

6.2.12 Near Field Communication (NFC)

Using an android device which has an NFC transmitter the user may add a new MooMonitor+ to any specified animal.

To do this ensure the NFC is switched on in the device, this is normally done within the device settings menu see Figure 91.

The User should note that the NFC symbol may not be present on the displays of the device.

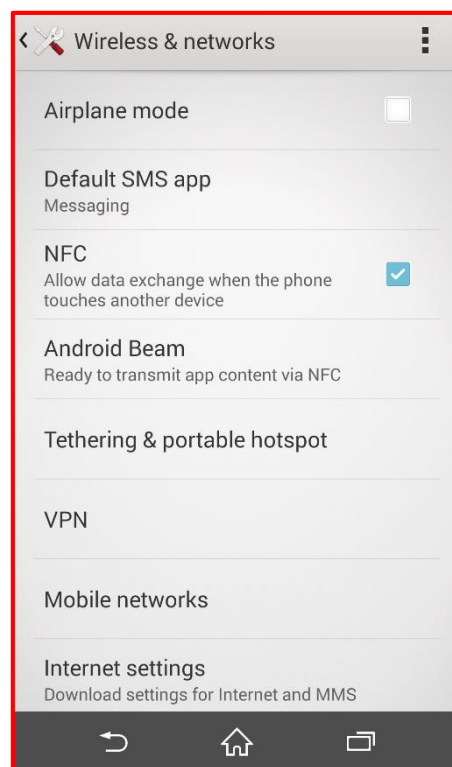


Figure 91 – Typical Android settings menu showing Near Field Communication Activation

The MooMonitor+ can be scanned using NFC simply by bringing the Android device antenna near to the tag in some cases depending on the device antenna strength the devices may need to touch Figure 92.

The Android device will read the MooMonitor+ ID and either display the cow's information that MooMonitor+ is assigned to or it will realise that MooMonitor+ is not assigned to any Cow ID and it will enter the **Assign MM** screen in the Options menu.



Figure 92 – Assign MooMonitor using NFC on an Android Device

6.3 MooMonitor+ IOS App (Version 2.0)

6.3.1 App Overview

The MooMonitor+ IOS App allows the User to interface with the MooMonitor+ system, giving them the ability to send and receive information from the devices and get a real time view of the data collected for their animals.

1. Receive alerts for Cows that are Active/Suspect/Health Alert.
2. View individual Cow Data.
3. View Individual Cow Activity/Rumination/Feeding/Resting Graphs.
4. Add events for the Cow such as Add Heat, Add Insemination, Add Calving Date, etc.
5. Set up cows for Scheduled and Permanent Drafting

The IOS app can be downloaded from the Apple App Store.

6.3.2 Launching the App

When launched for the first time the MooMonitor + IOS App will automatically request the user to enter their login details see Figure 65. These details will need to be obtained from Dairymaster.

Within the settings menu the app will require the user to enter the credentials required to log into the system see Figure 60.

These credentials will be provided to the user by Dairymaster and consist of the user name and password allocated to the specific user's farm. Input your Username and Password into the fields shown in Figure 60.

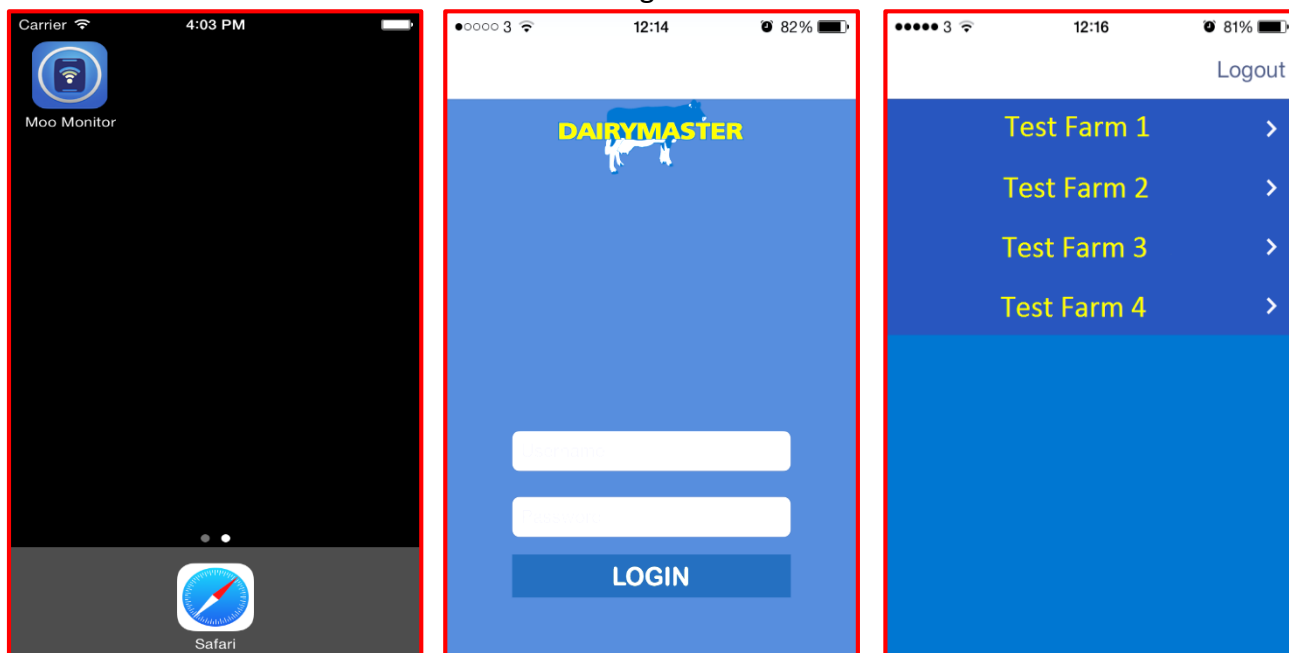


Figure 93 - IOS App login screen followed by farm selection

6.3.3 MooMonitor + IOS App User Interface

The app will launch with a screen displaying all the farms the user has access to.

The user selects the farm that they wish to view. If the user has only access to one farm it will proceed to the summary screen directly.

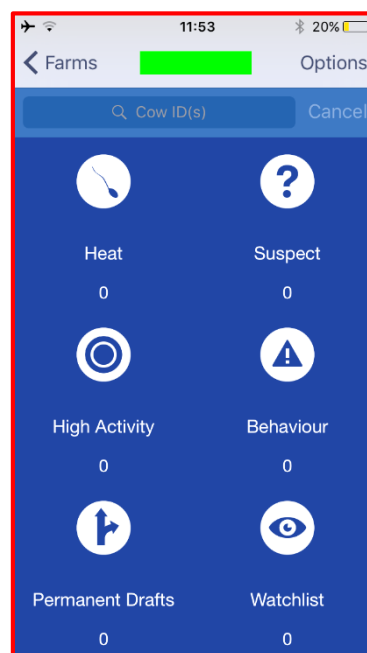
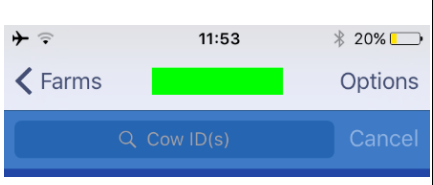


Figure 94 - Farm Summary screen

The Summary screen displays the different alerts applicable to the herd on an individual farm.

Heat Symbol	
Displays all cows with increased activity on the farm including pregnant Cows, Cows in Heat, Cows due to calve and cows that have had an AI or a confirmed heat within the last 4 days.	Heat 0
Suspect Symbol	
This is a list of the cows that are suspected to be in Heat. Their activity levels have increased but they have not yet overcome the Activity threshold. Farmers can identify these cows for further monitoring.	Suspect 0
Behaviour Alert Symbol	
The third symbol shows the cows that are displaying abnormal behaviour such as a decrease in rumination, feed intake, activity, increased resting etc.	Behaviour 0
High Activity Symbol	
This Icon will show the cows that are showing high levels of activity and therefore are identified as in heat. These cows will show factors such as high activity levels, decreased rumination, etc.	High Activity 0
Draft Symbol	
Full list of cows in the herd. The number shown underneath signifies the cows to be permanently drafted. Cows can be set up to draft by choosing 0, 1 or 2 in this table.	Permanent Drafts 0
Watch Symbol	
This is the list of animals that have been marked for further monitoring or treatment.	Watchlist 0

Summary Screen	
The current status of the base station is also shown in this ribbon (Green or Red). The user may search any known Cow by entering the Cow ID in the search bar and pressing on search.	

6.3.3.1 Animal Tables

Selecting any of the 6 alert icons will open up a tabulated list of the cows for that alert. The table contains the information for each individual cow such as **Cow ID**, **Days in Milk**, **Last Heat**, **Last Insem** (Last Insemination), **Num Insems** (Number of Inseminations) and **Group**. The drafting table generates a different table which is outlined in **section 6.3.3.2**.

The information in the table can be sorted by each individual column by selecting the column header at the top of the screen.

The colour codes at the left indicate the suitability of each cow for breeding. This is assigned to each cow based on the information input into the system for each cow. The colour code hint is accessed by selecting 'Options' at the top right of the screen and selecting Colour Codes from the list of options. The windows explaining the various colour codes will appear.

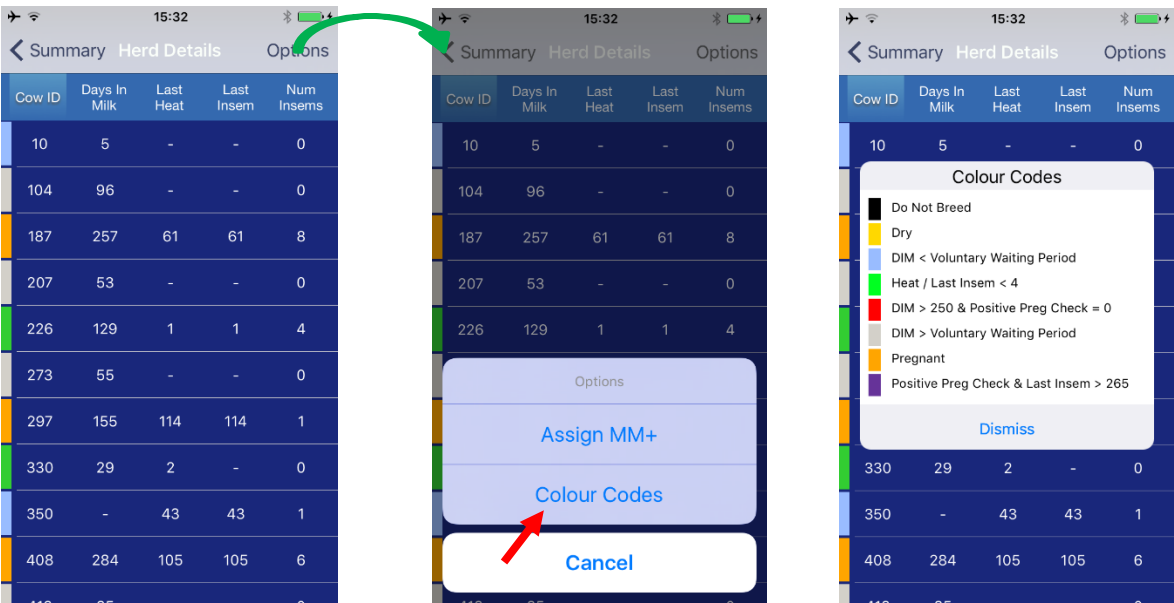


Figure 95 - Tabulated list of Cows along with the Colour Code hint

6.3.3.2 Draft Table

The Permanent Drafts table generates a list of all cows in the herd. The user can toggle between the Permanent drafting list and the scheduled drafting list by selecting 'Options' at the top right of the screen and selecting Scheduled drafting from the list of options.

The table contains information including Cow ID, Tag ID, draft PIN number, Group number and if the cow is being weighed. The information in the table can be sorted by each individual column by selecting any column header at the top of the screen.

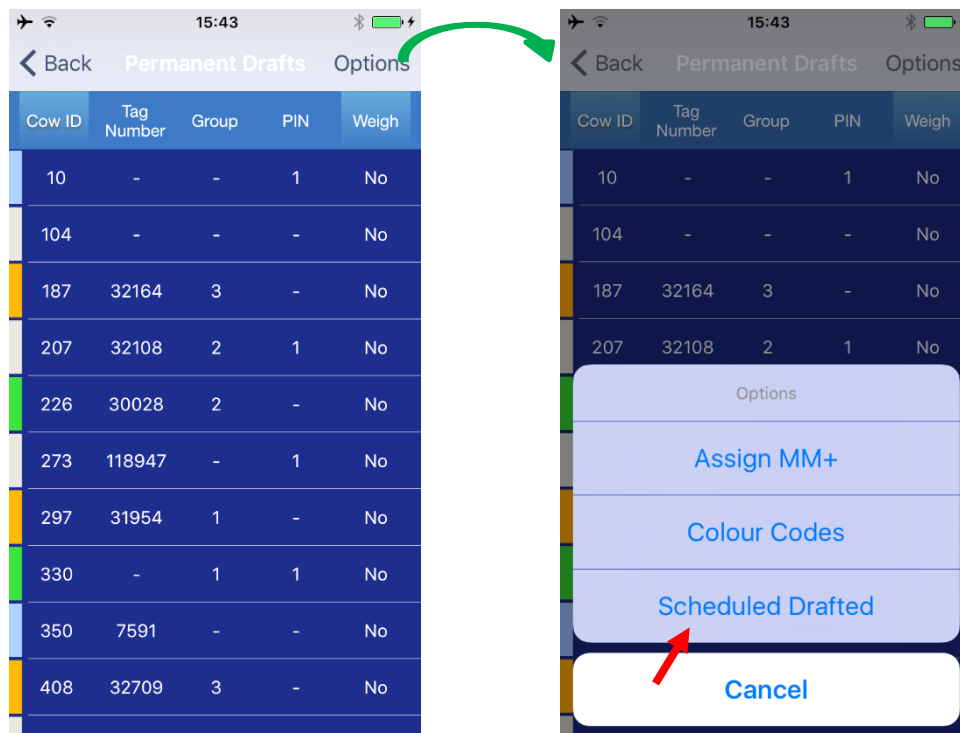


Figure 96 - Draft Table

6.3.4 View Cow data

A cow's individual data can be viewed on the IOS MooMonitor+ app by searching for the cow ID in the search bar or by clicking into any of the lists in the Summary screen

When you click into an Individual Cow the screen will display options to add events (see Figure 97).

By scrolling down it will also display the graphs associated with that cow. The activity and Rumination Graph, the Resting graph, feeding graph and Daily Activity Intensity graph will all be displayed.

The user can view the Alert details for the individual cow by selecting the **Show Alert Details** on the screen. This will display the most recent Heat and Health alerts see Figure 98.

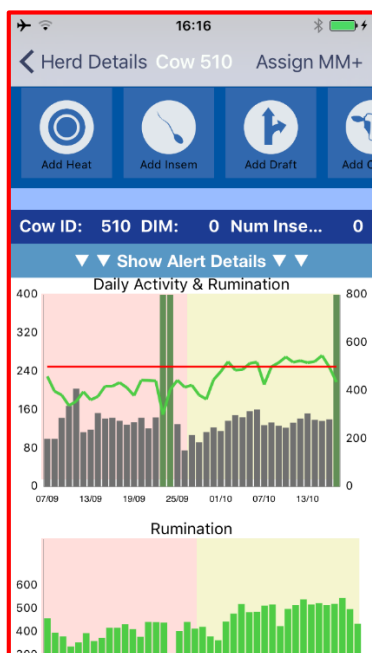


Figure 97 - Individual Cow Summary

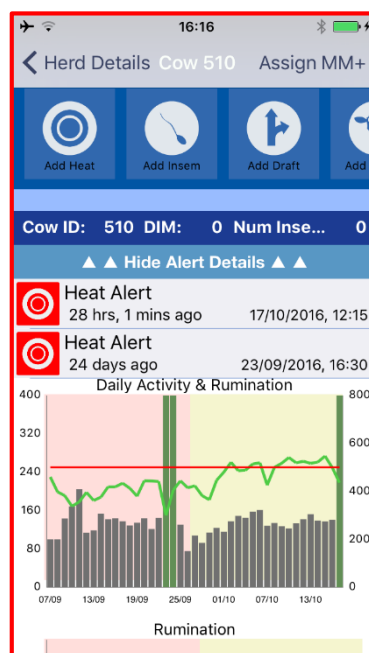


Figure 98 - Displaying Alert details

By pressing the Daily Activity & Rumination graph in the Cow Overview screen it is possible to switch to an hourly view of the cow's activity and rumination (Figure 99). This view gives a much better overview of the cow's activity.

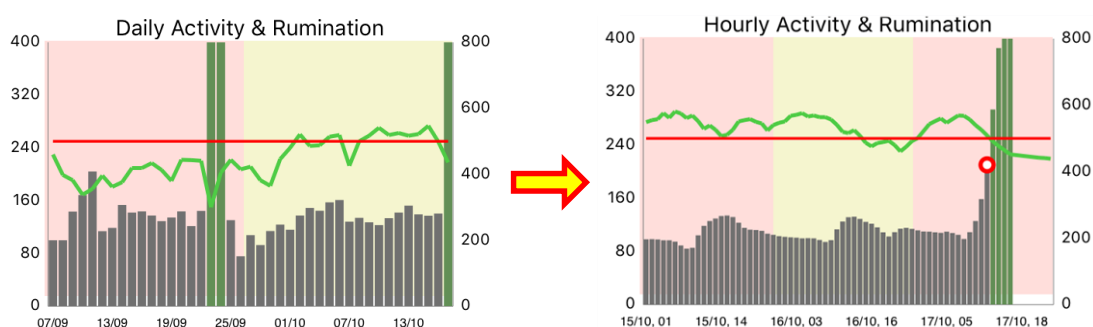


Figure 99 - Switching the Activity and Rumination graph from Daily to Hourly View



Figure 100 - Screens which are displayed while viewing cow data

6.3.5 Adding Events

The user may add a number of events within the app which will assist the farmer to organise the data generated by the MooMonitor+.

An event can be added by selecting the type of event top of the Cow Overview screen. By scrolling left to right more event options can be chosen.

Nine different events can be added using the Android App. There are also options to add cow to the **watch list** and **remove the animal** from the farm.

Add Heat		Add Preg Check		Add Dry Off Event	
Add Insemination		Add BCS		Add to Watch list	
Add Draft		Add DNB		Remove from Farm	
Add Calved		Add Health			

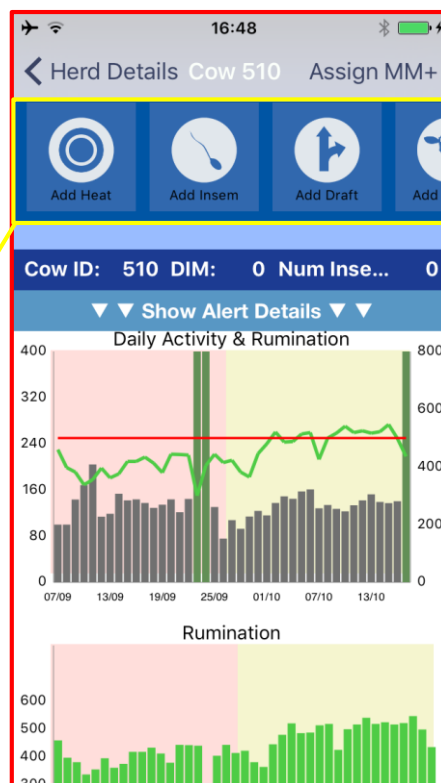
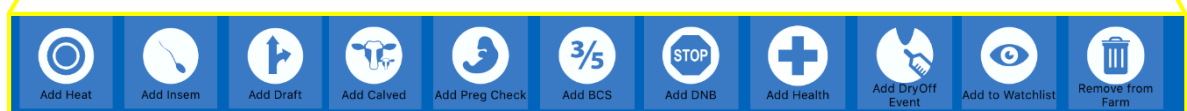


Figure 101 – Add Event Options



6.3.5.1 Add Heat

The user may at any time add an animal heat by pressing the **Add Heat** icon at the top of the screen. When an animal has a heat added they will be automatically added to the heats list.

1. The cow ID and the date of the heat event along with the time will automatically be entered.
2. The time and date may be manually changed by the user if required.
3. Any comments the farmer may have can also be added.
4. Once the details have been entered the user will need to click the save icon to store the information.

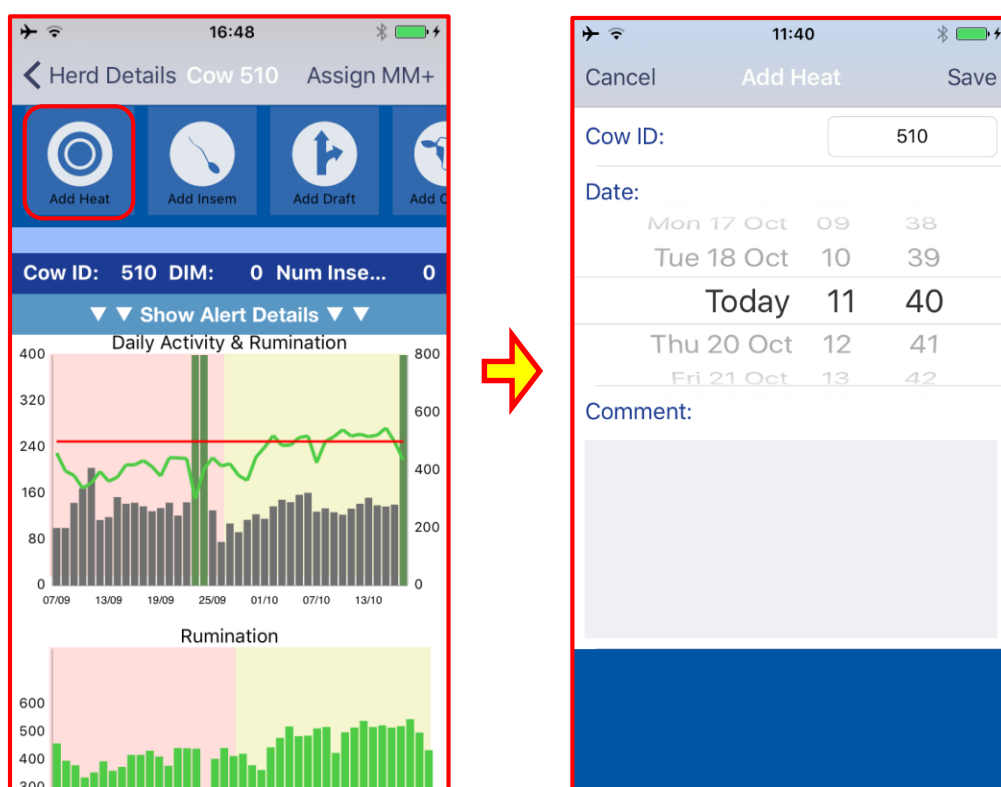


Figure 102 - Add Heat Event

6.3.5.2 Add Insemination event

The user may at any time add an animal insemination event by selecting the **Add Insem** icon at the top of the screen.

1. The cow ID and the date of the insemination event along with the time will automatically be entered.
2. The time and date maybe manually altered by the user if required.
3. The user will need to add in the siring animal ID to the app in the sire section.
4. Any comments the farmer may have can also be added.
5. Once the details have been entered the user will need to click the save icon to store the information.

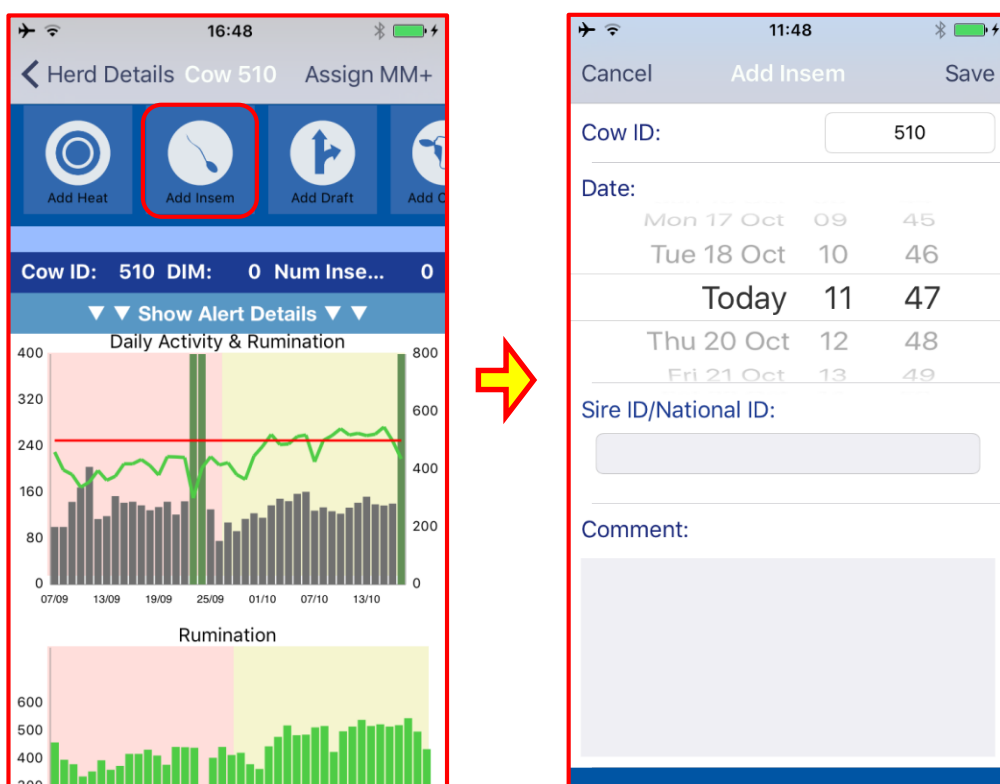


Figure 103 - Add insemination event

6.3.5.3 Add Drafting Event

It is now possible to add a drafting event for each animal. There is a range of drafting options available to the user when drafting a cow.

Select the **Add Draft** symbol at the top of the cow summary screen. A list of drafting options will appear on the screen. The cow can be set up for a **Scheduled Draft** or **Permanent Draft** from this menu.

There also options to add that cow to draft the cow to Pin 1 permanently, draft the cow to Pin 2 permanently and setting the cow to **No Draft**.

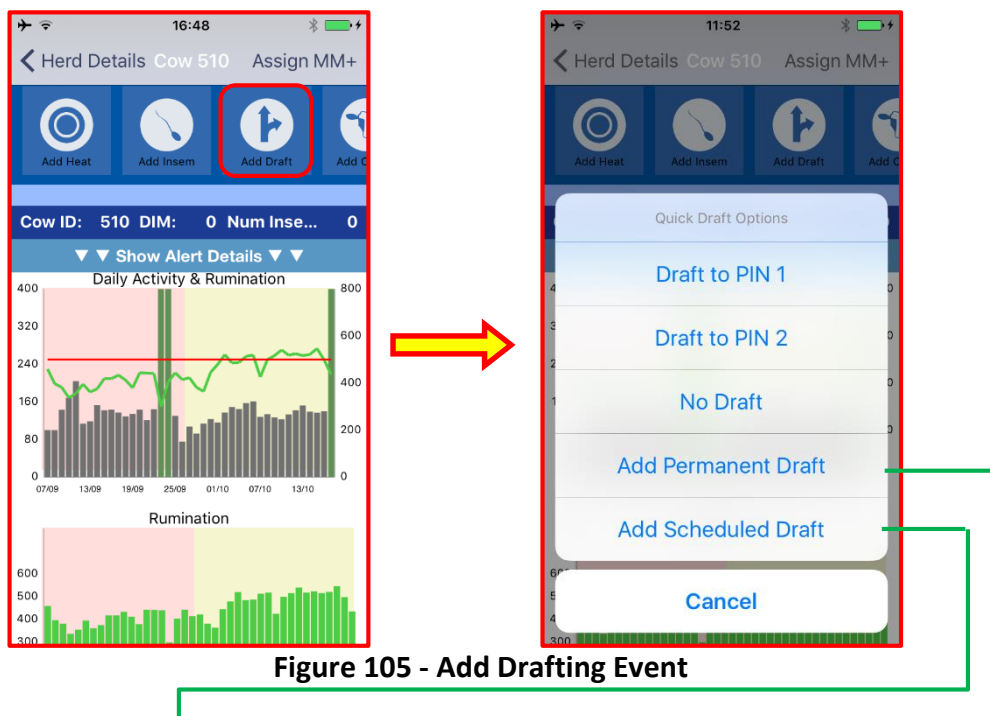


Figure 105 - Add Drafting Event

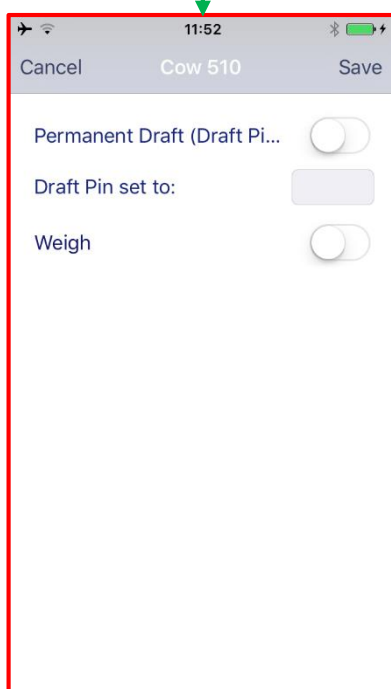


Figure 104 - Add Scheduled Draft

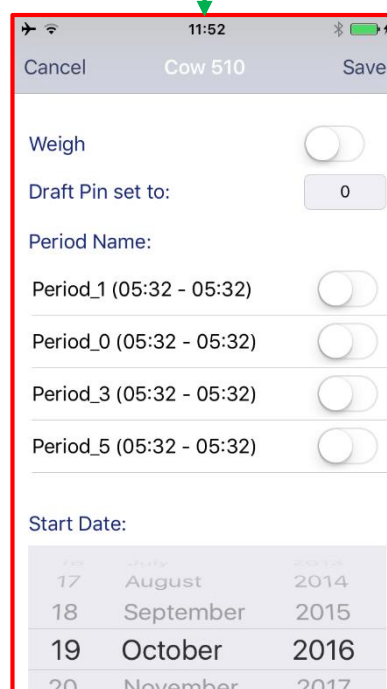


Figure 106 - Add Permanent Draft

6.3.5.4 Adding Calving event

When a cow has calved the information of the event can be entered by selecting the **Add Calved** icon at the top of the screen.

1. The cow ID and the date of the calving event along with the time will automatically be entered.
2. The time and date maybe manually altered by the user if required.
3. The difficulty of the calving and the sex of the animal may be selected.
4. Any comments the farmer may have can also be added.
5. Once the details have been entered the user will need to click the save icon to store the information.

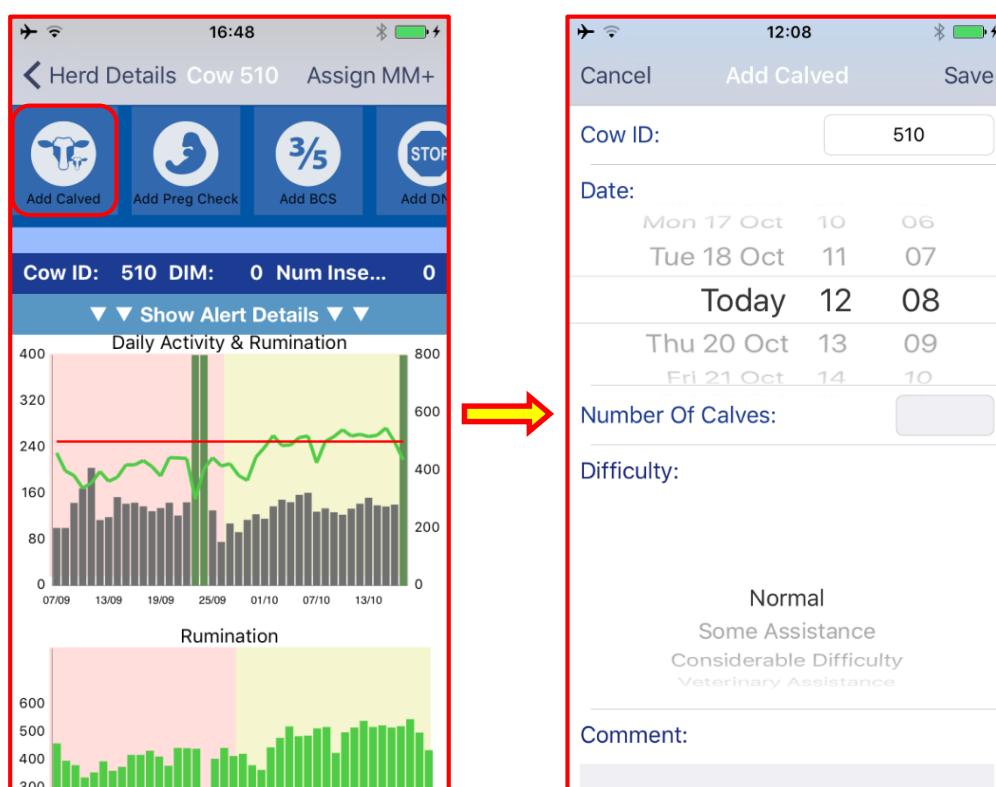


Figure 107 – Add Calving Event

6.3.5.5 Log a Pregnancy Check

The farmer can keep records of animal pregnancy checks and veterinary scans, which will assist the farmer in building a profile of which animals struggle to get pregnant.

1. The cow ID and the date of the calving event along with the time will automatically be entered.
2. The result of the pregnancy check (Positive or Negative) will need to be entered.
3. Any comments the farmer may have can also be added.
4. Once the details have been entered the user will need to click the save icon to store the information.

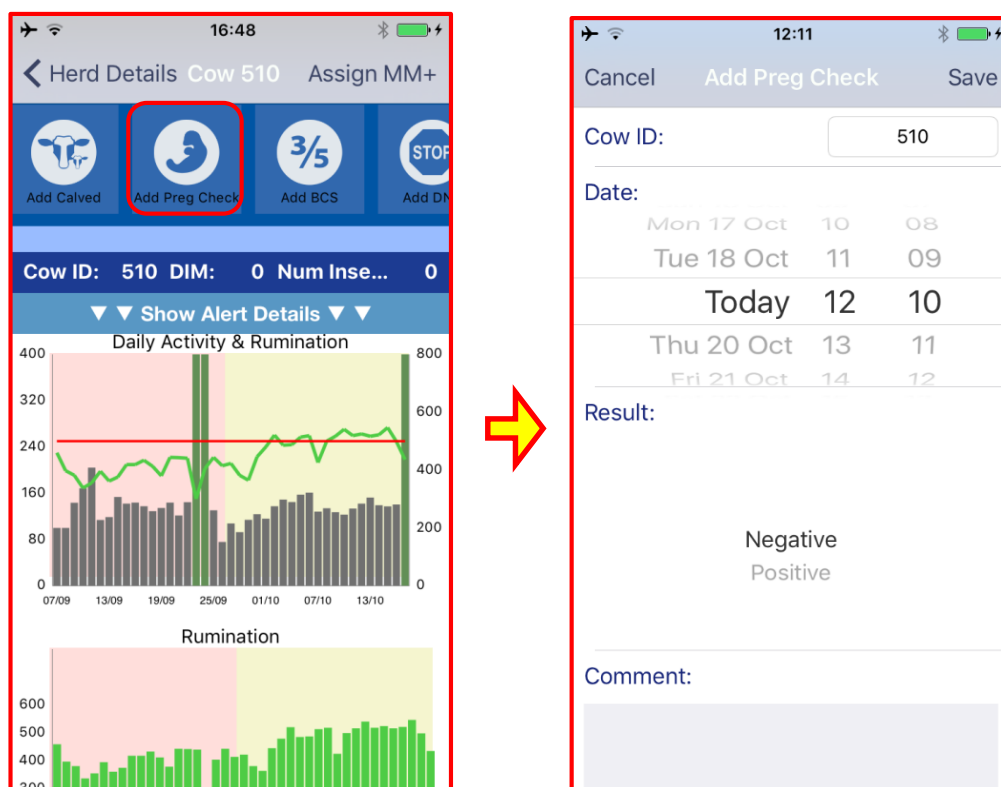


Figure 108 - Add Pregnancy Check Event

6.3.5.6 Log the animals Body Condition Score

The Body Condition Score (BCS) of the animal can be added by selecting the Add BCS icon at the top of the screen.

1. The cow ID and the date of the calving event along with the time will automatically be entered.
2. The Body Condition Score of the Animal is added.
3. Any comments the farmer may have can also be added.
4. Once the details have been entered the user will need to click the save icon to store the information.

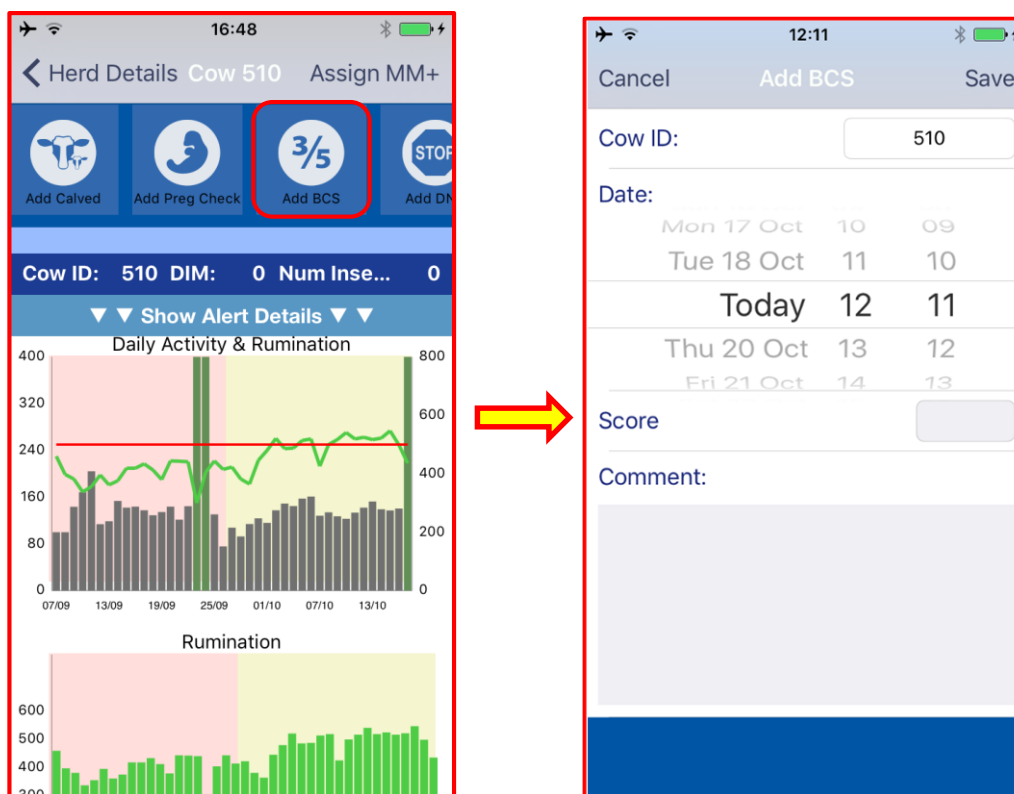


Figure 109 - Add Body Condition Score

6.3.5.7 Add Do Not Breed (DNB) Event

In the event that an animal has genetic issues or is of poor health, the user may select the animal for do not breed. This means the animal can be excluded automatically from inseminations.

At the top of the cow overview screen select the Add DNB icon.

1. Enter the Start and finish dates and times.
2. Any comments the farmer may have can be entered here also.
3. Once the details have been entered the user will need to click the save icon to store the information.

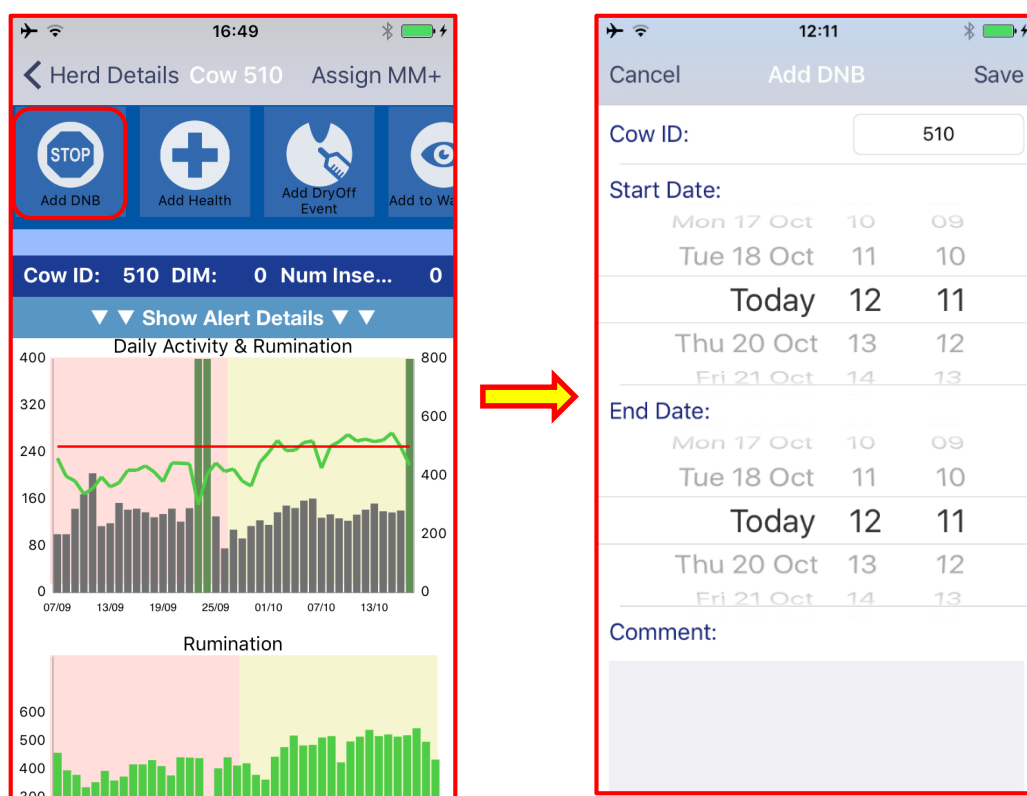


Figure 110 - Add Do Not Breed Event

6.3.5.8 Add Behaviour Alert

A health event may be added for any animal by selecting the **Behaviour Alert** icon at the bottom of the cow overview screen.

This will open up the Add Behaviour Event window on the Screen.

1. The cow ID and the start and end date and time of the behaviour event will automatically be entered.
2. The start and end time and date may be manually altered by the user if requires.
3. The type of behaviour event must be selected by scrolling through the list of illnesses.
4. Any comments the farmer may have can also be added at the bottom.
5. Once the details have been entered the user will need to click the save icon to store the information.

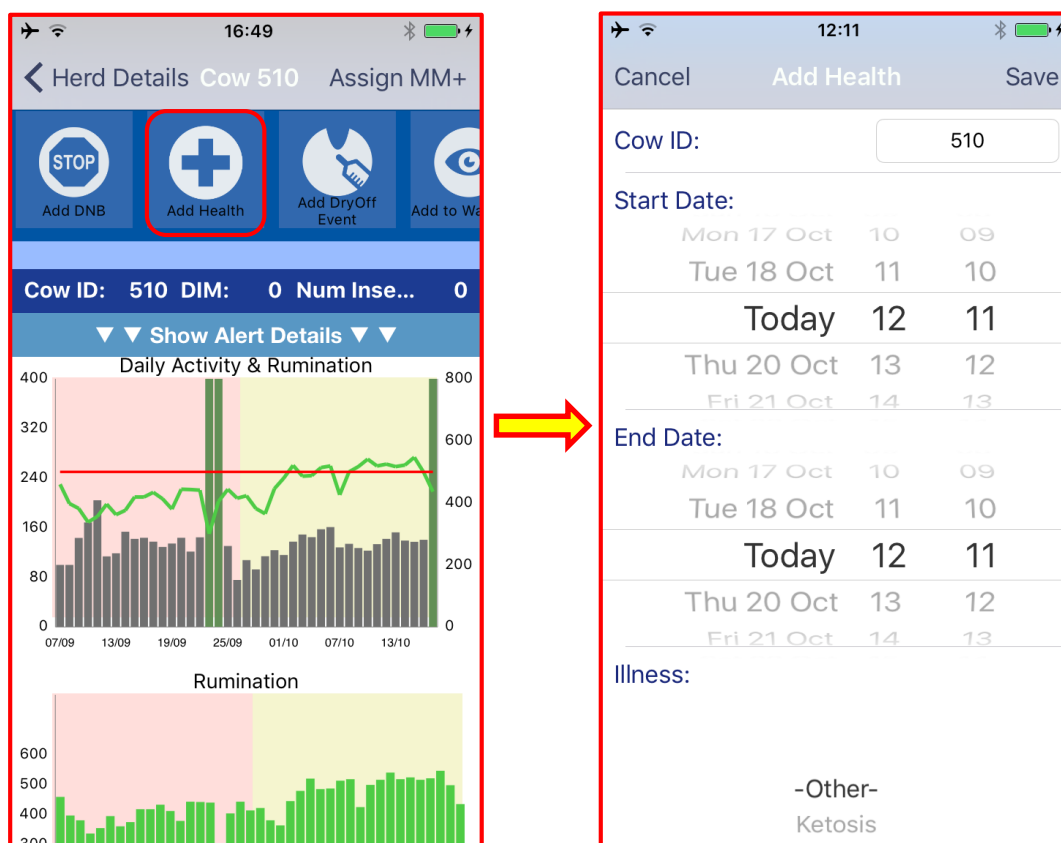


Figure 111 – Adding a health event

6.3.5.9 Add Dry Off Event

The user may add a Dry Off event by selecting the **Dry Off** icon at the bottom of the screen.

1. The cow ID, the date and time of the dry off event will be automatically entered. The user may enter a different date & time if they require.
2. Any comments the farmer may have can also be added.

Once the details have been entered the user will need to click the save icon to store the information

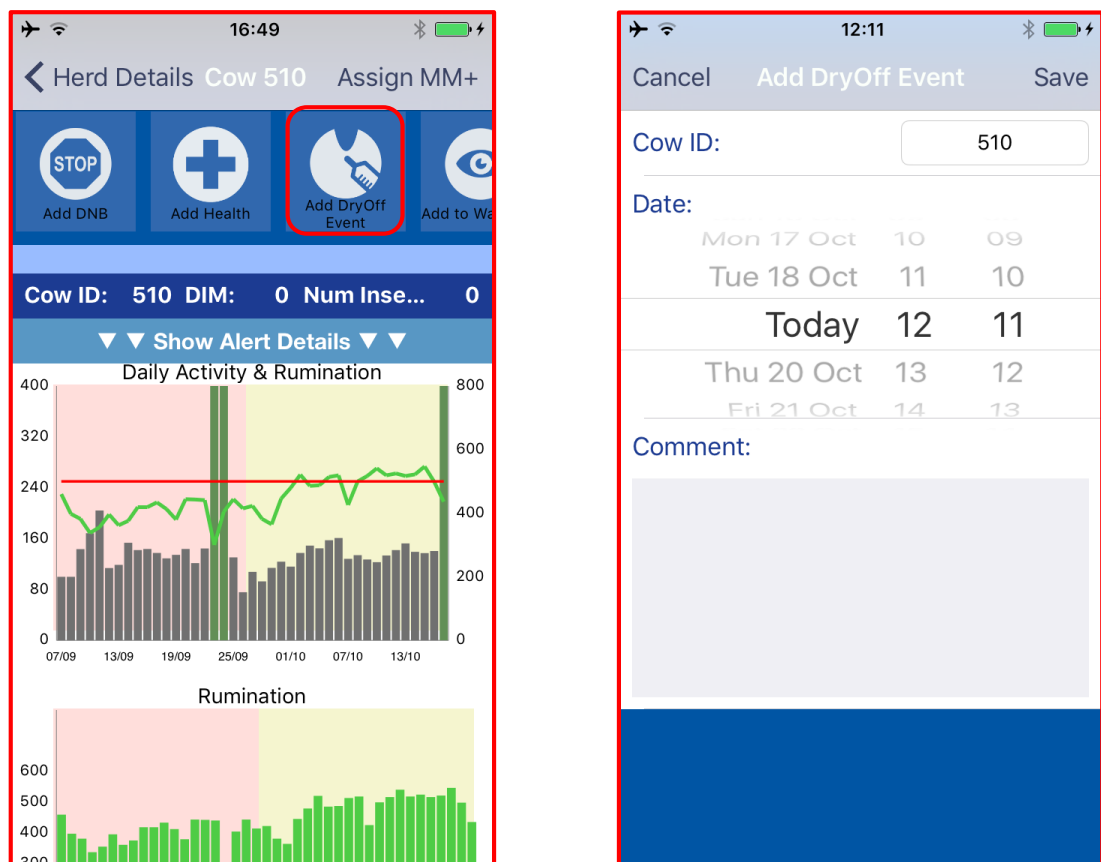


Figure 112 - Add a Dry Off Event.

6.3.6 Batching

The user may add an event to groups of animals at once by using the **Batching** feature on the App. The **Batching** feature is accessed by selecting **Options** on the top right of the home screen.

The **Batching** screen will display a list of the various groups of animals in the herd such as the **Heat, Suspect, High Activity, Behaviour, Drafts & All Cow lists** etc. By selecting into any of these lists, the user can then select a number of cows from the list by sliding the select key sideways next to each cow (**Figure 116** - Selection screen).

After selecting the cow ID's, the user can add an event to the selected group of cows by selecting one of the events on the scroll bar at the bottom of the screen

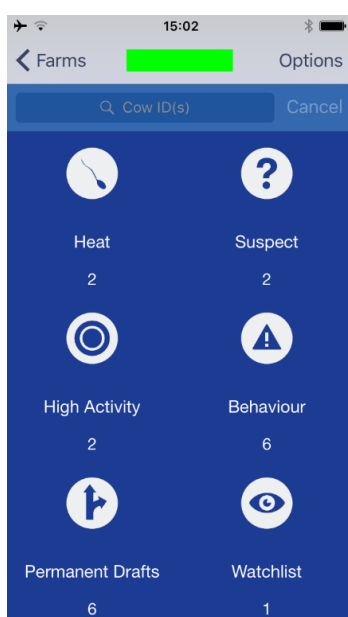


Figure 113 – Home Screen

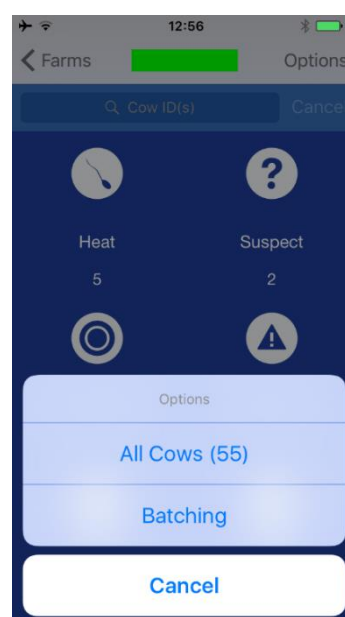


Figure 114 - List of Options

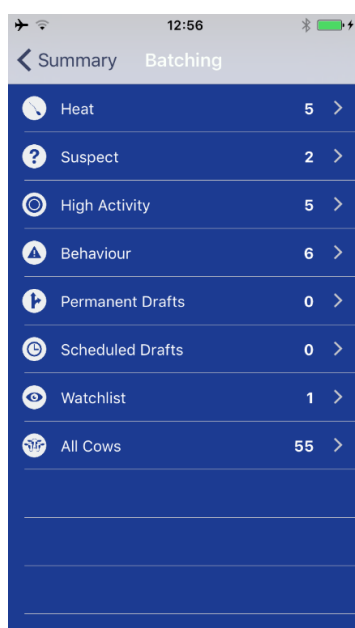


Figure 115 - List of groups for Batching

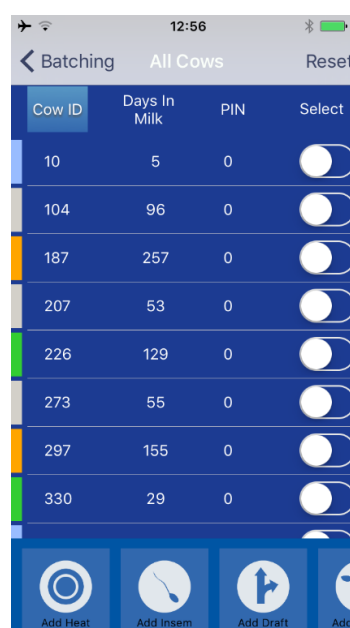


Figure 116 - Selection screen

6.3.7 Assigning a MooMonitor+

The user can assign a MooMonitor+ to a cow by selecting the Assign MM + on the top right of the Herd Details screen see Figure 117.

The Cow ID and MooMonitor+ ID can be entered see Figure 117.

The MooMonitor+ ID is located on the MooMonitor+ Tag rear face.

The Date Assigned may also be added.

1. From the Herd Details option click the Assign MM+ Tab.
2. Enter the Cow ID & the MooMonitor+ ID (Located on the rear of the MooMonitor+).
3. Enter the Date assigned.
4. Once the details have been entered the user will need to click the save icon to store the information.

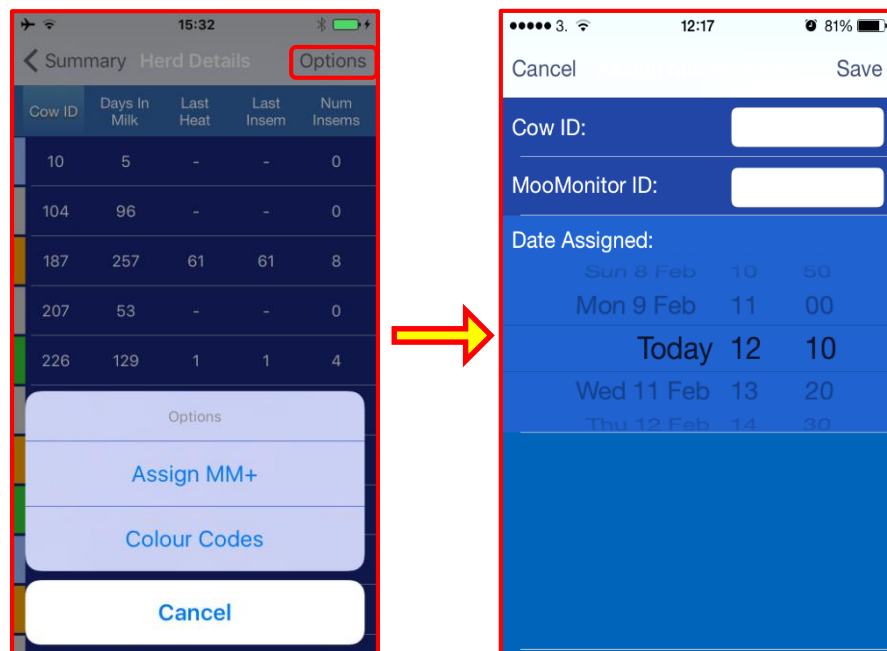


Figure 117 - Assigning a MooMonitor to a Cow ID

6.3.8 View Basestation Status

The User may view the Basestation Status and information about the tags communicating with the system.

To view the Basestation information, select the Basestation status bar along the top of the home screen (this will be green or red depending on whether the Basestation is connected or disconnected).

The system will show the number of collars which have communicated with the Basestation in the last 24hrs and the collars which have been out of range for longer than that period.

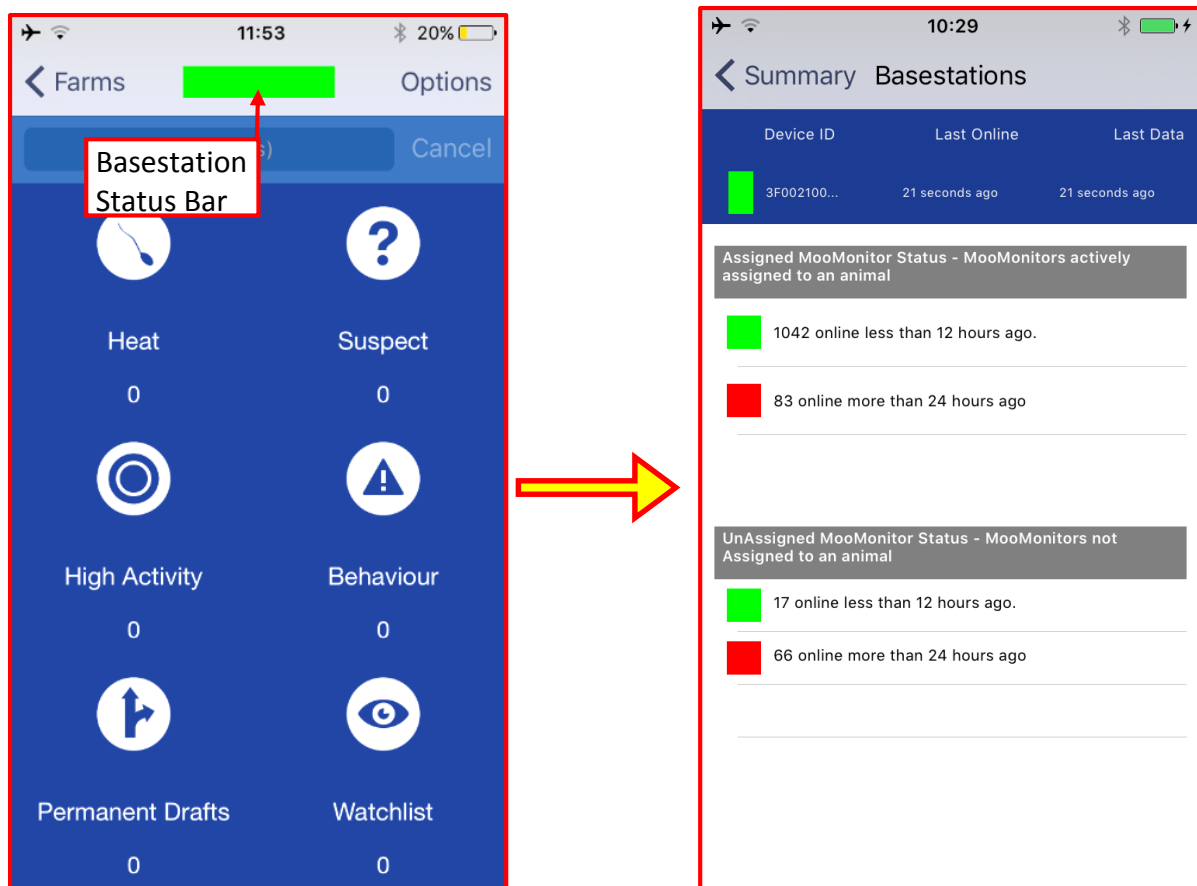


Figure 118 – View Basestation Status

6.4 MooMonitor+ Web Interface (Version 2.5)

6.4.1 Logging in

The Dairymaster MooMonitor + Web provided the user with an intuitive interface which can be accessed by typing the following address into the address bar of google chrome, or internet explorer:

cloud.dairymaster.com

Once the page loads a log in page will appear and ask the user to enter the credentials provided to them by Dairymaster. These credentials i.e. the customers Username and Password.

This information must be obtained from Dairymaster.

Important Note

The log in details for the Web interface and the Smartphone App are the same

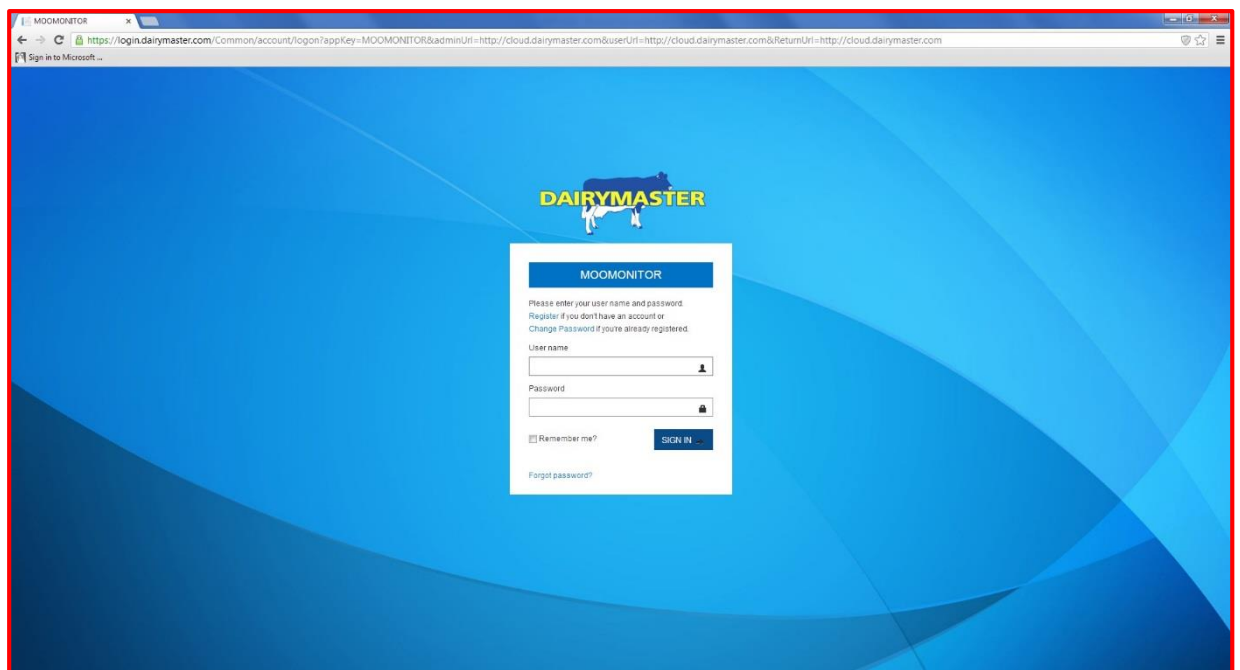


Figure 119 – MooMonitor + Web Interface Log in

6.4.2 Fertility Dashboard

The Fertility Dashboard will give an overview of the farm to the user. It contains the Day to day information that the user can view using the MooMonitor+ system.

The Dashboard contains the following:

1. Application Menu
2. Context Menu.
3. The Individual data for a specific animal.
4. Rumination and Activity Graphs.

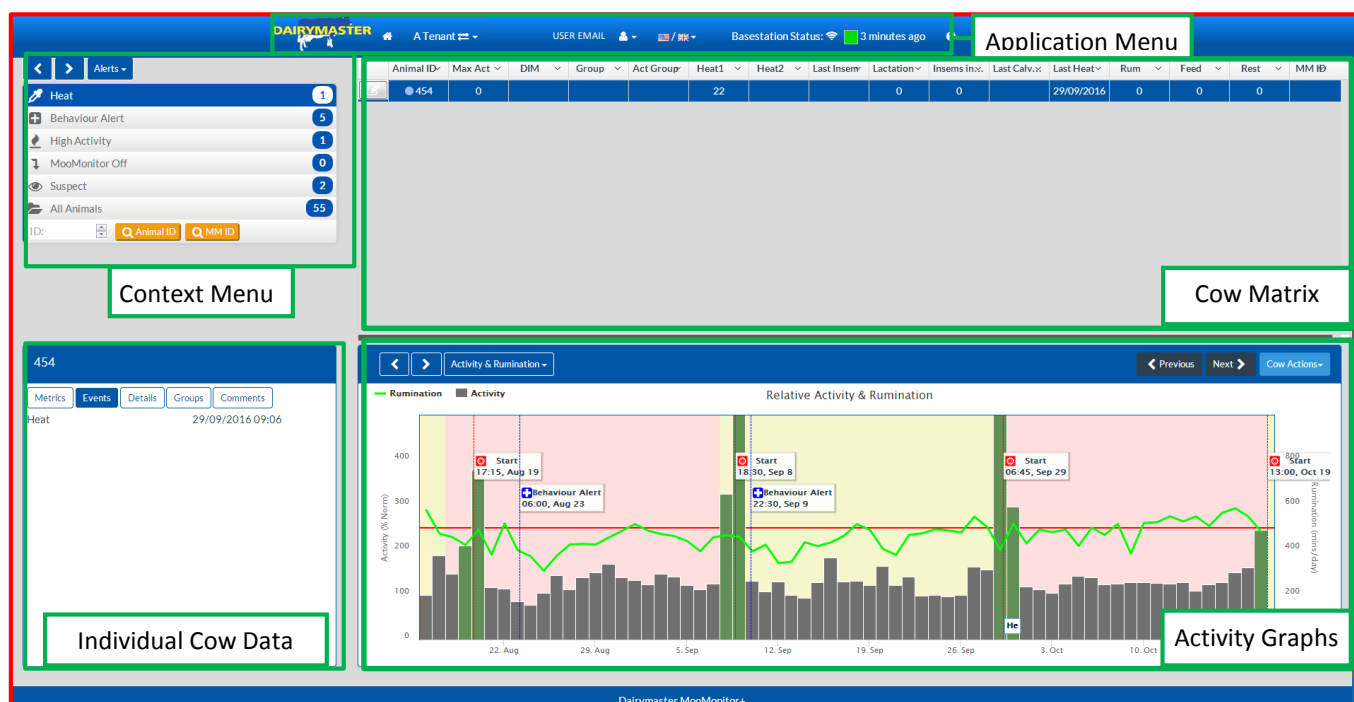


Figure 120 - View of the Fertility Dashboard on the Web Interface.

The Fertility Dashboard displays the animals using a number of different characteristics which can be selected by the user see Table 6:

Table 6 – Fertility Dashboard characteristic filtering

Animal ID,	Inseminations in Lactation
Max Activity	Last Calved
Days in Milk	Last Heat
First Heat	Rumination level
Second Heat	Last Heat
Group	Feed Level
Last Insemination	Rest Level
Lactation,	MooMonitor+ ID

By selecting the different groups or alerts on the Alerts tab in the Context menu, the user can view the list of in that group or alert.

6.4.3 The Application Menu:

The Application Menu displays the Farm Name, the Username, the language and the Base Station status.

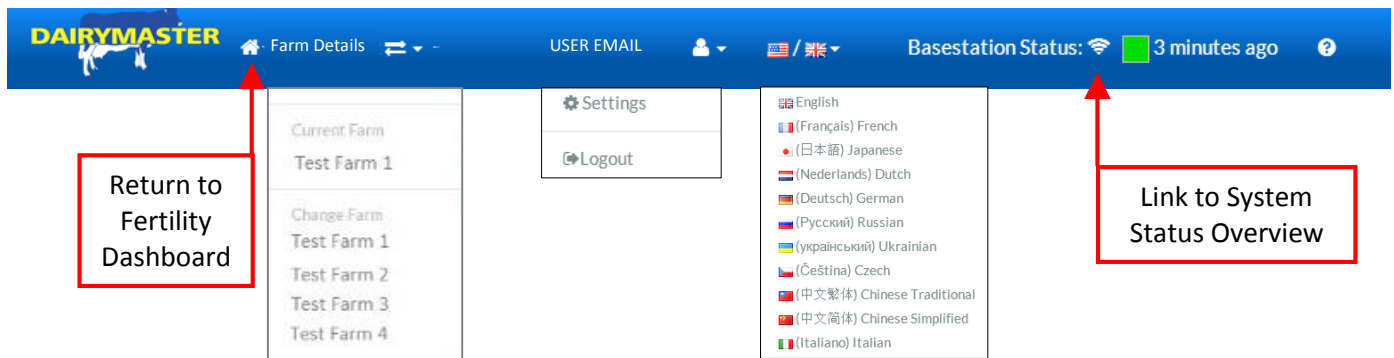


Figure 121 –Typical view of Application Menu with drop down options

By selecting the Dairymaster logo the user can return to the Fertility dashboard screen.

The Basestation Status shows when the Basestation last uploaded data to the cloud. The user can click on the Basestation Status to view the System Status Overview dashboard.

This dashboard displays information relating to the MooMonitor+ units which are communicating with the Basestation and the time of the last transmission see Figure 122.

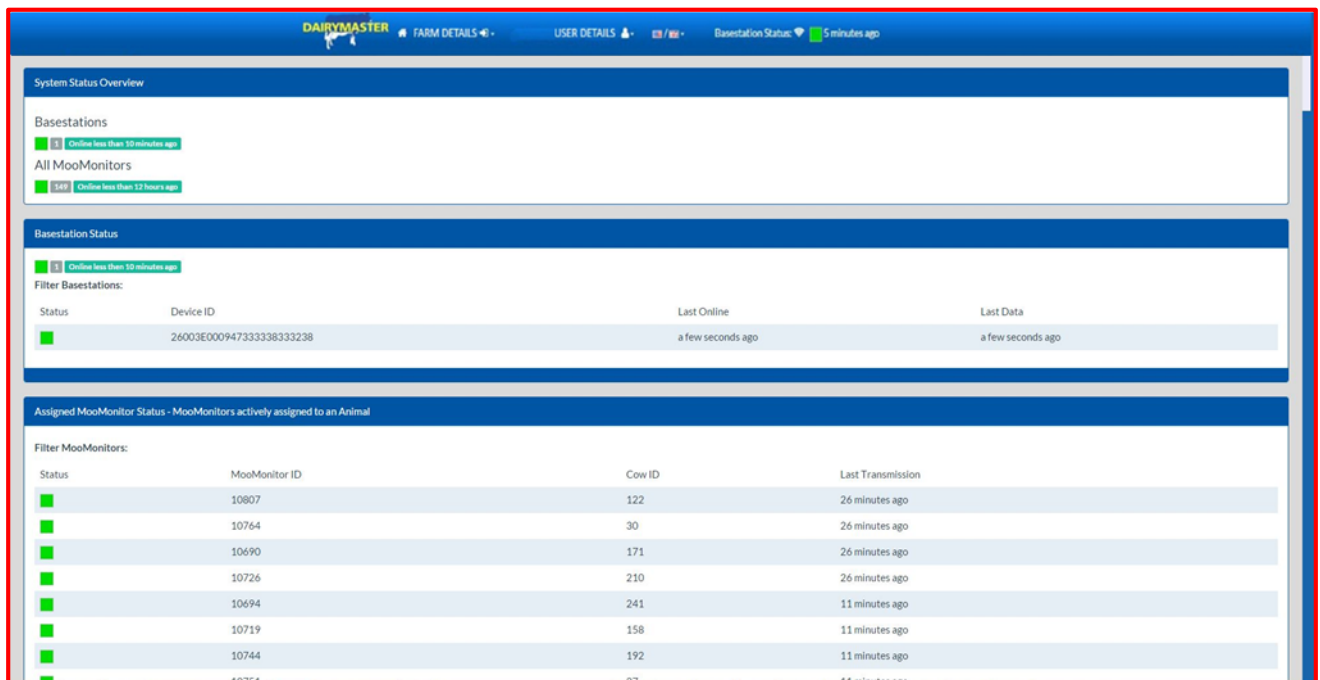


Figure 122 - System Status Overview

6.4.4 The Context Menu: Alerts Tab, Groups, Records Tab & Reports Tab

The Context Menu displays the Alerts tab, Groups, the Records tab and the Reports tab. Each tab is viewed by selecting the dropdown menu at the top of the Context menu

6.4.4.1 The Alerts Tab

This gives an overview of the cows in Heat, Suspect or displaying a Health Alert etc.

By selecting any of the alerts in the context menu the list of cows applicable to that alert will be displayed on the panel on the top right of the screen.

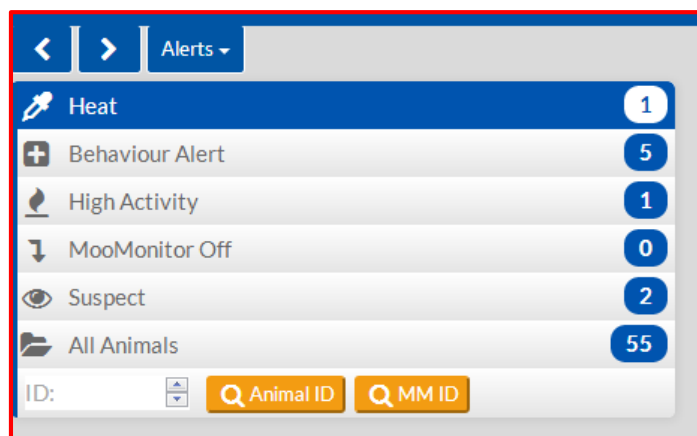


Figure 123 - Typical view of the Alerts Tab on the Context Menu.

Health Alert:
The Health Alert symbol shows the cows that are displaying abnormal behaviour such as a decrease in rumination, feed intake, activity, increased resting etc.
Heat button:
The Heat button will show the cows that are showing high levels of activity and therefore are identified as in heat. These cows will show factors such as high activity levels, decreased rumination, etc.
MooMonitor+ Off:
MooMonitor+ off is a list of the tags which have fallen off the cows. This may occur if the collar gets caught or the buckle on the strap becomes loose. The MooMonitor+ software will identify this and place the tag number on the MooMonitor+ off list.
MooMonitor+ Reversed:
The MooMonitor+ tag may also become twisted on the cow's neck if the strap is loose on the cow. The MooMonitor+ will become alerted to these changes and will place this cow on the MooMonitor+ reversed list.
Suspect:
This is a list of the cows that are suspected to be in Heat. Their activity levels have increased but they have not yet overcome the Activity threshold. Farmers can identify these cows for further monitoring.
All Animals:
The All Animals list will display all cows on the System.

6.4.4.2 The Groups Tab

The Groups Tab is generated based on the information inputted into the MooMonitor+ system.

The user can view each group individually by selecting them from the list. The information about the cows in that group will appear in the Cow matrix at the right of the screen.



Figure 124 - Typical View of the Groups Tab in the Context Menu

6.4.4.3 The Records Tab

The Records Menu allows the user to add or edit animals, or to assign Moo Monitors and manage notification settings.

The user may select any of the options on the records tab and a new window/tab will open up on screen, which the user may use to input or edit specific information.



Figure 125 - Typical View of the Records Tab on the Context Menu

6.4.4.4 The Reports Tab

The Reports Menu allows the user create reports in PDF format or CSV file format based on different criteria i.e. Heat alerts, Suspect alerts, Health alerts, etc.

These reports may be used for example to provide vets information on which animal to inseminate or which animals require a pregnancy scan. This function will allow the user to produce reports on the common feature of the application.

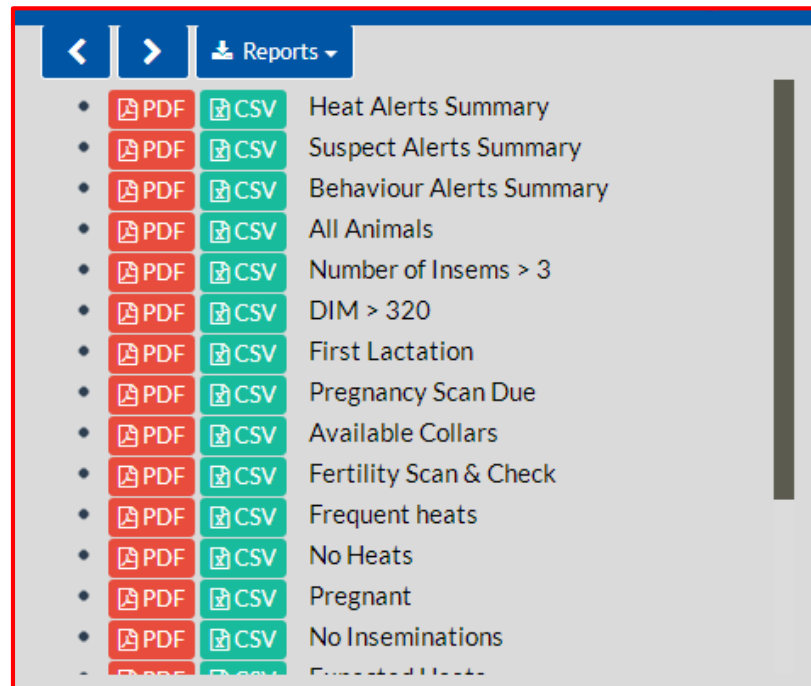
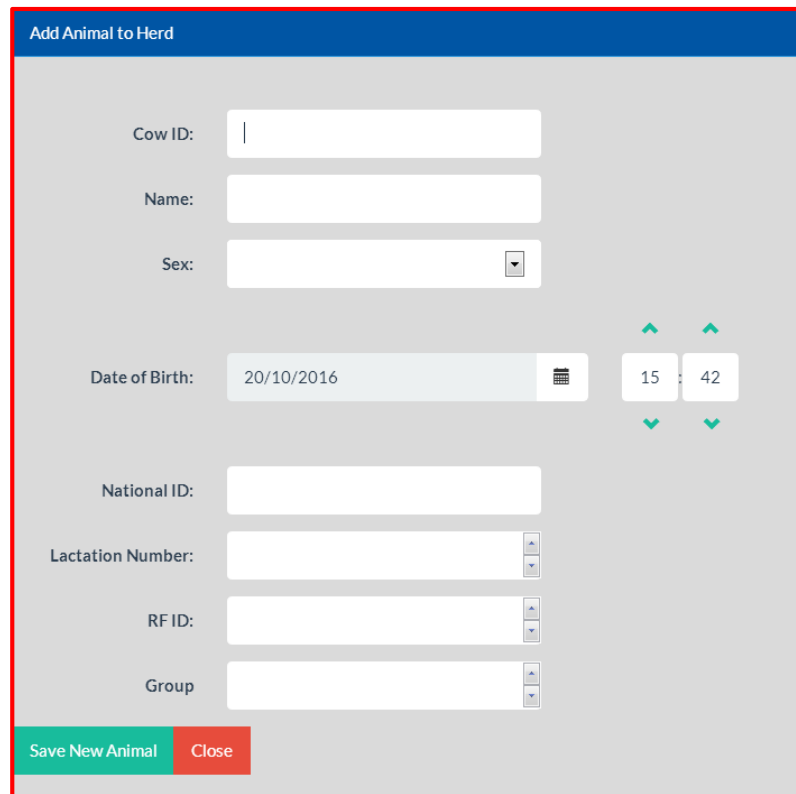


Figure 126 – Reports tap

6.4.4.5 Add Animal

The **Add Animal** option on the Records Tab will allow the user to add animal details to the system. By clicking on the tab a new window/tab will open up on screen which will prompt the user to enter the cow details see Figure 127.

When the information has been entered the user must click 'Save New Animal' to save the information to the system.



The screenshot shows a window titled "Add Animal to Herd" with a blue header bar. The main area is light gray and contains several input fields and controls:

- Cow ID:** A text input field with a vertical cursor.
- Name:** A text input field.
- Sex:** A dropdown menu with a small square icon on the right.
- Date of Birth:** A date picker showing "20/10/2016" with a calendar icon. To its right are two spinners for "15" and "42" with up/down arrows.
- National ID:** A text input field.
- Lactation Number:** A text input field with up/down arrows on the right.
- RF ID:** A text input field with up/down arrows on the right.
- Group:** A text input field with up/down arrows on the right.

At the bottom of the window are two buttons: "Save New Animal" (green) and "Close" (red).

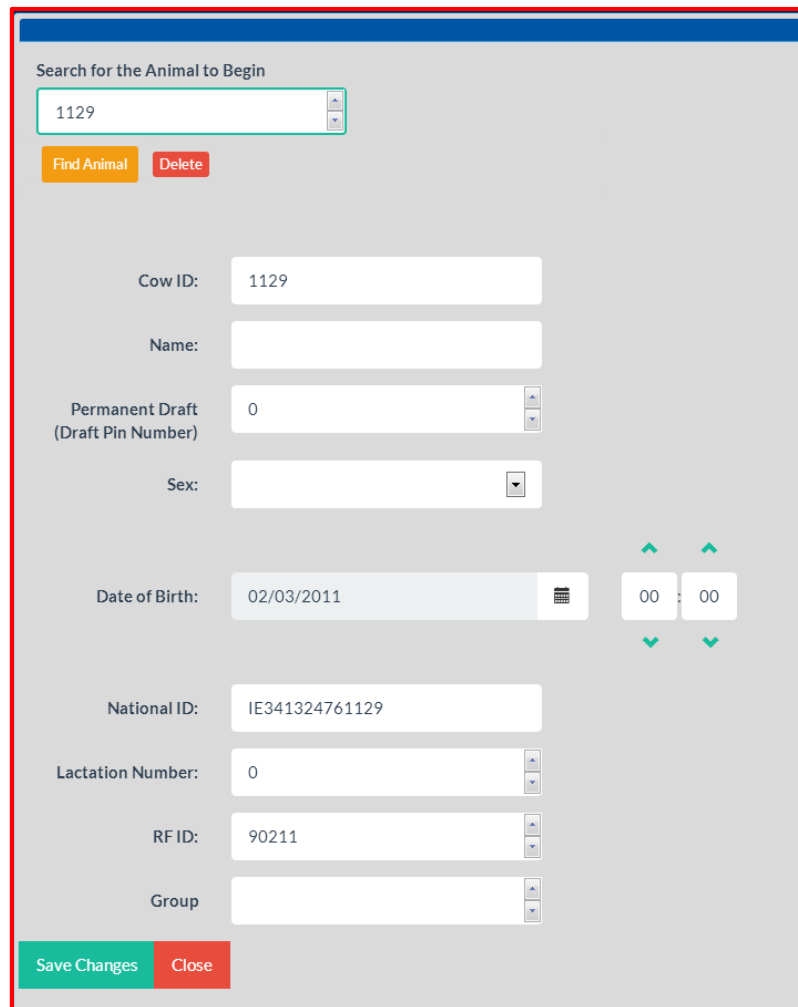
Figure 127 - Add Animal Window

6.4.4.6 Edit Animal

Each individual animal's details can be edited by selecting the Edit Animal option on the Records Tab.

The user will need to search for the animal by entering the cow ID at the top of the window and then clicking on the Find Animal tab.

The animal's details will then appear so the user can edit any details necessary. When all the changes have been made, click 'Save Changes' at the bottom of the window.



The screenshot displays the 'Edit Animal' window. At the top, there is a search bar with the text 'Search for the Animal to Begin' and a text input field containing '1129'. Below the search bar are two buttons: 'Find Animal' (orange) and 'Delete' (red). The main section contains several form fields for editing animal details: 'Cow ID' (1129), 'Name' (empty), 'Permanent Draft (Draft Pin Number)' (0), 'Sex' (dropdown menu), 'Date of Birth' (02/03/2011 with a calendar icon), 'National ID' (IE341324761129), 'Lactation Number' (0), 'RFID' (90211), and 'Group' (empty). To the right of the 'Date of Birth' field are two spinners for time, both set to '00'. At the bottom are two buttons: 'Save Changes' (green) and 'Close' (red).

Figure 128 - Edit Animal Window

6.4.4.7 Assigning a MooMonitor+

A MooMonitor+ can be assigned or removed from an animal by clicking on the **Assign MooMonitor+** option on the Records Tab.

The user will need to search for the animal by entering the cow ID at the top of the window and then clicking on the Find Animal see Figure 129.

The window will show whether the animal currently has a MooMonitor+ assigned and the serial number of the MooMonitor+.

- If the animal has no tag assigned to them, it will give the option to assign a tag.
- Historical data for the MooMonitor+ is also available at the bottom of the window.

Important Note

To assign a MooMonitor + to an animal, the animal will first need to be added to the system using the Add Animal option on the Records Tab.

Assign or Remove MooMonitor from Animal

Search for the Animal to Begin

1129

Find Animal

Animal is not assigned to a MooMonitor

Assign MooMonitor

MooMonitor ID: [dropdown]

Collar On: 20/10/2016 [calendar icon] 15 : 48 [up/down arrows]

Collar Off Date: [calendar icon] 15 : 48 [up/down arrows]

Assign MooMonitor

Past Collars for Animal

Collar On	Collar Off
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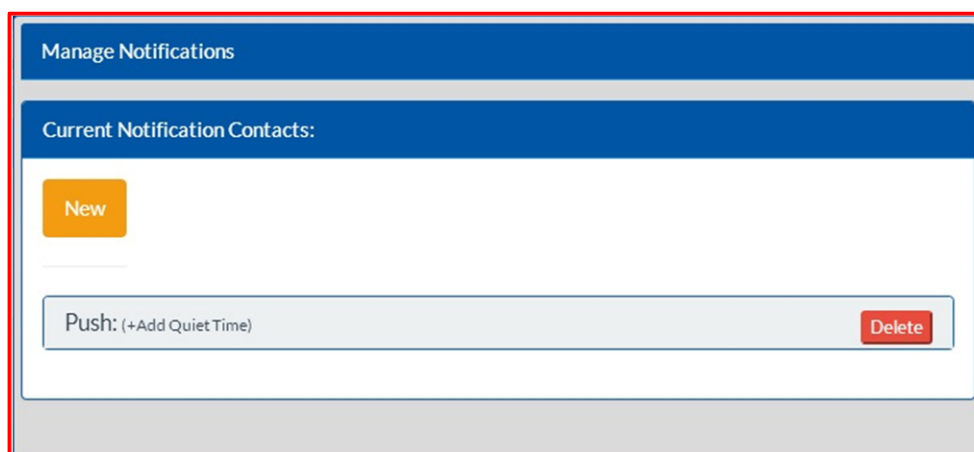
Figure 129 - Assign MooMonitor+ Window

6.4.4.8 Manage Notifications

Each user can manage the Notifications they wish to receive by selecting the **Manage Notifications tab** on the Records Tab.

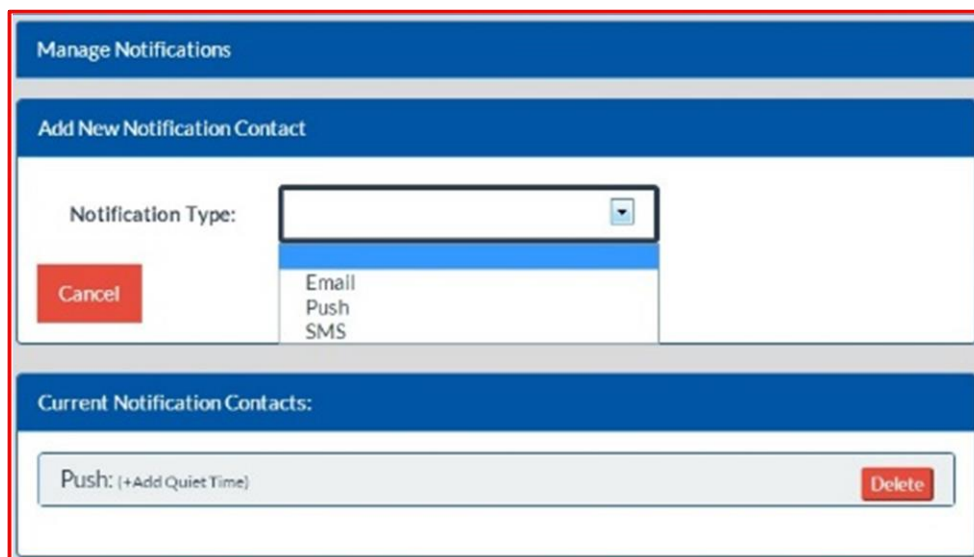
The user can receive notifications by email, by text or by push notifications to the mobile apps.

The Manage notifications window/tab will display the current notification type see Figure 130 and give the user the option of adding a new notification type see Figure 131 or deleting a current notification type.



The screenshot shows the 'Manage Notifications' window. It has a blue header bar with the title 'Manage Notifications'. Below the header is a section titled 'Current Notification Contacts:'. Inside this section, there is an orange 'New' button on the left. Below the 'New' button is a light gray bar representing a notification contact. This bar contains the text 'Push: (+Add Quiet Time)' on the left and a red 'Delete' button on the right.

Figure 130 - Manage Notifications Window



The screenshot shows the 'Add New Notification Contact' section within the 'Manage Notifications' window. It has a blue header bar with the title 'Add New Notification Contact'. Below the header, there is a 'Notification Type:' label next to a dropdown menu. The dropdown menu is open, showing three options: 'Email', 'Push', and 'SMS'. To the left of the dropdown menu is a red 'Cancel' button. Below this section is another section titled 'Current Notification Contacts:'. Inside this section, there is a light gray bar representing a notification contact. This bar contains the text 'Push: (+Add Quiet Time)' on the left and a red 'Delete' button on the right.

Figure 131 - Add New Notification

6.4.4.9 Adding Quite Time to Notifications.

There is an option to **Add Quiet Time** to the Push notification settings.

Adding a quiet time will disable any push notifications being sent to the user's device between the times outlined in the Add new quite time section of the Current Notification contacts.

To do this the user will need to click on Add Quiet Time on the Current Notifications Contacts List, then enter the times they wish the notifications to be disabled for.

This information must be confirmed and saved to the system by clicking the Save tab.

The screenshot displays the 'Manage Notifications' interface. At the top is a blue header bar with the text 'Manage Notifications'. Below this is a section titled 'Add New Notification Contact' in a blue bar. Underneath, there is a 'Notification Type:' label followed by a dropdown menu showing a downward arrow. A red 'Cancel' button is positioned to the left of the dropdown. Below the 'Add New Notification Contact' section is another blue bar labeled 'Current Notification Contacts:'. Inside this section, there is a card for a 'Push' notification contact, labeled 'Push: (+Add Quiet Time)' with a red 'Delete' button in the top right corner. Within this card, there is a sub-section titled 'Add New Quiet Time'. This sub-section contains two side-by-side time selection boxes. The left box is titled 'Daily Start Time' and the right box is titled 'Daily End Time'. Both boxes show a digital clock display with '12 : 00' and green up/down arrows for adjusting the time. At the bottom of the 'Add New Quiet Time' section is an orange 'Save' button.

Figure 132 - Adding Quiet Time to Push Notifications

6.4.4.10 Animal Group function

The User can now select and organise animals by groups. In order to do this the user will need to add a group number to the animal in question.

This is done by clicking on the **Records tab**, then clicking on the **Edit Animal** tab see Figure 133 and entering the animal ID into the search box see Figure 134.

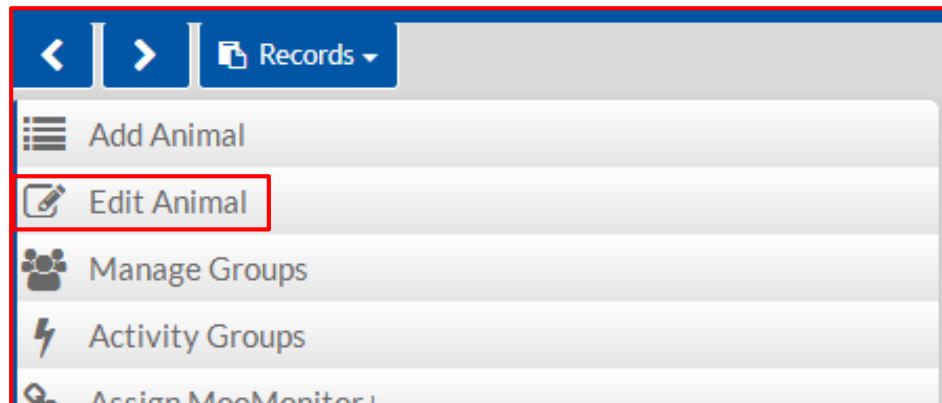


Figure 133 – Edit animal in Records Tab

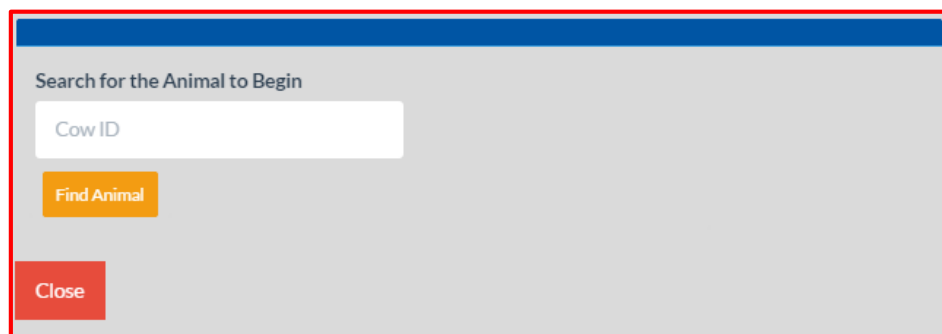


Figure 134 – Animal Search bar.

From here the user can specify a group number for the animal by entering a numerical value in the group box and clicking save changes see Figure 135.

Search for the Animal to Begin

1129

Find Animal Delete

Cow ID: 1129

Name:

Permanent Draft (Draft Pin Number) 0

Sex:

Date of Birth: 02/03/2011 00 00

National ID: IE341324761129

Lactation Number: 0

RF ID: 90211

Group

Enter Group Value here

Save Changes Close

Figure 135 – Entering the animal group id value

6.4.4.11 Undelete Animal

The Undelete Animal Option allows the users to recover the data for a cow they may have accidentally deleted from the system.

The user simply clicks on the **Undelete Animal** option on the Records Tab. This will open a window displaying the previously deleted animals see Figure 136.

The user can restore an animal to the system by selecting the Recover button on the right side of the window.

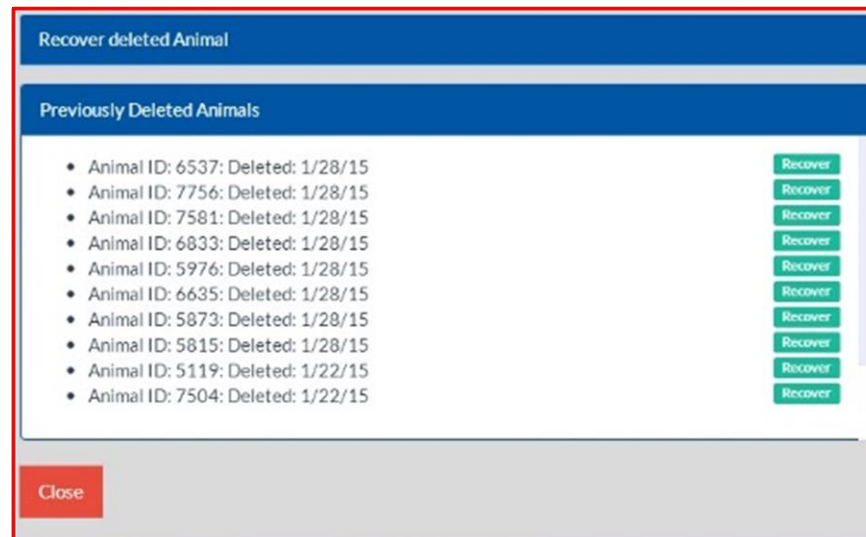


Figure 136 - Recover deleted animal Window

6.4.5 Viewing Herd Data

The user can view a cow's data by selecting any individual cow from the list on the screen.

This will display the animal's details in the bottom left of the window and the activity and rumination chart at the bottom right of the window.

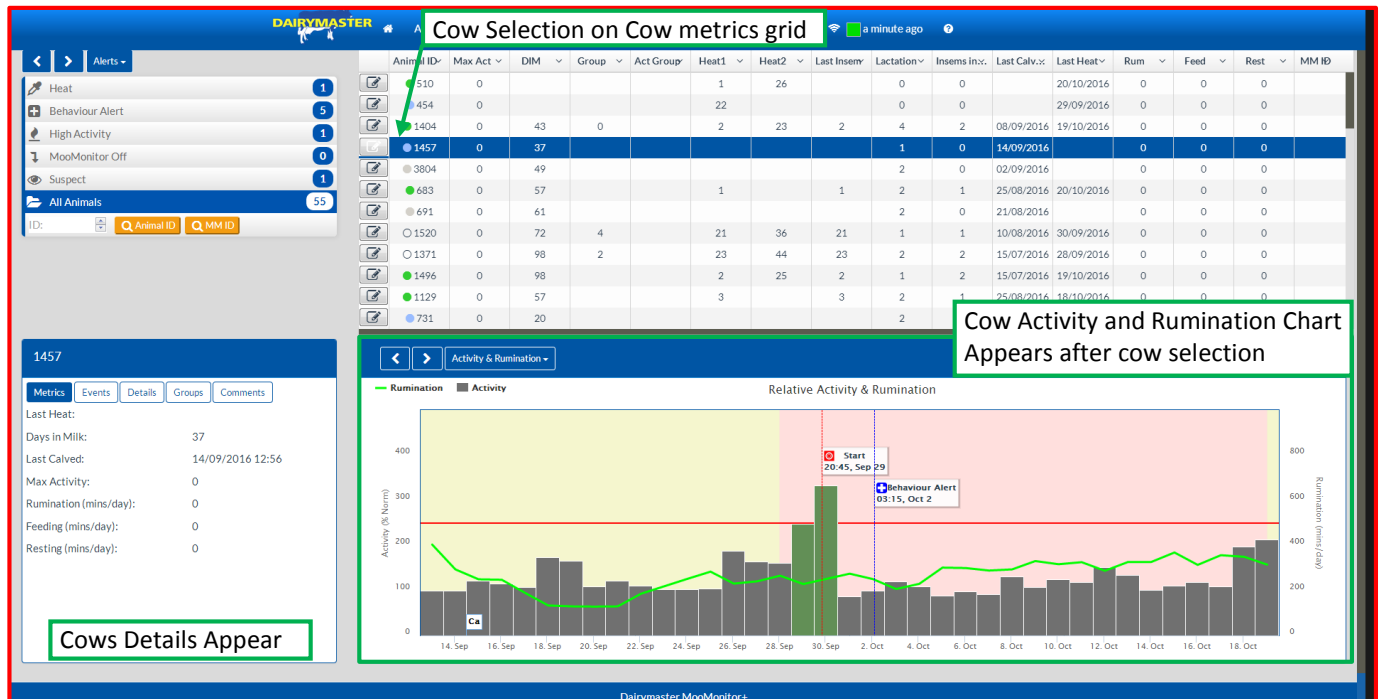


Figure 137 – Viewing Cow Data within the Web app

The user can view the cow's metrics, such as Last Heat date, Days in Milk, Calving date, etc.

There are four other tabs which display the cows past events and the details of that cow along with the groups she is in and any comments which have been entered.

Beside each animal ID on the cow grid there is a circle which will have a colour to indicate certain statuses a cow may have. These colour codes are explained by selecting the help icon on the application menu at the top of the screen.



Figure 138 - Tab explaining Colour indicators for each animal

Activity Charts:

When the page loads the first cow on the list is automatically selected and the MooMonitor+ activity data is presented in the chart for viewing.

There is a drop down list on the chart that allows the user to view different activity graphs such as rumination, feeding, resting and Activity Intensity and Groups (see Figure 139).

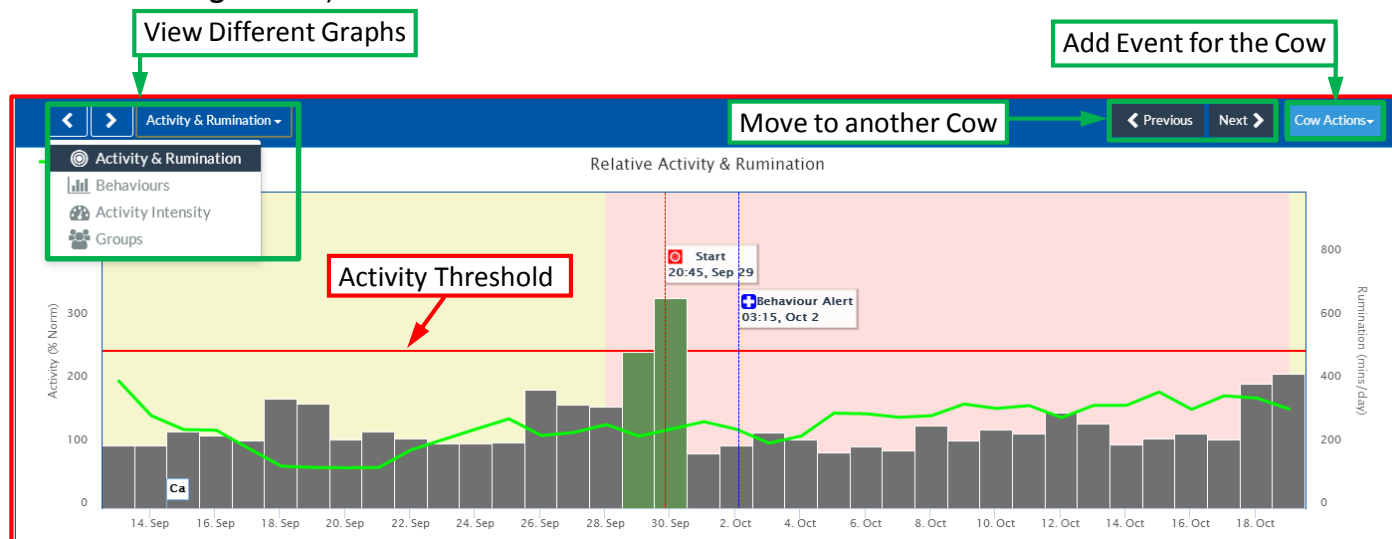


Figure 139 – Cow Rumination & Activity Graph

The user can also switch to the previous or next cow by clicking on the 'Previous' and 'Next' buttons at the top of the chart.

An event for the cow may also be added by clicking on the 'Cow Actions' Button. This will show a drop down menu listing the different Events that may be added for that cow.

It is possible for the user to view an hourly summary of the data. By selecting any daily column on the Relative Rumination & Activity graph see Figure 139, a window will appear showing the Hourly graph of the animal's activity and rumination see Figure 140.

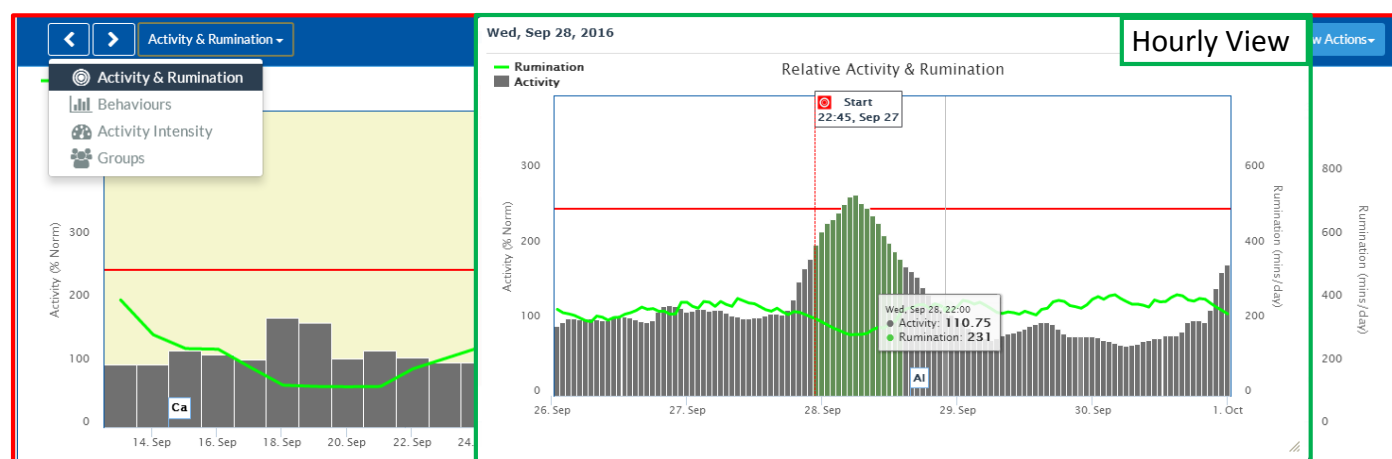


Figure 140 - Relative Activity showing Relative Activity and Rumination Hourly view.

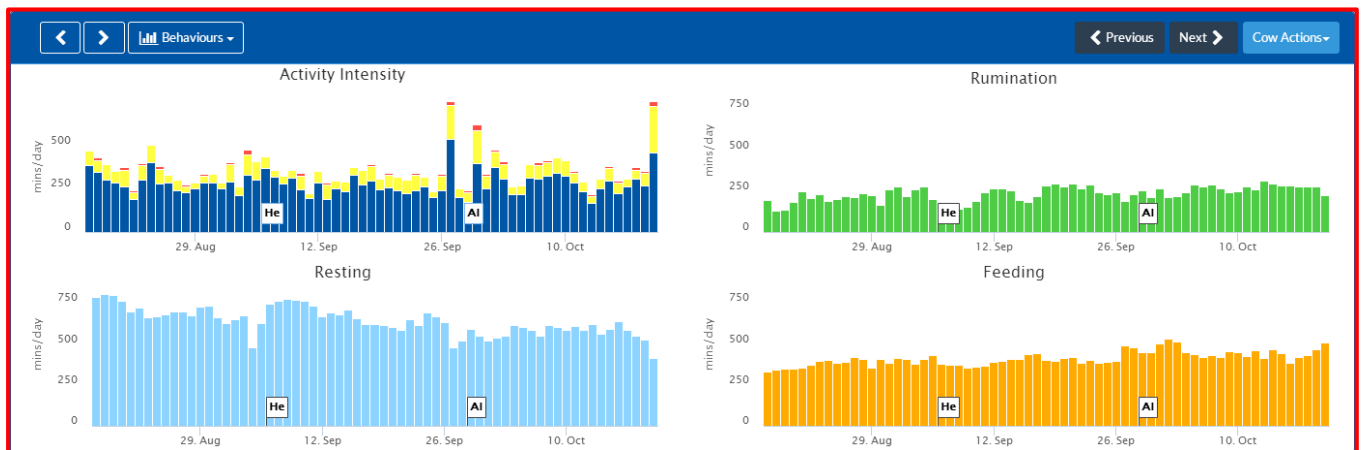


Figure 141 - Behavioural Graphs for Activity Intensity, Ruminating, Resting and feeding

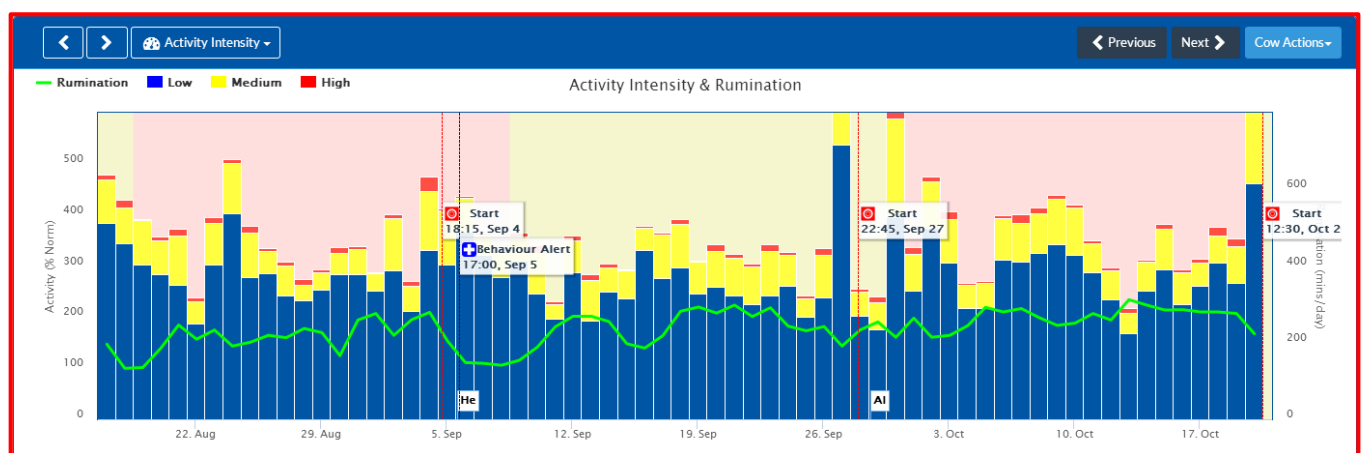


Figure 142 - Graph of Activity Intensity & Ruminating

The groups graph is a helpful feature for viewing an animal's performance against the herds average. The graph compares Resting (y-axis) with Ruminating + Feeding (x-axis). Different groups can be selected by selecting Groups in the Context menu (Section 6.4.4.2) at the top right of the screen.

The window will also display a bar chart comparing the individual animal data (coloured) to the herd average (grey). Selecting any cow in the plotted graph will display her performance in the chart.



Figure 143 - Individual Cow data

6.4.6 Adding Events

The user may add a number of events within the program which will help to organise the data generated by the MooMonitor+.

To add an event for a cow the user simply clicks on the **Cow Actions** Button. This will show a drop down menu listing the different Events that may be added.

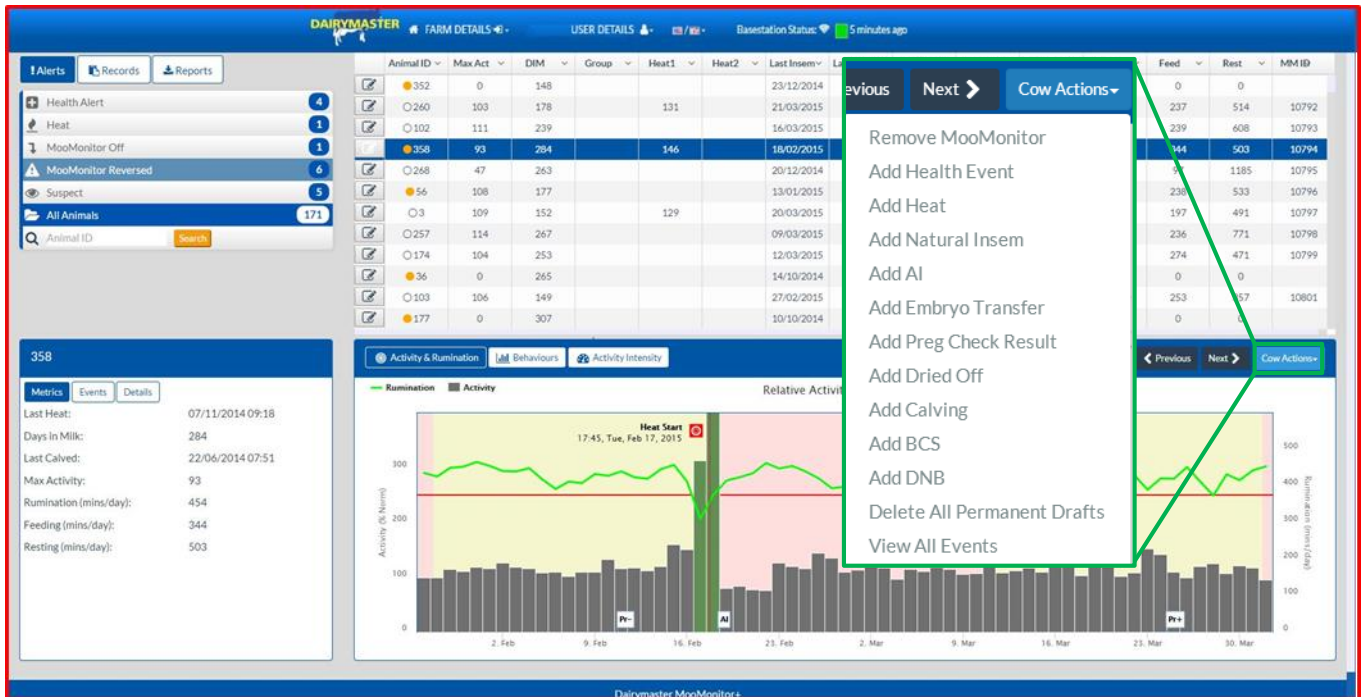


Figure 144 - Cow Actions drop down menu

6.4.6.1 Add Health Event

A health event may be added for any animal by selecting the **Add Health event** on the **Cow Actions** drop down menu located on the top right corner of the Cow charts display.

This will open up the Add Health Event window on the Screen.

1. The user can input a specific health event from the dropdown menu.
2. Enter the start and finish date (Finish date is optional).
3. Add any necessary comments.
4. The user will need to click save to save the event on the database.

Add Health Event

Search for the cow to begin.

132 Search Close

Illness:

Start Date:

End Date (Optional):

Comment:

Save

Animal Details

Animal ID: 132 Age:

MooMonitor ID: 9026 Last Insem Date: 11/14/14 6:23 PM

Insems this Lactation: 2

Figure 145 -Add Health Event Window

6.4.6.2 Add Heat Event

The user may at any time add an animal heat by selecting the **Add Heat** on the drop down menu.

When an animal has a heat added they will be automatically added to the heats list.

1. The cow ID and the date of the heat event along with the time will automatically be entered.
2. Any comments the farmer may have can also be added
3. The user will need to click save to save the event on the database.

Add Heat Event

Search for the cow to begin.

132 Search Close

Start Date: 2/10/15 15:31

Comment:

Save

Animal Details

Animal ID	132	Age	
MooMonitor ID	9826	Last Insem Date	11/14/14 6:23 PM
		Insems this Lactation	2

Recent Events:

1. AI Insem - 11/14/14 6:23 PM - 3 months ago
2. AI Insem - 10/23/14 6:00 AM - 4 months ago
3. Heat - 9/12/14 11:00 AM - 5 months ago
4. Calved - 7/29/14 6:00 AM - 6 months ago

Figure 146 - Add Heat Event Window

6.4.6.3 Add Insemination

The user can add an animal insemination event by selecting the **Add Natural Insem** or **Add AI** from the dropdown menu.

1. The cow ID and the time and date of the insemination event will automatically be entered.
2. The farmer can choose the Siring animal from the dropdown menu for the Natural Insemination event, provided that the Siring Bull has been added to the database see Figure 147.
3. The farmer will need to add in the Siring animal ID if they are adding an AI Event see Figure 148.
4. Any comments the farmer may have can also be added.
5. The user will need to click save to save the event on the database.

The screenshot shows the 'Add Insemination Event' form for Natural Insemination. At the top, there is a search bar with the text 'Search for the cow to begin.' and a search button. Below the search bar, the 'Event Date' is set to 2/10/15, and the 'Sire' is set to '-- Choose Sire --'. There is a 'Comment' field and a 'Save' button. The 'Animal Details' section shows the Animal ID as 132, MooMonitor ID as 9826, and the Last Insem Date as 11/14/14 6:23 PM. The 'Recent Events' section lists two events: 1. AI Insem - 11/14/14 6:23 PM - 3 months ago and 2. AI Insem - 10/23/14 6:00 AM - 4 months ago.

Figure 147 – Add Natural Insemination Event

The screenshot shows the 'Add AI Event' form for Artificial Insemination. At the top, there is a search bar with the text 'Search for the cow to begin.' and a search button. Below the search bar, the 'Event Date' is set to 2/10/15, and the 'Other Sire ID' is set to an empty field. There is a 'Comment' field and a 'Save' button. The 'Animal Details' section shows the Animal ID as 132, MooMonitor ID as 9826, and the Last Insem Date as 11/14/14 6:23 PM. The 'Recent Events' section lists two events: 1. AI Insem - 11/14/14 6:23 PM - 3 months ago and 2. AI Insem - 10/23/14 6:00 AM - 4 months ago.

Figure 148 Add AI Insemination Event

6.4.6.4 Add Embryo Transfer

The user can add an embryo transfer event by selecting the **Add Embryo Transfer** from the dropdown menu.

1. The cow ID and the time and date of the insemination event will automatically be entered.
2. Any comments the farmer may have can also be added.
3. The user will need to click save to save the event on the database.

The screenshot shows a web interface for adding an embryo transfer event. The title bar reads "Add Embryo Transfer Event for 8284". Below this is a search section with the text "Search for the Animal to Begin", a text input field containing "8284", and two buttons: "Search" (orange) and "Close" (red). The main form area has a "Start Date:" label, a date input field with "10/20/16", a calendar icon, and two spinners for time, showing "16" and "47". Below the date is a "Comment:" label and a large text area. A green "Save" button is at the bottom left of the form. Below the form is a section titled "Animal Details:" containing fields for "Animal ID:" (8284), "MooMonitor ID:" (8385), "Age:" (9/28/16 3:49 PM), "Last Insem Date:" (empty), and "Insems this Lactation:" (1). At the bottom is a "Recent Events:" section with a list of two events: "1. AI Insem - 9/28/16 3:49 PM - 22 days ago" and "2. Heat - 9/5/16 3:05 PM - a month ago".

Figure 149 - Add Embryo Transfer Event

6.4.6.5 Add Pregnancy Check Result

The user can select **Add Preg Check Result** from the dropdown menu.

1. The cow ID and the date will automatically be entered.
2. The result of the pregnancy check (Positive or Negative) will need to be entered.
3. The insemination which was successful can be chosen.
4. Any comments the farmer may have may be entered
5. The user will need to click save to save the event on the database.

The screenshot shows a web interface for adding a pregnancy check result. The form is titled "Add Pregnancy Check Result" and includes a search bar for the cow ID (132) with "Search" and "Close" buttons. Below the search bar are fields for "Result:" (a dropdown menu), "Event Date:" (2/10/15) with a calendar icon and a range selector (15 to 34), "Choose Insemination(Opt):" (a dropdown menu), and a "Comment:" text area. A green "Save" button is located at the bottom left of the form. Below the form is a section titled "Animal Details" which displays the following information: Animal ID (132), Age, MooMonitor ID (9826), Last Insem Date (11/14/14 6:23 PM), and Insems this Lactation (2).

Figure 150 – Add Pregnancy Check Event

6.4.6.6 Add Dried Off Event

The user may add a Dry Off event by selecting the '**Add Dry Off**' from the dropdown list.

1. The cow ID, the date and time of the dry off event will be automatically entered. The user may enter a different date & time if they require.
2. Any comments the farmer may have can also be added.

Once the details have been entered the user will need to click the save icon to store the information

Add Dried Off Event for 8284

Search for the Animal to Begin

8284 Search Close

Event Date: 10/20/16 16 : 50

Comment:

Save

Animal Details:

Animal ID: 8284 9/28/16 3:49 PM

MooMonitor ID: 8385 Age:

Last Insem Date:

Insems this Lactation: 1

Recent Events:

1. AI Insem - 9/28/16 3:49 PM - 22 days ago

2. Heat - 9/5/16 3:05 PM - a month ago

Figure 151 - - Add Dry Off Event Window

6.4.6.7 Add Calving Event

When a cow has calved the information of the event can be entered by selecting the **Add Calving** option from the dropdown menu.

1. Information such as the difficulty of the calving, number of calves may be added
2. Any comments the farmer has may be added to the record.
3. The user will need to click save to save the event on the database.

Figure 152 - Add Calving Event Window

6.4.6.8 Add Body Condition Score (BCS)

The Body Condition Score (BCS) of the animal can be added by selecting the **Add BCS** icon from the Drop down menu.

1. The cow ID and the date will automatically be entered see Figure 153.
2. The Body Condition Score of the Animal is added.
3. Any comments the farmer may have can also be added.
4. The user will need to click save to save the event on the database.

Add Body Condition Score

Search for the cow to begin.

132 Search Close

Score:

Date Recorded: 2/10/15 15 35

Comment:

Save

Animal Details

Animal ID	132	Age	
MooMonitor ID	9826	Last Insem Date	11/14/14 6:23 PM
		Insems this Lactation	2

Recent Events:

1. AI Insem - 11/14/14 6:23 PM - 3 months ago
2. AI Insem - 10/23/14 6:00 AM - 4 months ago
3. Heat - 9/12/14 11:00 AM - 5 months ago

Figure 153 - Add Body Condition Score

6.4.6.9 Add Do Not Breed Event (DNB)

Should the user so require they may list an animal as DNB (do not breed).

This is done by selecting the animal ID and clicking on the Cow actions menu tab. A drop down menu will appear and the user may Add DNB from the dropdown menu.

Enter the duration of the event along with any comments the user may wish to add to the event.

The User must click save to confirm the event see Figure 155.

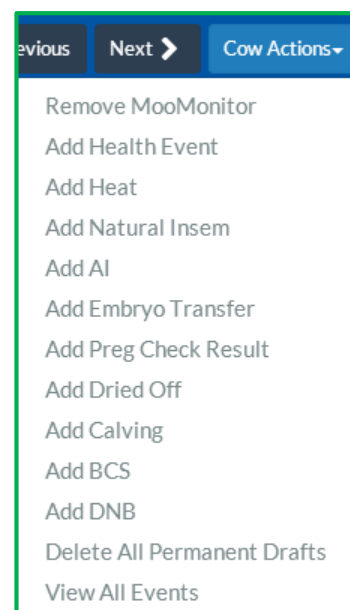


Figure 154 – Selecting DNB from the cow actions tab

A screenshot of a web form titled 'Add Do Not Breed Event'. The form has a blue header bar with the title. Below the header, there is a search bar with the text 'Search for the cow to begin.' and a search button. The search bar contains the number '1201'. To the right of the search bar are 'Search' and 'Close' buttons. Below the search bar, there are two date pickers for 'Start Date' and 'End Date', both set to '23/02/2015'. To the right of the date pickers are two sets of up/down arrows for selecting a range, with '15' and '20' displayed. Below the date pickers is a text area for 'Comment'. At the bottom left of the form is a green 'Save' button. Below the form is a section titled 'Animal Details' with a blue header. This section contains fields for 'Animal ID' (1201), 'MooMonitor ID' (6138), 'Age', 'Last Insem Date', and 'Insems this Lactation' (0). Below the 'Animal Details' section is a section titled 'Recent Events' with a blue header. This section contains a list of two events: '1. Calved - 13/03/2014 00:00 - a year ago' and '2. Calved - 06/02/2014 16:20 - a year ago'. At the bottom left of the entire form is a red 'Close' button.

Figure 155 – Typical Do Not Breen event details sheet.

Once the event has been entered the user will note that the animal's data tab will have changed from blue to red.

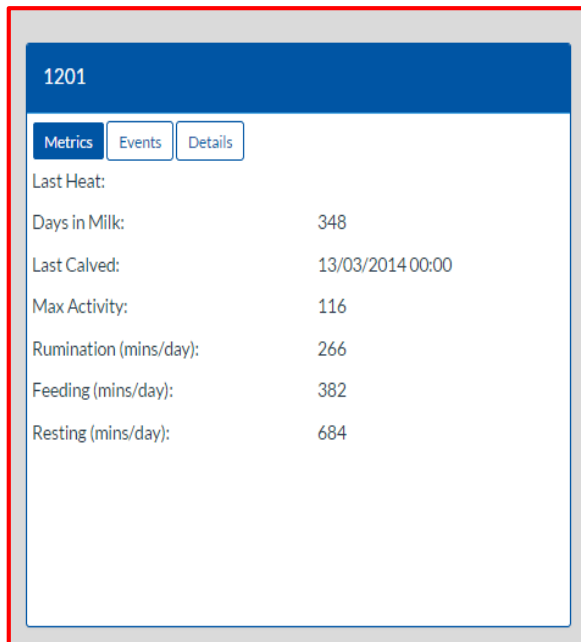


Figure 156 – Animal data tab without a Do Not breed event

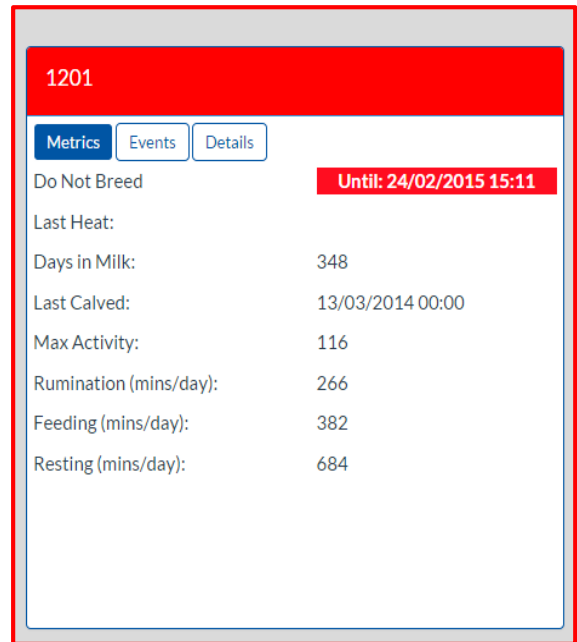


Figure 157 – Animal data tab with Do Not Breed Event Active

6.5 Dairymaster Standalone Drafting Program

The Dairymaster Standalone Drafting Program can be setup to interact with the MooMonitor + System to draft cows after milking. The Program synchronises with the information from the MooMonitor cloud system and updates automatically.

The Programme displays the Drafting information for each cow in the herd. The columns on the window Display: Cow ID, Tag Number, Drafting Pin Heat start time and Hours in Heat. Each column can be sorted by selecting the column header. The Draft column shows which pin each cow is due to be drafted to.

To set up a cow to be drafted from the Drafting program, select 'Modify' at the top of the window. This will open a separate window to edit cow details (**Figure 159**).

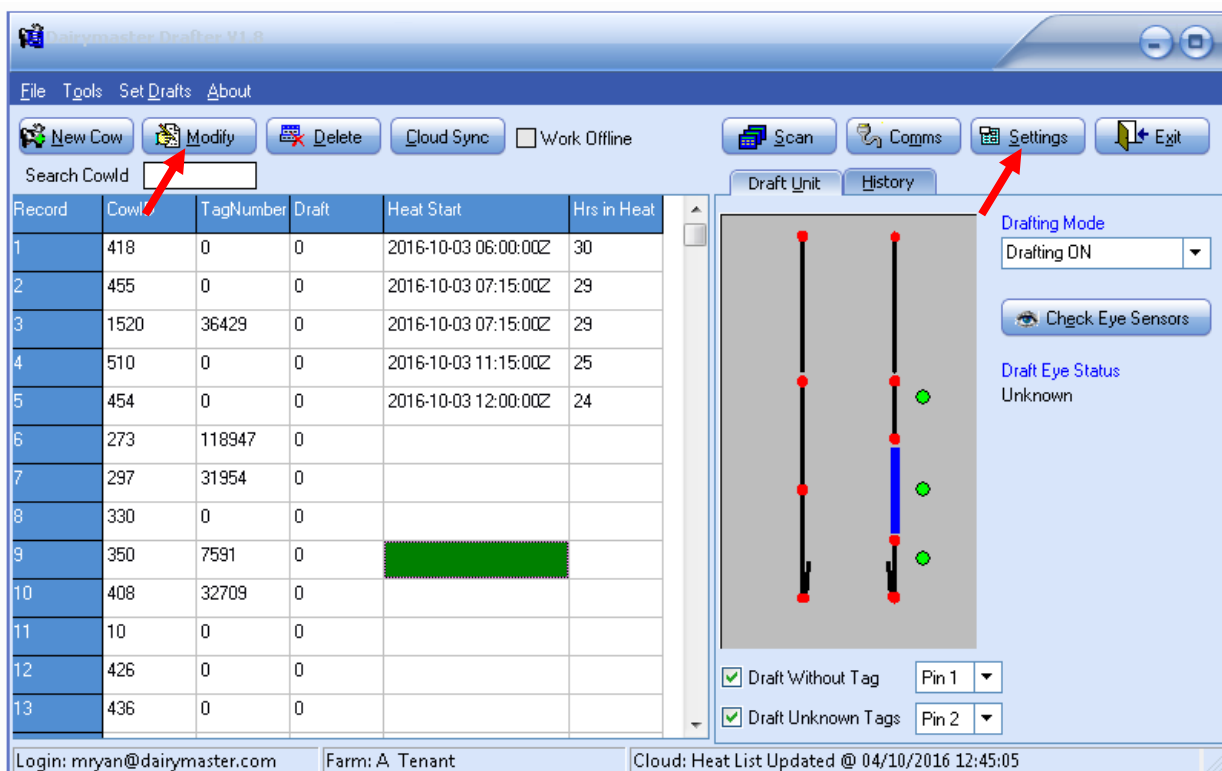


Figure 158 - Standalone Drafting Program Main Screen

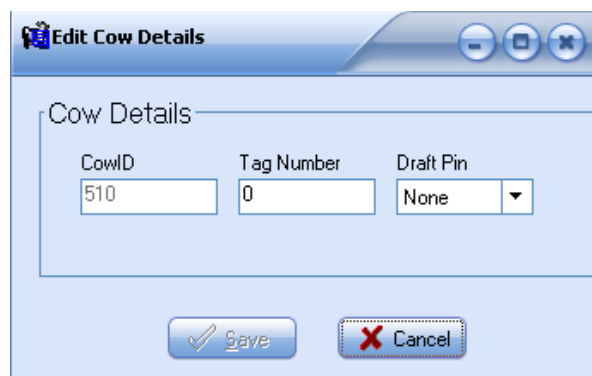


Figure 159 - Modify Draft status for any animal

The Standalone drafting programme has a number of settings which will need to be inputted in order for both systems to interact with each other.

1. Open the Standalone Drafting Program on the PC.
2. The Cloud Sync settings are entered by selecting the 'Settings' tab at the top right of the program window.

The cloud login details will need to be inputted into this window. The Cloud login and Password is inputted by the user and if multiple farms are accessible then they can be selected from the 'Select Farm' dropdown menu.

The Cloud Options section allow the users to edit how often the program is synchronised with the cloud for Heat and Drafting information

The screenshot shows the 'Settings' window for the Standalone Drafting Program. It is divided into several sections:

- Drafting:** Base Address (6), Draft Units (1), Draft Gate Delay (0), Drafting Type (2 Way), Spray Time (0), Spray Delay Time (0).
- Feeder Terminals:** Base Address (2), Num Controls (1).
- Draft Terminals:** Base Address (11), Num Controls (0).
- Draft Count:** Draft Count (0), Count Pin (Off).
- General:** Com Port (Com4), 6 Digit CowID (checked).
- Cloud Login:** Username, Password, Change, Save, Select Farm (A Tenant).
- Draft Options:** Heat Draft Pin (Pin 1), Heat Draft Start Hour (0), Heat Draft End Hour (35).
- Cloud Options:** Draft Sync Interval (Minutes) (20), Heat Sync Interval (Minutes) (5), Show Heats for last (num)hrs (35).

Red boxes and arrows highlight specific sections:

- Cloud Login Details:** Points to the Cloud Login section.
- Draft Options:** Points to the Draft Options section.
- Cloud Options:** Points to the Cloud Options section.

Figure 160 - Standalone Drafting Program Settings Tab

Any Drafting information inputted into the cloud system via the Web Interface or mobile app will be updated to this program so drafting will be carried out at the animals next parlour visit.

7 Commissioning

7.1 Range Tag Test

In all cases the installer is required to conduct a range test on site. Use the following procedure to conduct a range test to ensure that the devices perform as required on site.

1. To switch on the range tag move the switch at the side on the "ON" position.



2. The device will initiate a boot sequence and both the green and red LEDs will flash for a period of approx. 10s.
After the sequence is finished the tag will try to communicate with the Basestation.



3. If the tag successfully connects to the Basestation the Green LED will flash at different rates depending on signal strength.

Green Flashes	Signal Strength
1	Average (>30%)
2	Good (>50%)
3	Very Good (>80%)
4	Excellent (>90%)



4. IF the connection fails the Red LED will flash.



5. This test will repeat every 5secs and after 1000 attempts the tag will stop and go into sleep mode.
6. To restart the test switch off the tag and back on or reuse the NFC Configuration App to reset the tag.
7. The incoming successfully messages will appear on the Basestation UART option which can be viewed using the UART install cable and the HyperTerminal on the PC.

Important Notes:

1. The Range Tag will need to have the same Farm ID & frequency as the Base Station in order to communicate.
2. If the tag has the wrong Farm ID or frequency they can be changed using the NFC Config App.

8 Trouble shooting

Issue	Possible Causes	Solution
No Green Light on the Base Station	No Power to the Base Station	Check power socket
	Loose Connection	Check all connection from socket to Base Station
	Blown Fuse	Check Socket fuse
	Faulty Power Supply	Replace Power Supply
GSM Text Not Responding	Poor GSM Signal	Check Antenna Connections are secure – Use UART Config or Web Config to check signal GSM strength
	Sim Card not inserted correctly	Power down the Base Station, remove Sim Card and reinsert, repower the Base Station and Retest
	No Sim Credit	Check/Top Up Sim Credit
	Wrong SMS Centre Number	Use UART Install Wizard or Web Config to check/change the GSM Settings
Wi-Fi Not Connecting	Poor Wi-Fi Signal	Check Antenna is secure and install external Wi-Fi Antenna kit if required – Use UART Config or Web Config to check signal strength
	Incorrect SSID (Wi-Fi) Settings	Use UART Install Wizard or Web Config to check the SSID (Wi-Fi) Settings
	Router Not Online	Check local router is working and connected to the internet, reboot if required
Range Tag Flashing Red	Range Tag not in Range	Move Tag Closer to Base Station until it starts to flash green
	Farm ID Incorrect	Use NFC to Check/Change Tag Farm ID - This must match the Base Station Farm ID
	Base ID Incorrect	Use NFC to Check/Change Tag Farm ID - This must match the Base Station Base ID
	Tag Frequency Incorrect	Use NFC to Check/Change Tag Frequency - This must match the Base Station Frequency
Tag Not Downloading	Tag Out of Range	Move Tag Closer to base Station
	Farm ID Incorrect	Use NFC to Check/Change Tag Farm ID - This must match the base Station Farm ID
	Base ID Incorrect	Use NFC to Check/Change Tag Farm ID - This must match the base Station Base ID
	Tag Frequency Incorrect	Use NFC to Check/Change Tag Frequency - This must match the base Station Frequency

9 Acronyms / abbreviations

AI – Artificial Insemination.

BCS – Body Condition Score.

CAT6 - Category 6 cable for Ethernet wiring connections.

CowID – Cow Identification number. Not to be confused with the National Cow Identification number.

CSV - Comma-separated values file for use with applications such as excel.

DIM – Days in Milk.

DNB – Do Not Breed.

GPS - Global Positioning System.

GSM - Global System for Mobile Communications.

Insem – Insemination.

ISM - Industrial, scientific and medical band width antenna signal range.

LED - Light-emitting diode.

NFC – Near Field Communications.

PCB – Printed Circuit Board.

PDF - Portable Document Format for use on mobile or PC based platforms.

Preg Check – Pregnancy check.

UART - Universal asynchronous receiver/transmitter for data communications between parallel and serial forms

USB - Universal Serial Bus (USB) is an industry standard communication port on computerised systems

WI-FI - Wireless fidelity network connection, meaning you can access or connect to a network using radio waves, without needing to use wires.

10 Reference documents/appendices

For Information on the MooMonitor+ check on the Dairymaster info point website at <http://infopoint.dairymaster.com/>

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11 Contact Information

Global Headquarters

Dairymaster
Causeway
Co. Kerry
Ireland

Email: info@dairymaster.com

Tel: +353 (0) 66 7131124

Fax: +353 (0) 66 7131670

Web: www.dairymaster.com

Dairymaster UK

Dairymaster (UK) Limited
Buntsford Hill Business Park
Buntsford Park Road
Bromsgrove
Worcestershire
United Kingdom

Email: ukinfo@dairymaster.com

Tel: 01527 878505

Fax: 01527 878003

Web: www.dairymaster.com

Europe

Europe Dairy Systems
Marconiweg 17
3899 BR Zeewolde
The Netherlands

Email:

info@europedairysystems.com

Tel: +31 88 32479 00

Fax: +31 88 32479 01

Web:

www.europedairysystems.com

Dairymaster USA

Dairymaster USA Inc
11405 Sebring Drive
Cincinnati
Ohio
45240
USA

Email: usa@dairymaster.com

Tel: (513) 942 0868

Fax: (513) 942 2934

Web: www.dairymaster.com