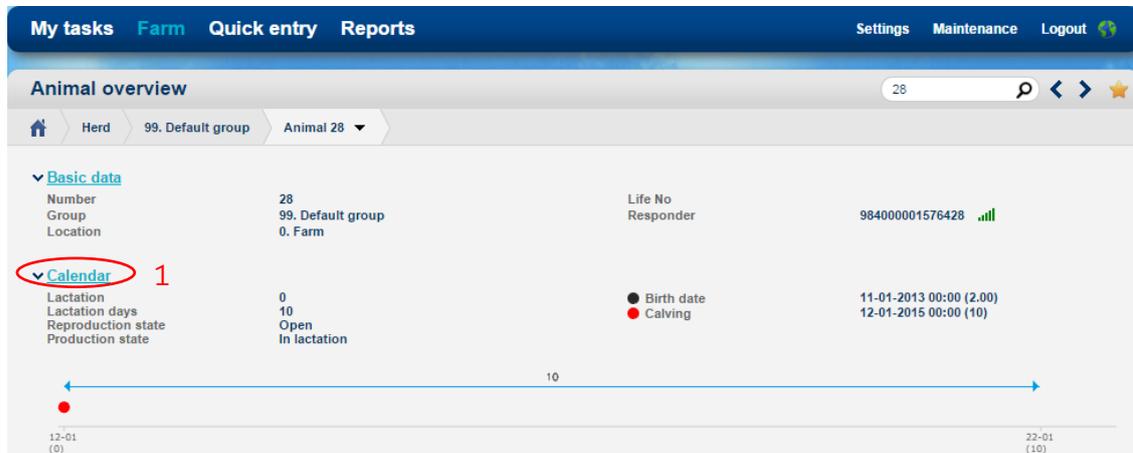


5.8 Entering calendar data

The calendar is used to register calendar events like birth day, calving date, insemination for an animal.

5.8.1 Add or change calendar events

1. Click Farm - Calendar



2. Click on "Add event"
3. Select an event, e.g. heat



My tasks Farm Quick entry Reports Settings Maintenance Logout

Calendar - Events

Herd 99. Default group Animal 28

Event	Date	Memo	Performer	Sire	Result
▼ Lactation 0					
<input type="checkbox"/> Calving	12-01-2015 00:00				
<input type="checkbox"/> Birth date	11-01-2013 00:00				

selected items: [remove](#)

[Add event](#) 2

Add

Event: Heat

Date:

Performer:

Memo:

Close Submit

- Heat
- Birth date
- Insemination
- Pregnancy check
- Dry off
- Calving
- Keep open
- Heat
- Custom events
- Memo

3

4. The event is shown in the calendar

▼ Calendar

Lactation 0
Lactation days 10
Reproduction state Open
Production state In lactation

● Birth date 11-01-2013 00:00 (2.00)
● Calving 12-01-2015 00:00 (10)
◆ Heat 22-01-2015 14:03 (0)

12-01 (0) 10 22-01 (10)

4



5.9 Viewing Mobile My tasks attentions

Go to View *Mobile Access - My Tasks* if Mobile access is available. Log in with the username and password. The home overview screen appears.

Click



to open the menu



to search for animal(s)



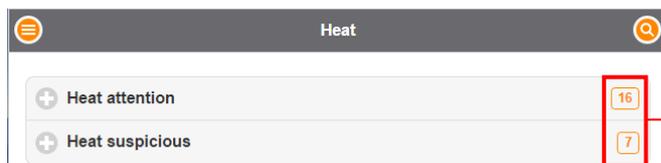
to logout

Click on the icon and the type of attention to be viewed.

An example:



Click on the Heat detection icon to view the heat detection attentions.



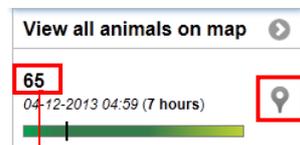
Number of attentions

0 = all attentions were marked as seen

No attentions = not shown



Click on the plus sign to view the animal(s) with an attention.



→ View the positions of all animals with an attention (if available).

→ Click on  to view the position of one animal with an attention (if available).

→ Click on an animal number e.g. **65** to view the basic animal data.



6. Maintenance, malfunctions and disposal

6.1 Maintenance

Check the operation of the antennas regularly by testing the identification with a Smarttag that is not used on an animal and by checking the registered activity data.

Carry out maintenance of the antennas according to the table below.

Item to check	After 1 st week	Every week	Every month	Every 6 month	What/how to check
Smarttags			X		Check the attachment at the animal's leg or neck.

6.2 Malfunctions

The webpage **My tasks > System - System attentions** will show if there are any malfunctions. If the system is not working correctly, an alarm will occur. The blue light on the process unit will blink. Check the cause of the alarm, solve it and remove the system attention.

Click in the page **Maintenance > Monitor - Behaviour components** on the button **View** to see the actual state of the Antenna.

Monitor - Behaviour components				
VPU <input type="text" value="vpu_1 [Master]"/>				
State	Components	Monitor	Category	Type
	Attention light		Activity	Attention light

6.3 Disposal

At discard dispose of materials from the Heat detection system in accordance with the current environmental rules of the state or local governing authorities.



Appendix A Technical specifications

Specifications for transport / installation

Functionality	RealTime Heat Detection
Electrical supply	
Main supply	100V - 240V
Frequency	50 – 60 Hz
Input voltage (use Nedap power supply)	24-28V DC
Environmental	
Operating temperatures	0°C / +45°C
Transport / storage temperatures	-25°C / +70°C
Humidity (rh)	45°C / 85%
Enclosure protection class (when cover and cables installed correctly)	IP65
Enclosures of electronics may not be exposed to direct sunlight.	

The identification of the Nedap Velos system is compatible with the ISO standard (ISO 11784 and 11785).



Check if electronic equipment from manufacturers other than Nedap is used on the farm. If the other system is not compatible to the ISO system this can have a negative influence on the ID performance of the Nedap Velos system. Please contact your Nedap Velos dealer.



Appendix B Declaration

Declaration of Conformity

We, the undersigned,

Company	N.V. Nederlandsche Apparatenfabriek "Nedap"	
Address, City, Country	Parallelweg 2, 7141 DC Groenlo, The Netherlands	
Phone number / Fax number	+31 544 471 162 / +31 544 463 475	
certify and declare under our sole responsibility that the following equipment:		
Product description / Intended use	Heat detection system operating on 433 MHz	
Manufacturer and Brand	N.V. Nederlandsche Apparatenfabriek "Nedap" and Nedap	
Type: LACTIVATOR REALTIME and NECKTAG ACT RT		
is tested to and conforms with the essential requirements for protection of health and the safety of the user and any other person and Electromagnetic Compatibility, as included in following standards:		
Standard	Issue date	
EN 60950-1 and A11 + A1 EN 62369-1 and EN 50364 EN 301 489-1 V1.8.1 and EN 301 489-3 V1.4.1 EN 61000-6-2 and EN 61000-6-3. (NOTE: Immunity tested at industrial levels)	2006 and 2009 + 2010 Both 2009 2008 and 2002 2005 and 2007	
and is tested to and conforms with the essential radio test suites so that it effectively uses the frequency spectrum allocated to terrestrial/space radio communication and orbital resources so to as to avoid harmful interference, as included in following standard:		
Standard	Issue date	
EN 300 220-1 V2.3.1 and EN 300 220-2V2.3.1. ERC REC 70-03	2010 and 2009, 2010	
and therefore complies with the essential requirements and provisions of the Directive 1999/5/EC of the European Parliament and of the council of March 9, 1999 on Radio equipment and Telecommunications Terminal Equipment and the mutual recognition of their conformity and with the provisions of Annex III (Conformity Assessment procedure referred to in article 10). The following laboratories and institutions performed the tests and issued the relevant reports:		
Report numbers	Issued by	
11051602.e01, 11060901.p03, 11060901.r01, 11060901.s01, 11060901.p02, 11060901.r02, 13022501 (revised unit (19 Jun 2013) 11102011.02_HE, E135130-A13-UL-1, 270613.02_eq	TUV Rheinland EPS B.V., Eiberkamp 10, 9351 VT Leek, (was: Smidshornerweg 18, 9822 TL Niekerk), The Netherlands Nedap, Parallelweg 2, 7141 DC Groenlo, The Netherlands	
The technical documentation as required by the Conformity Assessment procedure is kept at the following address:		
Company	N.V. Nederlandsche Apparatenfabriek "Nedap"	
Address, City, Country	Parallelweg 2, 7141 DC Groenlo, The Netherlands	
Phone number / Fax number / Email	+31 544 471 162 / +31 544 463 475 / jacques.hulshof@nedap.com	
	TF reference nr.	270613.01
	Drawn up in	Groenlo, The Netherlands
	Date	27 June 2013
	Name and position	Jacques A.M. Hulshof, Approbation Officer

 Vital element for growth



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