

 **TECNIPLAST**

Release Note 3.1.0





# RELEASE NOTE 3.1.0

## 1 RELEASE FEATURES

### FEATURES MARKETING

In this DVC® Analytics release 3.1.0 we added new important features, and simultaneously we apply some critical infrastructure changes of the system to manage new capabilities. A more detailed list of the new features is reported below:


#### 1.1 FEATURE #1 – IMPROVED USER CREDENTIAL MANAGEMENT

Leveraging on already existing AMAZON cloud technologies, we implemented a critical package to manage user credentials in a more secure way, it is called Amazon COGNITO (<https://docs.aws.amazon.com/cognito/latest/developerguide/what-is-amazon-cognito.html>).

Thanks to this functionality, now the process of a new user registration follows the below steps:

- a) Click on the USERS area in the home page in order to be quickly redirect on the "DVC® Analytics user" section,



Here, you can click on the icon  (Create User), a new pop-up window appears. In this window, you must enter the email address of the new User and the "Role" (RESEARCHER or FACILITY\_MANAGER)

- b) Once you "Confirm" the information, an invitation email is sent to the new user



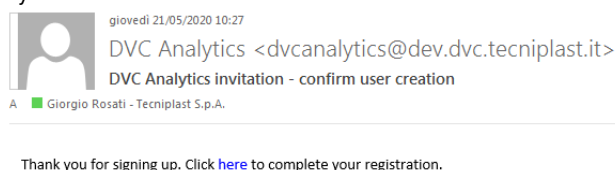
- c) The new User receives the email and must click on "here" to properly register in the DVC® Analytics



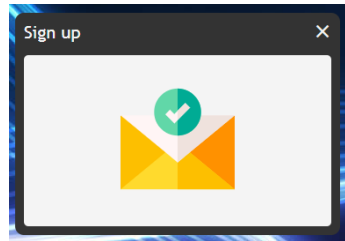
- d) The new User is redirected to the DVC® Analytics registration page where credential pieces of information are requested:

- e) Remember that password has some requirements: *"Use min 8 characters or more, min one number and one symbol and min one special symbol as [@\$!%\*?&-()\_!|: '<>, €]"*  
f) Once all the information is inserted, you can click "Confirm", and a confirmation pop-up appears.

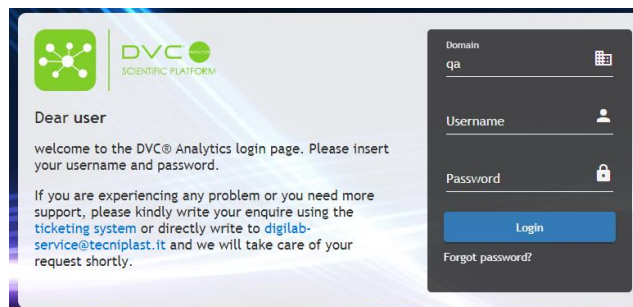
- g) Now, it is time to validate the email entered for the new User. A confirmation email has been sent to the new User who must accept it to confirm the email address (this is important for password recovery).



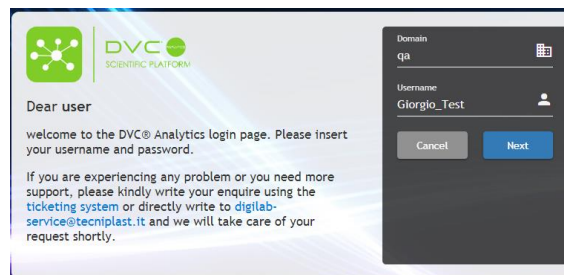
- h) Clicking "here", the process of new user authentication is completed and confirmed.



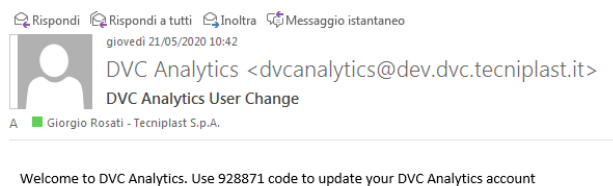
- i) The new User can now finally login to the DVC® Analytics platform.
- j) In case any user has lost credentials, it is possible to click on the corresponding section "Forgot password?" of the login page:



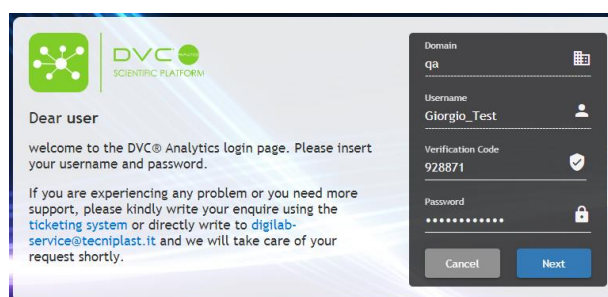
- k) User must enter the Username and then click "Next":



- l) A "Verification Code" has been sent to the email address of the User:



- m) Inserting it in the corresponding field altogether with a new (valid) password, then clicking on "Next", the User can finally login in again (with the new password):



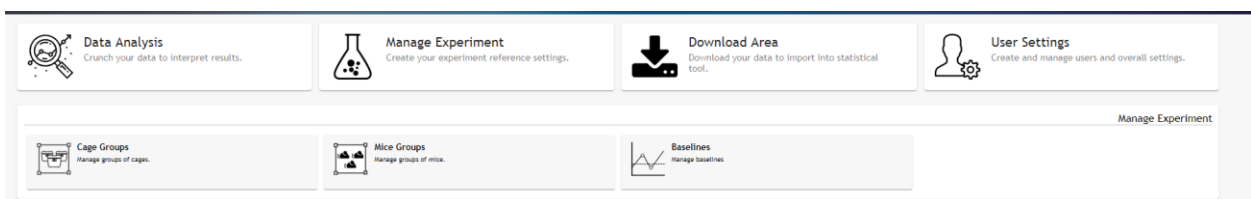


## 1.2 FEATURE #2 – BASELINE MANAGEMENT

















One of the most beneficial ways to use the DVC® system is related to the fact that it collects 24/7 data from any cage and this allows robust comparisons between data collected before a specific treatment/test/operation (or more generically, before the start of any experiment) and after these events.

To better support your analysis, we implemented the possibility to let you create different "baselines" based on the study you are performing and retrieve any established baseline in the "Data Analysis section".

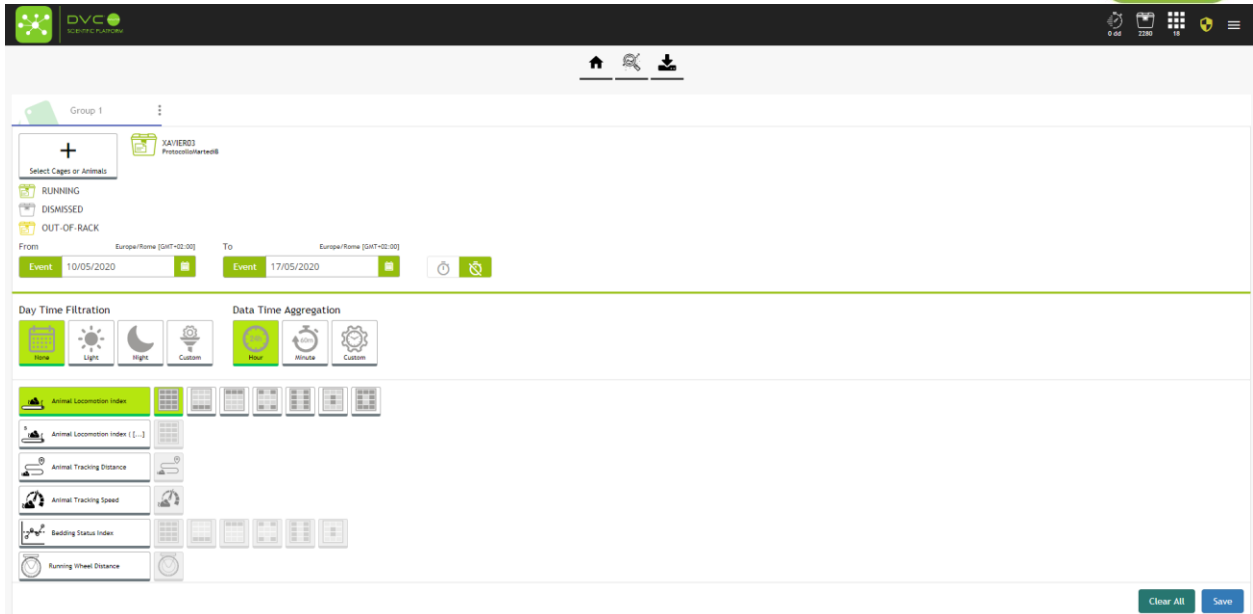
To do so, we added a new section, called "Baselines", under the macro section "Manage Experiment":



Clicking on this button, you are redirected to a page where all the currently available baselines are shown in a recap table:

Name	Description	Metric	Value	
Jonny		Animal Locomotion Index	3.322 %	 
GiorgioT2	GiorgioT2 description	Animal Locomotion Index	2.611 %	 
GuldoStart	10-14 May Notte only	Animal Locomotion Index	3.086 %	 
pippo	pp	Running Wheel Distance	2,188.247 cm	 
baselineTest	test	Animal Locomotion Index	2.376 %	 
Test_Giorgio	test	Animal Locomotion Index	0.003 %	 
dfs	sdf	Animal Locomotion Index	0.001 %	 
baseline	baseline	Animal Locomotion Index	0.002 %	 

To create a new one, simply click on the corresponding button  and you can now select one (or more) cage(s), a specific time interval, some possible "Day Time Filtration" (None, Light, Night, Custom) and some available "Data Time Aggregation" (Hour, Minute, Custom)



Finally, selecting the available metric (based on the properties of the cage(s) you selected) you want to calculate the baseline, the system allows you to click on the "Save" button and create the corresponding baseline value related to the above-described selection.

The baseline is created by calculating the AVERAGE of all the data for the selected cage(s) in the selected period.

Then, you have to provide some information (Name, Description, Owner) to add it to the list of the available ones and then finally click on "Confirm".

**Add new baseline**

Metric  
Animal Locomotion index

Value  
2,611 %

Name \*  
Test\_Baseline

Description  
Test\_baseline for demo purposes

Owner \*  
Giorgio\_Test

Please be aware that it is NOT possible to select multiple metrics to create multiple baselines at once. You have to repeat the process for any single metric for all the metrics you want to create the corresponding baseline.

Now, when a new baseline is created, it is possible to apply it to the "Data Analysis" section.

There is a new button **Compare To Baseline** that can be clicked to open a submenu with all the available baselines, divided by the used metrics, which User's access (FACILITY\_MANAGER User has access to all the created baselines, RESEARCHER User has access only to his/her own baselines):

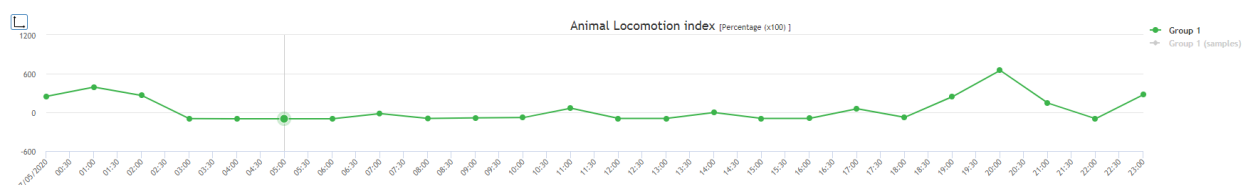


All these baselines are disabled until you select the metric you want to apply for the analysis.

From the drop-down menu, it is possible to select the specific baseline you want to apply to the cage selection and proceed with your own analysis:

The outcome is the result of the calculation:

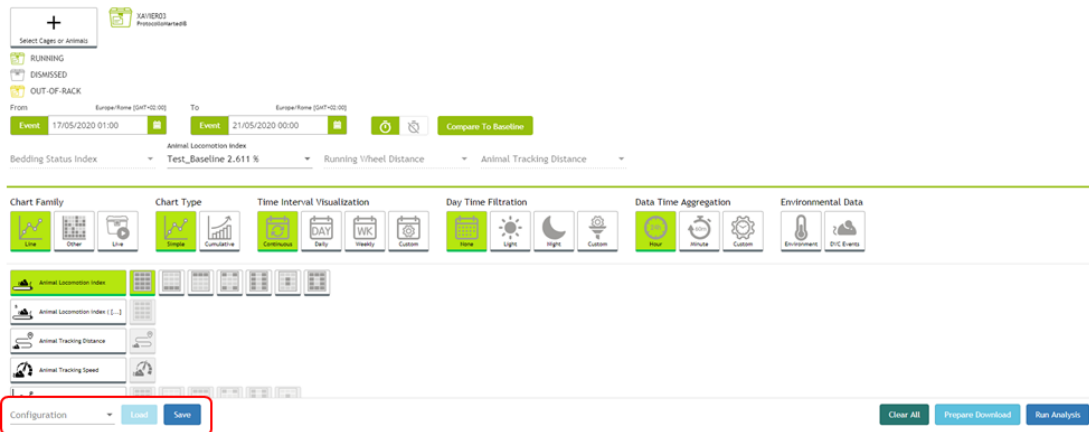
$$\text{Data}_{\text{bas}} = \frac{\text{Data} - \text{Baseline Value}}{\text{Baseline Value}} \%$$





### 1.3 FEATURE #3 – SAVE CONFIGURATION

While you are performing your analysis, in case you want to save a specific configuration for easy and fast retrieval in the future, you can easily click on a new section, located on the left bottom of the screen



Clicking on "Save" button, the system asks for a "Name" and "Owner" of this configuration (again, FACILITY\_MANAGER user can assign configurations to any registered user, RESEARCHER user only to him/herself):

Add new configuration

Name \*

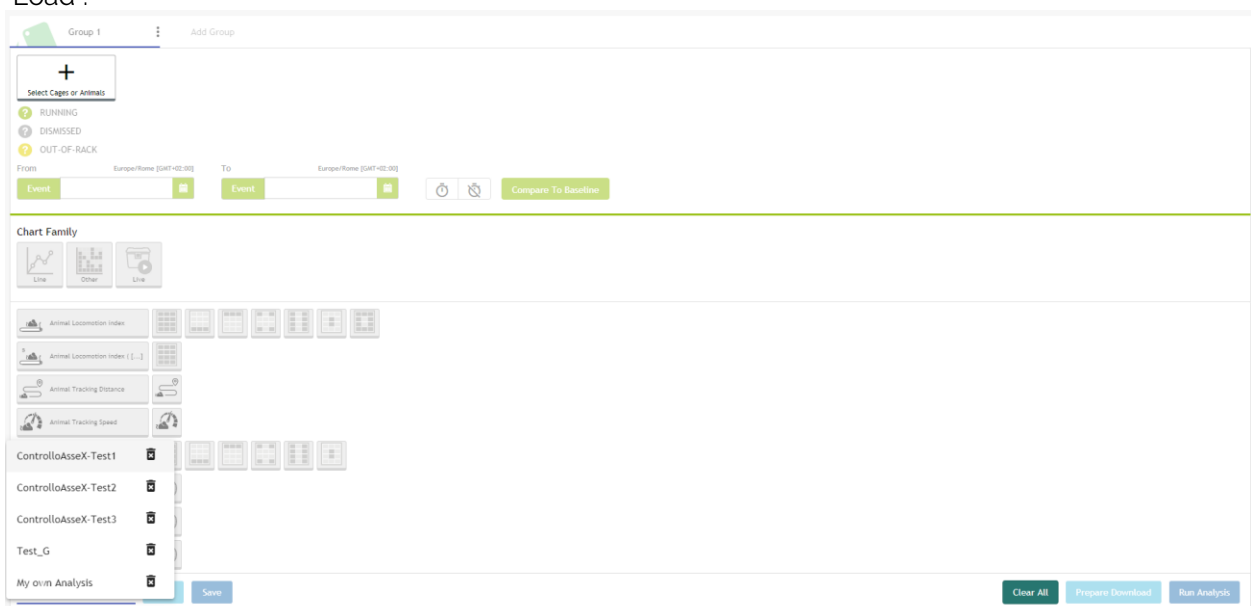
My own Analysis

Owner \*

Giorgio\_Test

Cancel Confirm

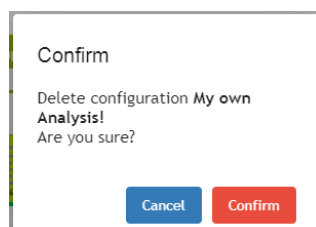
Clicking "Confirm", the system creates this new configuration that can be easily retrieved whenever you want, simply clicking on "Configurations" and choose the one you want to apply and finally click "Load":







Last but not least, you can quickly delete any already created configuration, merely clicking on the small icon located nearby and then confirming this decision.



## 1.4 FEATURE #3 – ANIMAL LOCOMOTION (SMOOTHED)

With this new release, we want to introduce a new metric called "Animal Locomotion Index (smoothed)" ( $ALI_{smoothed}$ ) that is an improved version of the historical (and well used by anyone) metric "Animal Locomotion Index" (ALI).

The statistical reason behind is because the smoothed process increases robustness to noise and provides more sensitiveness to the intensity of mice movements.

More specifically, to calculate the minute data aggregation (that is the current smallest data granularity in the DVC® Analytics platform), instead of performing a sample by sample difference (remember that every sample is collected every 250msec), the  $ALI_{smoothed}$  considers the moving difference between 2 groups of 4 consecutive samples each. In case the module of this difference is above a minimum threshold, the current group of samples is counted as a valid activation.

In general, these 2 metrics are very similar in the patterns of data.

For retro compatibility with already running studies and analysis, both metrics (ALI and  $ALI_{smoothed}$ ) are available, but only new cages will generate  $ALI_{smoothed}$ . At the same time, it is not possible to have historical data converted to  $ALI_{smoothed}$  (unless we perform a playback task).

## 2 ENHANCEMENTS

In this section, there are highlighted some current enhancements that are affecting already existing features that are improved by the present new release proposed.

No enhancements for this release.

## 3 BUG FIXES

This section refers to bugs that have been fixed by the current release. There are some potential bugs relating to the overall infrastructure that are not here reported because "invisible" to the final User unless these are not critical bugs that are affecting the overall workflow.

No bug fixes for this release.



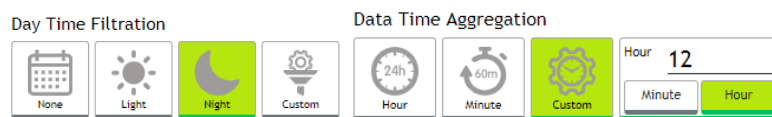
## 4 KNOWN ISSUES AND PROBLEMS

There are currently some open bugs/known issues we would like to share with you and let you carefully handle:

### 4.1 OPEN BUG #1 – TEMPORAL AGGREGATION ALWAYS STARTS FROM MIDNIGHT (UTC)

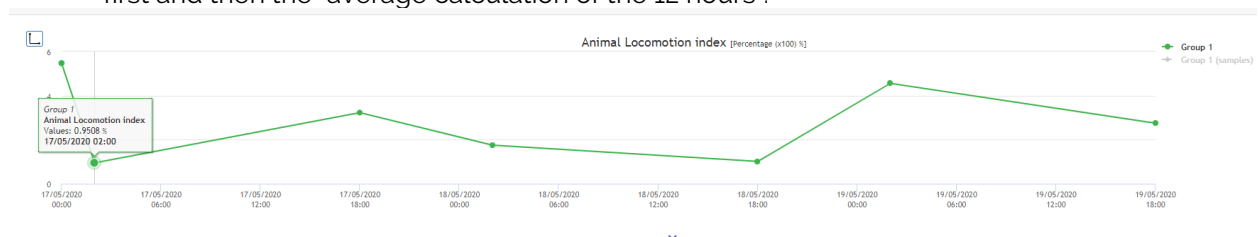
Every time you perform aggregation of data, using the "Data Time aggregation" Custom button, the system starts aggregating data from the midnight (in UTC) ([https://en.wikipedia.org/wiki/Coordinated\\_Universal\\_Time](https://en.wikipedia.org/wiki/Coordinated_Universal_Time)). This fact means that if you are in Central Europe time during summer (CEST), the midnight in UTC corresponds to your 2 am. This bug has 2 direct consequences on the system. Let's use a couple of examples to explain the issue:

- If you have set a night of 12 hours and you want to sum up all this period in one unique representative value, you should select the following settings

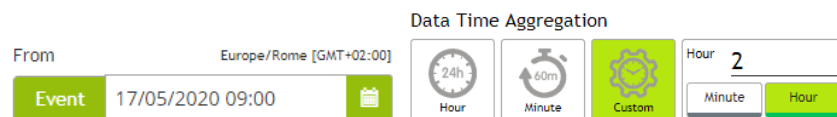


What you would expect is a single representative point for any night of your time interval. Unfortunately, the outcome is not the desired one because, due to the bug, the system is first "averaging the 12 hours" starting from midnight (referring to UTC) and then applying the "night" filter.

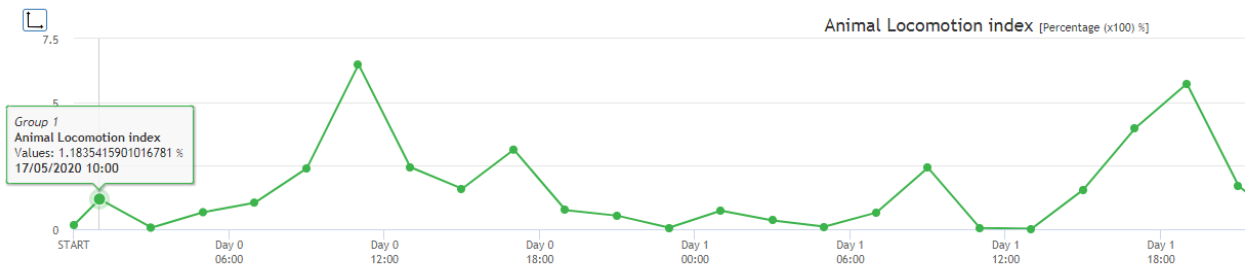
In other words, the logic is flipped around. We will fix the bug soon to apply "Night" filtration first and then the "average calculation of the 12 hours".



- In case you want to start any analysis from a specific time, let's say, from 9 am and aggregate data every 2 hours, you should select the following settings:

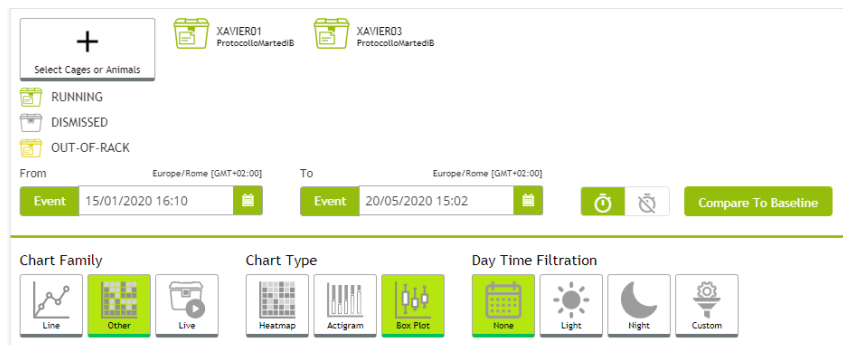


What you would expect is a line chart, starting at 9 am and then, a point every 2 hours. Unfortunately, due to the bugged flipped logic, it first applies the 2 hours aggregation, and then it starts from 9 am to show data. If my time zone is CEST, this means that I will have a line chart, for instance, with a data point at 9 am, then 10 am and then every 2 hours (12 pm, 2 pm, 4 pm, etc.).



## 4.2 OPEN BUG #2 – NIGHT TEMPORAL AGGREGATION IN BOXPLOT

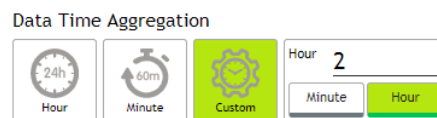
If you select multiple cages in the same group, it is possible to apply the "Box Plot" Chart Type.



If you apply for Night "Day Time Filtration", the night is not considered as the "real" night from, for instance, 7 pm to 7 am, but it is calculated as from midnight to 7 am and from 7 pm to midnight. This bug doesn't affect the Light "Day Time Filtration" because it falls all inside the same day of analysis.

## 4.3 OPEN BUG #3 –CUSTOM DATA TIME AGGREGATION AFFECTS SOME METRICS

If you want to aggregate data using a custom aggregation, it provides you the average of the data in the selected period (i.e., if you aggregate by 30min, it gives you the average of the 30min for the metric you chose, starting from the minute aggregation).

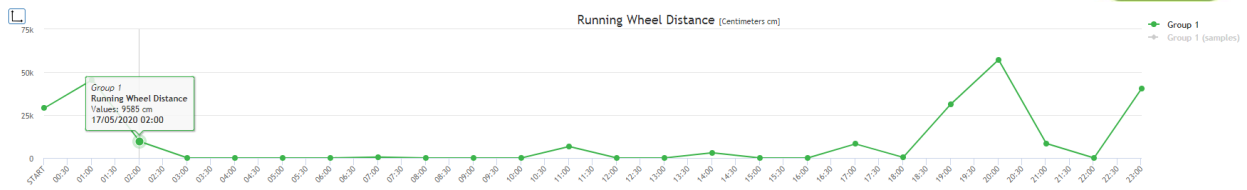


This average calculation doesn't fit some available metrics such as Running Wheel distance, Running Wheel rotations, and Individual Tracking distance.

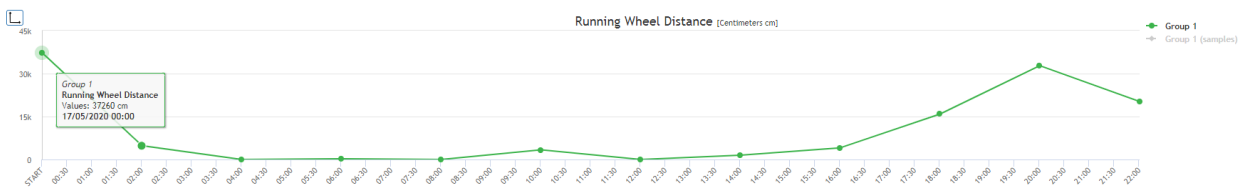
In this case, what the system should provide you are the sum of the data in the corresponding selected period.

Let's explain it with an example.

When you select the standard hour aggregation of a DVC® Running wheel distance data for one entire day, it provides you, hour by hour, how many centimeters have been run by the animal:

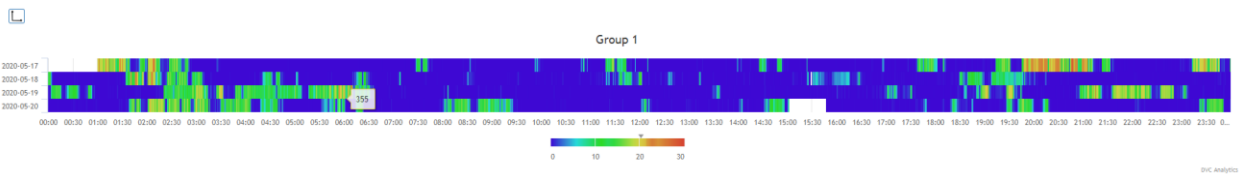


If you now aggregate data every 2 hours, you would expect the sum of the data in blocks of 2 hours each. Unfortunately, due to the bug, it calculates the average of 2 hours of each block. So, in the total day length, the sum of the 12 blocks of 2 hours each is different compared to the sum of the 24 (standard hours).



#### 4.4 OPEN BUG #4 –MISLEADING HEATMAP TOOLTIP INFORMATION

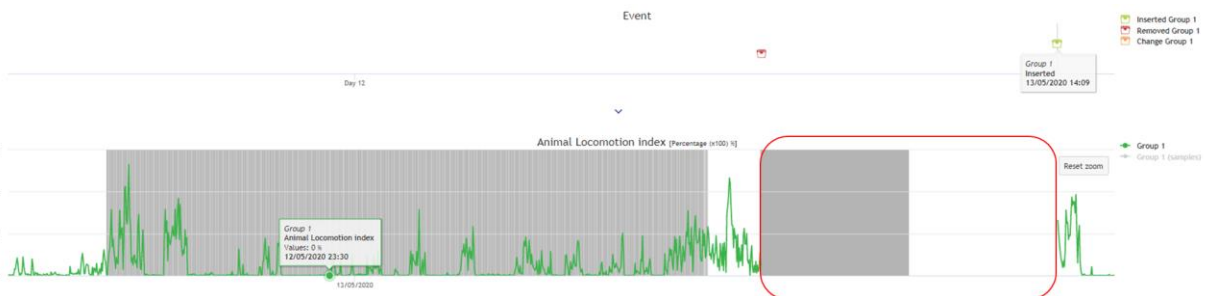
In any Heatmap visualization, if you move the mouse over the chart, the tooltip does not represent the value of the data, but it is the counter of how many minutes have been spent from midnight (i.e., 335 min from midnight, means 05:35 am)



#### 4.5 OPEN BUG #5 –MISLEADING LIGHT REM MISSING DATA

If a cage is extracted for several minutes from the DVC® Rack (or more generically, the data are missing for any reason), consequently, the DVC® data are not displayed (because of missing) as well as the associate REM data.

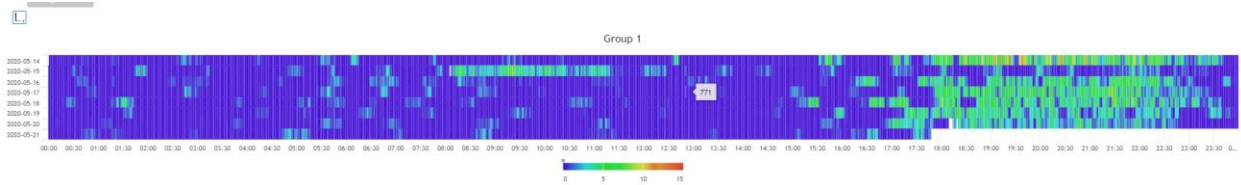
In reality, while the visual representation of the DVC® data is pretty intuitive (data are missing), for the REM data, the empty data block is filled with 2 vertical stripes (grey and white) that are misleading for the User from a REM data visualization perspective.





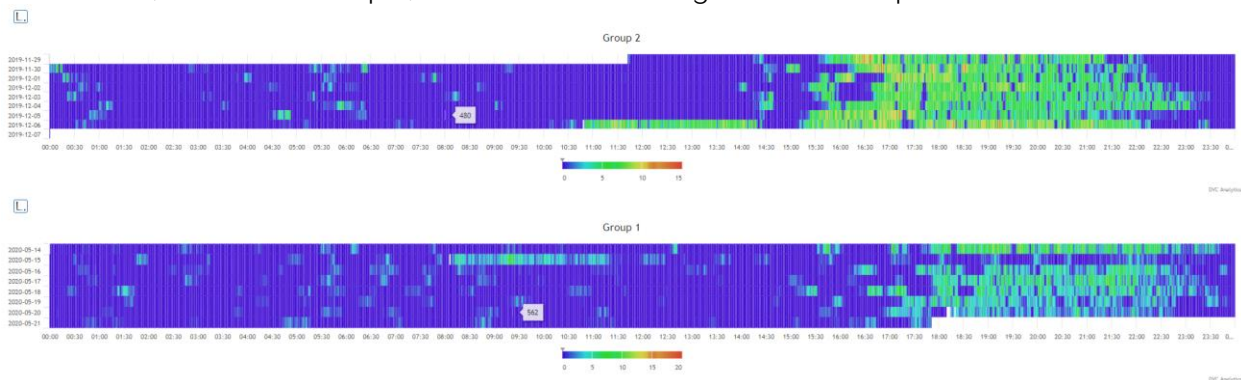
## 4.6 OPEN BUG #6 –DIFFERENT HEATMAPS DO NOT RESIZE IN COLOUR

Whenever you select a Heatmap chart, the system auto resizes the color code based on the maximum level reached by the data in the selected period.



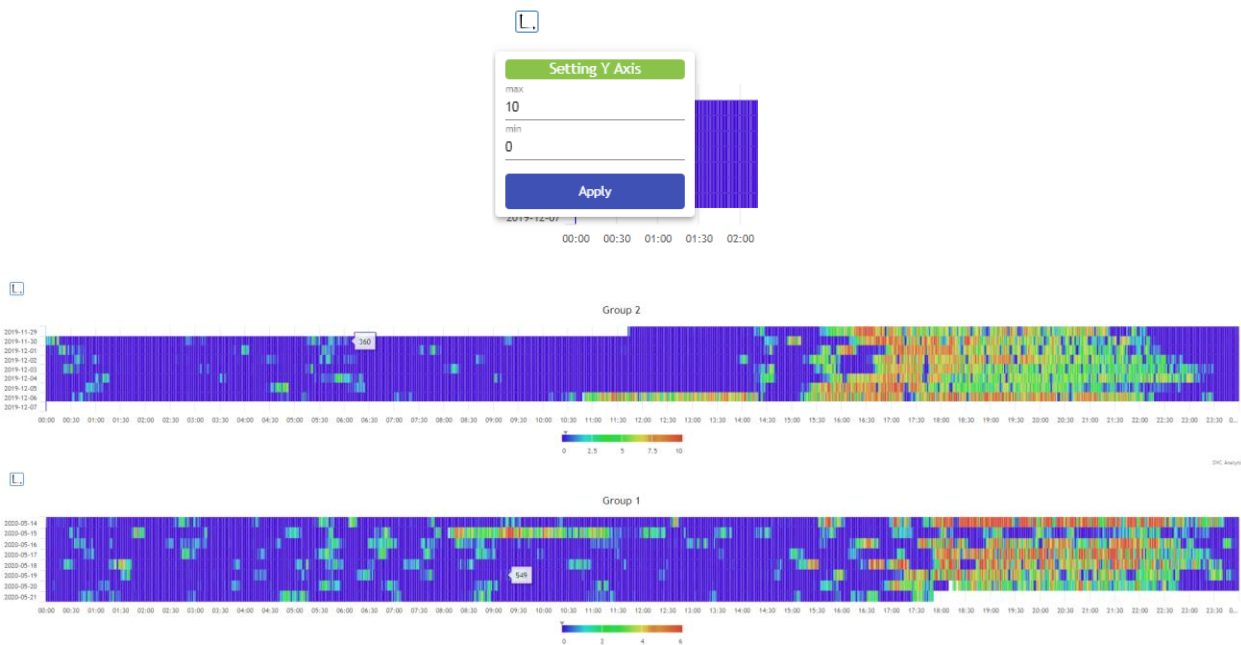
On the contrary, if you perform a comparison between multiple groups of cage(s), the system resizes each group independently from the others. In this way, you might end up on false interpretation of the patters of data due to the different scale.

For instance, in the next example, we have 2 different cages in the same period of time:



The bottom cage seems to be less active than the top one.

But if we resize both scales (setting 10 as maximum value to both), we can appreciate a better comparison between the 2 cages.





 **TECNIPLAST**  
*innovation through passion*