



DVC
DIGITAL VENTILATED CAGE

Release Note
6.2.0



RELEASE NOTE 6.2.0

This DVC® release 6.2.0 includes several new features, enhancements and bug fixings. Some of these new features have been developed, including new DVC® tools that will come soon, such as the DVC® MASTER GUI and the ELECTRONIC TOP HOLDER.

FEATURES

1.1 FEATURE #1- BREEDING MODULE ON BEDDING CHANGES

Following the standard working flow for Breeding Cages, when a Delivery is added on a DVC® cage, the system automatically switches from DVC® Bedding Algorithm Evaluation to Calendar Bedding Change.

This means that the DVC® scheduler will generate a bedding change task every n days (by default 7; although the period can be customised on a Facility level). And this is repeated for the upcoming days until the pups are weaned.

After that, the DVC® Breeding Module will be automatically disabled, switching back to the original changing protocol.

A specific icon near the Changing Protocol identifies those cages with Breeding Module activated. You will see a pop-up message by moving the mouse over the icon with your mouse.

The screenshot displays the DVC software interface for a breeding cage. At the top, there is a navigation bar with a 'BREEDING' icon and the cage ID 'C-27'. A central banner area contains an 'Insert mouse ID' field and a pop-up message: 'Changing protocol temporarily forced to weekly change due to pups'. To the right of this banner, there are status indicators: 'Registered: 217 days ago', 'Last bedding change: partial, 2 days ago', and 'Changing protocol: CCP-MONDAY-WE'. Below the banner, there are tabs for 'Prot-Mond-W' and 'Research20', and a red button with a female symbol and the number '3'. On the far right of this row are buttons for 'Cull all animals' and 'Edit all animals'. The main content area is a list of three 'Generic animal' entries. Each entry has a female symbol icon, a name field, and several data fields: 'Strain' (with an 'Insert strain...' dropdown), 'Date of birth' (with a date picker), 'Mating date' (with a date picker), and 'Markings' (with an 'Insert markings...' dropdown). The first entry also shows 'Age: 217 days' and 'Pups: no pup'. To the right of each entry is an 'Add delivery' button. At the bottom right of the interface are 'Save' and 'Cancel' buttons.



1.1 FEATURE #2– READERLESS BEDDING CHANGE

This new release introduces the option to manage the Bedding Tasks (scheduled or manual) without using the DVC®READER. This feature is disabled by default, and it can be enabled on request.

This new feature allows operators to perform total and partial bedding changes by just starting the tasks and removing the dirty cage. The only constraint is that, after performing the bedding change, the operator must insert the cage back into its previous position, and the minimum (settable) time of extraction has to be reached.

The Digilab Service Team must enable this function during the installation or by customer request. The duration to complete the Bedding Change must be defined and configured (by default, 40 seconds).

In the case of scheduled tasks, when the operator starts the task, the rack will turn its LEDs to yellow for those dirty cages identified by the DVC® Bedding algorithm.

When the cage is removed and the operator performs the bedding change, different CASES can be managed:

CASE # 1

After the time is over, the original LED position from where the dirty cage has been extracted becomes green, indicating that the clean cage can be inserted. The original cage label is now moved to this new clean cage.

CASE # 2

The clean cage is inserted in the previous position before the time is OVER (LED on position still not green) – The Bedding Task is not completed, and the LED position stays yellow.

CASE # 3

The time is over, and the clean cage is inserted in a different position. The BEDDING CHANGE TASK will not be completed, and the cage inserted in the new position is not registered in case the Operator performed a total cage change.

CASE # 4

The operator can reject the DVC® Bedding task by pressing the capacitive button for 3 sec on the left runner of the DVC® board corresponding to the cage slot position of the dirty cage. The LED becomes RED, and the task is REJECTED.



1.2 FEATURE #4 - DAILY & WELFARE CHECK TASKS – ALL-IN-ONE TASK

This feature is disabled by default and can be enabled on request.

Daily & Night Welfare checks are combined on the same task.

During the Daily Check, the cages with a Night Welfare Task will be illuminated with RED LED, pointing out those cages that require more detailed control and forcing the Operators to manually remove them from the DVC® Rack.

The screenshot displays a software interface for managing cage tasks. At the top, there is a navigation bar with icons for SCHEDULER, RACKS, REM, NWC, and TOPHOLDERS. The main area shows a grid of cages (rows 1-10, columns A-F) with icons indicating task status. A 'Daily check' button is set to 20, and a 'Welfare check' button is set to 5. A 'PLAY' button is visible. The rack ID is 16002000A. A large illustration of a cage with a red LED indicator is shown on the right.

In the screenshot example above, there are 20 Daily Check tasks. In 5 of these cages, the system requires a Night Welfare Check and it illuminates those cages in RED. To accomplish the Night Welfare Check tasks, these cages have to be physically removed from the DVC® Rack (each for x seconds – where x is 3sec by default).



1.3 FEATURE # 6 – WELFARE CHECK EXECUTION TABLE FOR SINGLE RACK.

From this version, the operator can follow the progress of a Welfare Check task performed on a single rack, giving the possibility of checking the task and cages information, such as Rack ID, Position, Anomaly evaluation, Cage ID, Task Status and Feedback is provided. The table can be opened and closed by clicking on the welfare check box. The table will not expand for Welfare check tasks with more than one Rack.

Cage Id	Position	Rack	Evaluation	Feedback	Status
X0892	F9	17000393A	No activity		To do
X0889	G9	17000393A	No activity		To do
X0895	B5	17000393A	No activity		To do
X0847	D4	17000393A	No activity		To do
X0857	E4	17000393A	No activity		To do
X0912	G4	17000393A	No activity		To do
X0845	B3	17000393A	No activity		To do
X0888	D9	17000393A	No activity		Completed
X0848	D7	17000393A	No activity		Completed
X0908	E6	17000393A	No activity	No	Completed

1.4 FEATURE # 7 - CULL ALL ANIMALS FROM THE CAGE CARD LABEL PAGE

Thanks to this new feature, the operator can Cull all the animals of an entire cage with just a few click. The same death reason will be assigned to all the culled animals.

AP32988-F-HET-40

Registered: 24 days ago
Changing protocol: DVC_STANDARD

DVC Default Protocol

Insert mouse ID...

1 ♀ 1 ♂

14/10/2022

Cage additions **Cull all animals** Edit all animals Treat all animals

Animals: 96pt

Daily check

Bedding change

NWC

Alarms history

Animal reports

Strain: 96pt
Date of birth: 14/12/2023
Cage parent: N/A

Strain: 4e47
Date of birth: 14/12/2023
Cage parent: N/A

Save Cancel



Death report for 2 mice

Death reasons Generic Information

Search

- Aging
- covid-19
- diabete
- Fighting
- Hight pressure
- ischemia
- Obesity
- other
- Tumor

Ok Cancel



2 ENHANCEMENT

2.1 ENHANCEMENT #1 - ADD MOUSE ID

In this release, we enlarged the mouse ID button to directly type also the mouse ID in case this is needed.

Thanks to this design, it is now faster than before the Animal ID registration, especially in case the animal card label has a barcode to be quickly scanned.

STOCK	20221028-0000	Add Generic	Insert mouse ID...
Select research protocol...	Select owner...	01	Cull all animals Edit all animals
Animals	Mouse 1	Strain Insert strain...	Date of birth gg/mm/aaaa
		Markings Insert markings...	Cage parent N/A
			Save Cancel



2.2 ENHANCEMENT #2 - DISABLED SCHEDULER ICON

From this version, the scheduler icon on the Operator Interface can be disabled based on the user profile.

Thanks to this feature, the user who are not allowed to perform scheduled tasks can interact with the DVC[®] OPERATOR interface without any interference with cage tasks.

This feature is available in the DVC[®] workplace by selecting the corresponding profile (Administration -> Profile Manager -> Permissions) the user has to be associated with.

The screenshot shows a 'Permissions' configuration window with a blue header and a 'test' user profile. The 'Navigation' tab is selected, showing a list of permissions with 'On/Off' toggle buttons. The 'Show Tasks Page' permission is highlighted in yellow.

Permission	Off	On
Manual Bedding Change Partial	Off	On
Enter Manual Termination	Off	On
Cage Search	Off	On
Enter Manual Reconciliation	Off	On
Show Welfare Table	Off	On
Cage Weaning	Off	On
Cage Weaning Advanced	Off	On
Manage TopHolders	Off	On
Show Tasks Page	Off	On



2.3 ENHANCEMENT #3 – NEW CHART FOR NIGHT WELFARE CHECK

In this version, we introduce an improved Chart for the NWC task.

This is composed of a graphical part (bottom) and a more descriptive one (top).

The graphical part is a new chart that provides the last 24hrs circadian pattern (red) in comparison to the previous 9 days of baseline to compare (green). The goal is to provide a visual interpretation of why the welfare task has been raised.

The descriptive part is the last 10 days of evaluations where, for each day, the outcome of the NWC algorithm is reported.

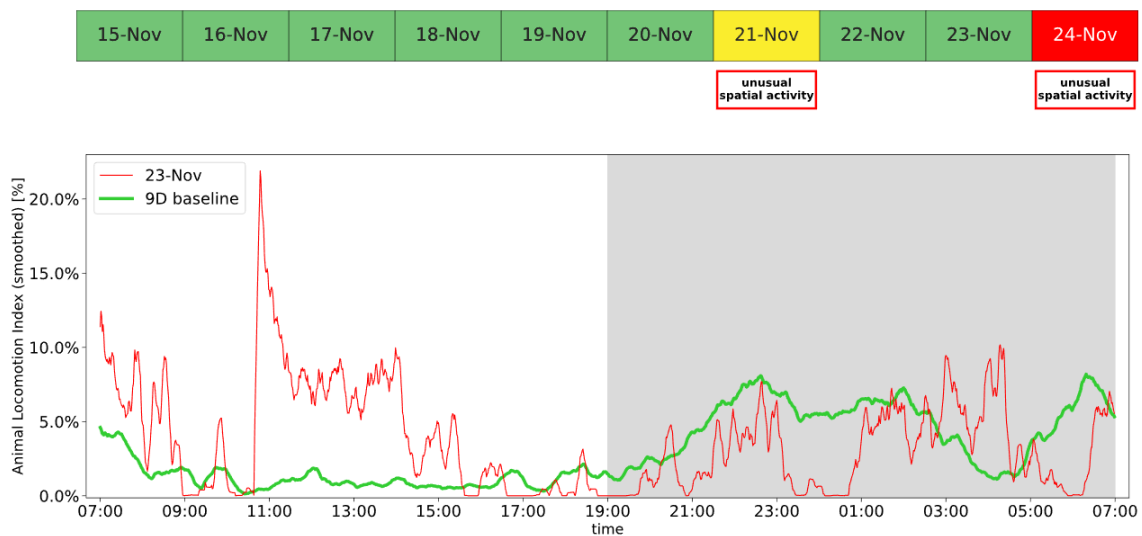
In case there is no issue (from DVC perspective), the corresponding day is green.

In case, a mild issue has been detected (but no task generated), the corresponding day is yellow,

In case, a severe issue has been detected (and the NWC task generated too), the corresponding day is red.

Currently, the possible outcomes of the NWC algorithms are:

- Hypoactivity
- Hyperactivity
- Unusual spatial activity



2.4 ENHANCEMENT #4 - MISSING BOTTLE ALARMS

The missing bottle alarm algorithm has been refined and can now differentiate a bottle change task from a real bottle missing event; therefore not raising up a false alarm during a simple bottle change task is performed in the animal room.

Now, to do so, a double polling attempt has been implemented to be sure that the bottle is really missing before raising the alarm.

Just for the sake of clarity, below you can find the recap of how it works:

- At any cage insertion, the water bottle presence is immediately checked. In case this is missing (or flipped), the DVC® immediately raises an alarm
- If the cage has not generated any alarm at insertion, now the DVC® Master takes the lead in polling the water bottle (and food) availability. By default, it checks the water bottle presence of any registered DVC Cage every 20min. In case there is a missing bottle, the alarm is raised if



the second polling also confirms the same alarm (therefore, 2 consecutive checks – 20min + 20min = 40min).

2.5 ENHANCEMENT #5 NO NWC FOR CAGE WITHOUT ANIMALS

For those cages where animals have been “culled” but the cage has not been terminated yet (for any reason), the NWC algorithm will not generate any Night Welfare Task (No Activity in this case). This feature has been designed to support those facilities that want to “book” cages in advance before the start of the experiment without generating NWC tasks.



3 BUGFIX

This section refers to "user-visible" application bugs that the current release has fixed. Some potential bugs referring to the overall infrastructure are not reported here because they are "invisible" to the final user unless these are not critical bugs affecting the overall workflow.

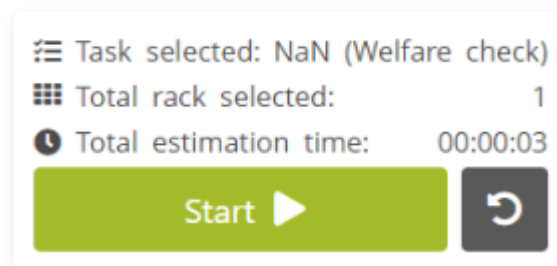
3.1 BUGFIX #1- REM USER INTERFACE

The REM management page has been improved; these are the bugfixes:

- Now, the user can scroll up and down and interact with more than five REM on the same page.
- The user can no longer cause REM association errors; now, only the available REM and Racks are shown. Furthermore, only one set of free Racks to choose from is open at the time, eliminating the possibility of cross-association.
- In the DVC® Workplace, the REM data visualization tool that generates charts was not able to plot graphs when the samples were over five thousand. Now this bug has been fixed.
- The alarm **REM Light Off during Day** and **REM Light ON during Night** has been improved, avoiding false alarms notification during the sunset and sunshine period.

3.2 BUGFIX #2 – TASK TO DO NAN

After some specific combination of operations, the numeric field of the number of tasks to do showed a "NaN" (not a number) text instead of the actual number of tasks to do. This bug has now been fixed.



3.3 BUGFIX #3 – BUOY WITH THE SAME NAME

On the Workplace interface, certain buoys showed as having some associated racks that were not their own but the racks of other buoys with the same name. This was just a graphic error and has been fixed.

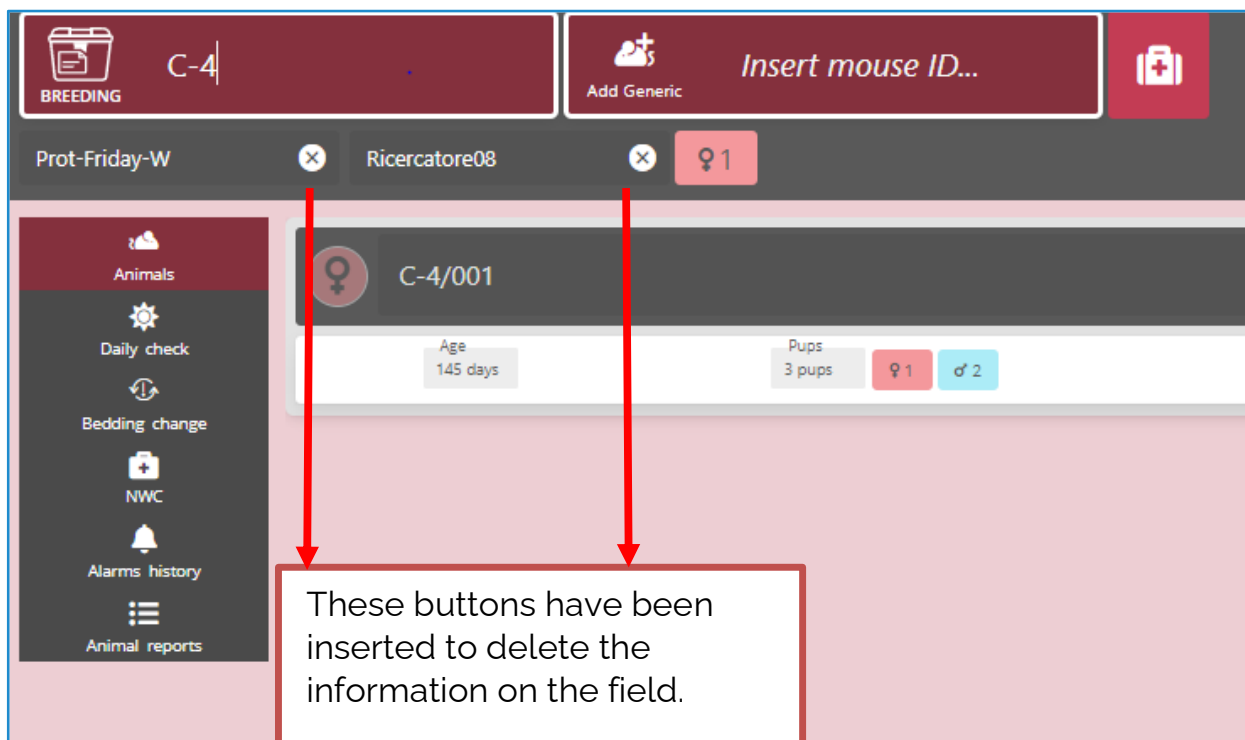


3.4 BUGFIX #4 –TEXTS OVER FRAMES AND TOOLTIPS

On multiple pages, titles and names that were too long, the items were used to be shown overlapping. This happened with tasks with more than 99 cages, protocols, and cage names. The graphic elements have been made responsive.

3.5 BUGFIX #5 – PROTOCOLS AND OWNERS

On the cage preparation page, the selection and de-selection of protocols and owners were rather cumbersome, the problems have been addressed, and now the steps to set protocols and owners are user-friendly.



3.6 BUFIX #6 - CALENDAR BIRTHDATE

The calendar element used to select the animal's date of birth had some graphic troubles when setting the date in some specific circumstances. The issue has been fixed.

3.7 BUGFIX #7 - DAILY CHECK WITH MULTIPLE RACKS

The task was randomly blocked whenever the operators ran daily tasks simultaneously on more than five racks. Now, this bug is fixed.



Furthermore, if the operators waited more than 20 minutes between racks tasks, the tasks were stopped automatically even though the maximum timeout for no activity was 30 minutes. Now the issues have been solved, and the operator can perform tasks on multiple racks simultaneously.

3.8 BUGFIX #8 - CAGE TERMINATION PROBLEMS

With a scheduled task selected (daily check, welfare check, etc.), it was not possible to terminate cages included in the task, and the DVC[®] Operator interface could get blocked. Now, the problems have been fixed.

3.9 BUGFIX #9 - EMAIL REPORT TASK.

Regarding the automatic email service, some facilities (depending on their time zone) received empty task report emails. This bug has been fixed.

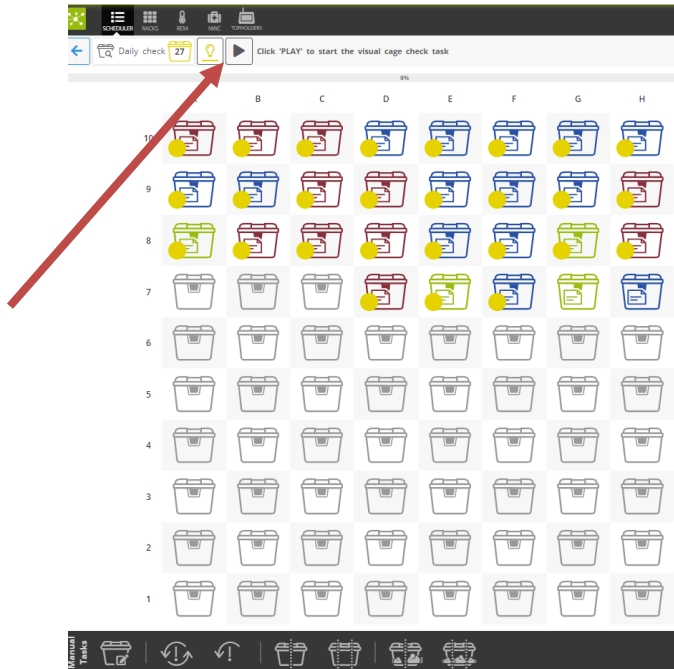
4 KNOWN ISSUES AND PROBLEMS

There are currently some open bugs/known issues we would like to share with you and let you know that will be solved in the upcoming releases:

- During a weaning (or split) task, in case a new cage is registered, if the Operator exits from the task page without closing (saving) the new cage, this is not saved.
- If you are enabling the feature "Daily + NWC" and there is a cage with a task of Bedding Cage assigned + NWC, and you performed the Bedding Change task, the Daily Check will be closed, but the NWC can be only performed using the NWC Task, not the "DAILY + NWC" feature.
- It is not possible to change the Device Name of the Rack on the DVCWORKPLACE.
- In the DVCWORKPLACE, even if the PLANNER is disabled, there is still an ICON PLANNER on the main page.
- Depending on your screen size, if you open the table task for NWC, you cannot scroll down in case the number of tasks exceeds the screen.
- If, during the Weaning, you want to edit or modify the pups' properties, the cage content is not updated when you close the cage.



- Depending on the version of the browser, the PLAY button on Daily Check is not clickable. Users can activate the Daily check by touching any runner on the rack (see picture below).





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