

Animal Disease Spread Model

Results - Model Output



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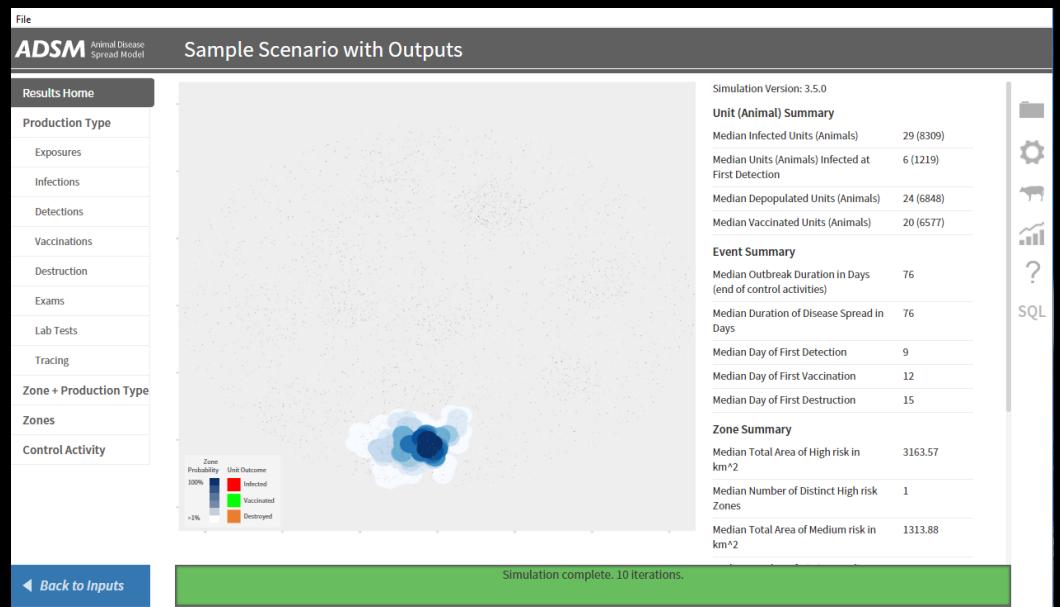
Results Home

Navigation Tabs

Output Files

Raw Data

What's Next?



Document Conventions

The following conventions are used throughout the training modules:

TRAINING MODULES other than the one you are currently in will use all capital letters, bold face, italics and underline.

Rhetorical questions and *extra notes* will be in orange italics.

Conventions applying to the ADSM application are:

Navigation tabs on right and Admin panels on left are designated with an underline. Examples are Project Panel or Population tab.

Items with an action on click, such as [Apply] Button or [Save As] icon are enclosed in square brackets.

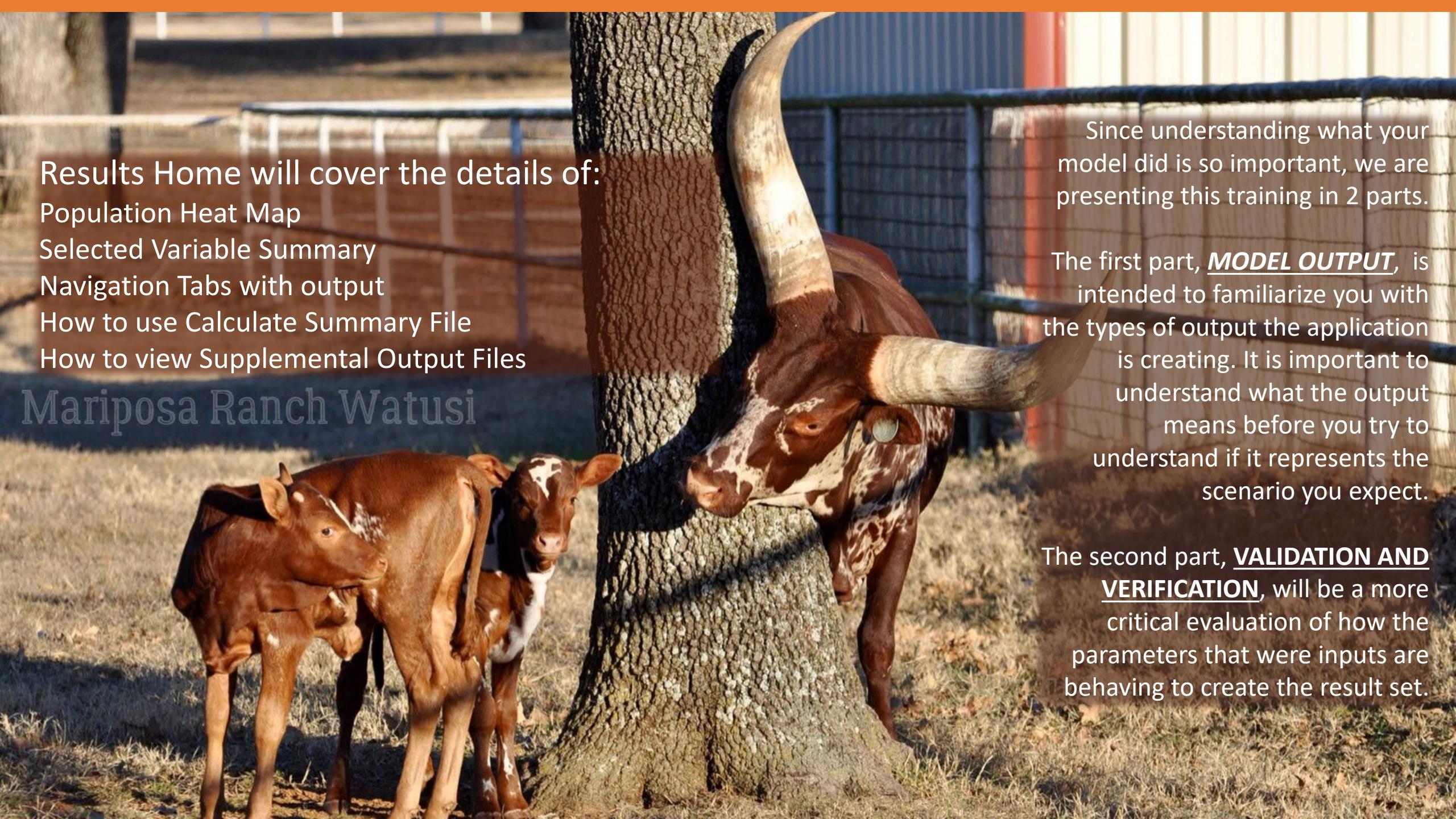
Parameter fields (inputs) are in blue italics and *Variables* (outputs) are in green italics.

Navigation Tabs > *Parameter field* indicates to go to the given navigation tab to find the given field.

Hyperlinks appear in bright green type with underline <http://navadmc.github.io/ADSM/>

Results Home





Results Home will cover the details of:
Population Heat Map
Selected Variable Summary
Navigation Tabs with output
How to use Calculate Summary File
How to view Supplemental Output Files

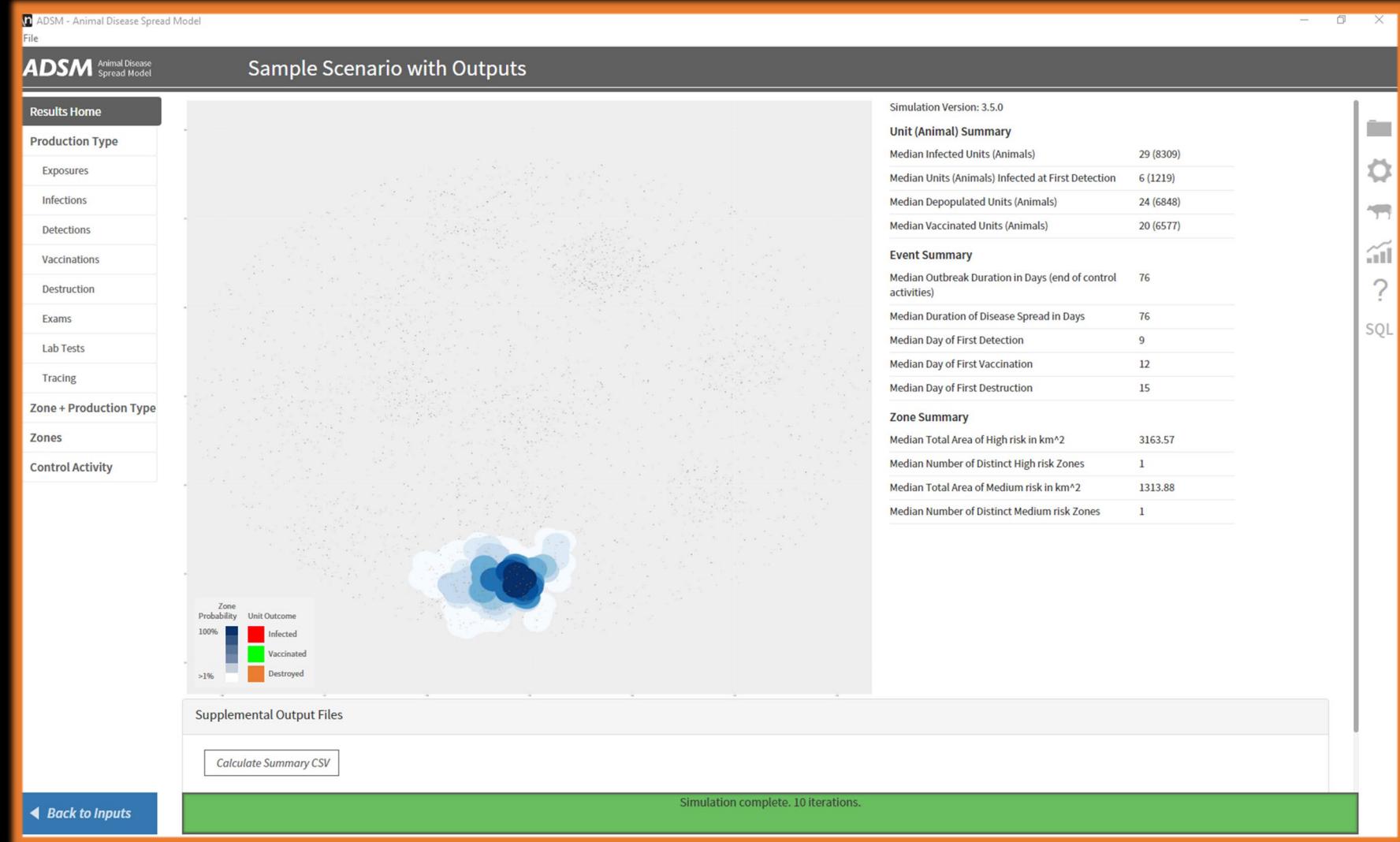
Mariposa Ranch Watusi

Since understanding what your model did is so important, we are presenting this training in 2 parts.

The first part, **MODEL OUTPUT**, is intended to familiarize you with the types of output the application is creating. It is important to understand what the output means before you try to understand if it represents the scenario you expect.

The second part, **VALIDATION AND VERIFICATION**, will be a more critical evaluation of how the parameters that were inputs are behaving to create the result set.

This is the initial screen shown when ADSM iterations have completed.



Let's get familiar with Results Home

The screenshot shows the ADSM - Animal Disease Spread Model Results Home interface. At the top, it displays the Scenario Name "Sample Scenario with Outputs" and the Selected Variables Summary. The interface includes a Population Heat Map showing disease spread across zones, a navigation bar with tabs for various production types, and a sidebar with supplemental output files. Arrows point to several key features:

- Navigation Tabs with all output variables:** Points to the navigation bar on the left.
- Selected Variables Summary:** Points to the summary table on the right.
- Unit (Animal) Summary:** Points to the first section of the summary table.
- Event Summary:** Points to the second section of the summary table.
- Zone Summary:** Points to the third section of the summary table.
- Generate Summary:** Points to the "Calculate Summary CSV" button.
- Supplemental Output Files:** Points to the "Supplemental Output Files" section at the bottom.
- Iteration Count:** Points to the "Iteration Count" indicator at the bottom.
- Supplemental Files:** Points to the "Supplemental Files" section at the bottom.
- Return to Input Parameters:** Points to the "Return to Input Parameters" button at the bottom.
- Back to Inputs:** Points to the "Back to Inputs" button at the bottom.
- Scroll Bar, if needed to see more Supplemental Output Files:** Points to the scroll bar on the right side of the supplemental output files section.

Population Heat Map Legend:

Zone Probability	Unit Outcome
100%	Infected
>1%	Vaccinated
<1%	Destroyed

Selected Variables Summary:

Simulation Version: 3.5.0	
Unit (Animal) Summary	
Median Infected Units (Animals)	29 (8309)
Median Units (Animals) Infected at First Detection	6 (1219)
Median Depopulated Units (Animals)	24 (648)
Median Vaccinated Units (Animals)	20 (6577)
Event Summary	
Median Outbreak Duration in Days (end of control activities)	76
Median Duration of Disease Spread in Days	76
Median Day of First Detection	9
Median Day of First Vaccination	12
Median Day of First Destruction	15
Zone Summary	
Median Total Area of High risk in km ²	3163.57
Median Number of Distinct High risk Zones	1
Median Total Area of Medium risk in km ²	1313.88
Median Number of Distinct Medium risk Zones	1

Supplemental Output Files:

- Sample Scenario with Outputs\Supplemental Output Files\states_1.csv

Bottom Status Bar:

- Simulation complete. 10 iterations.

Results Home - Population Heat Map

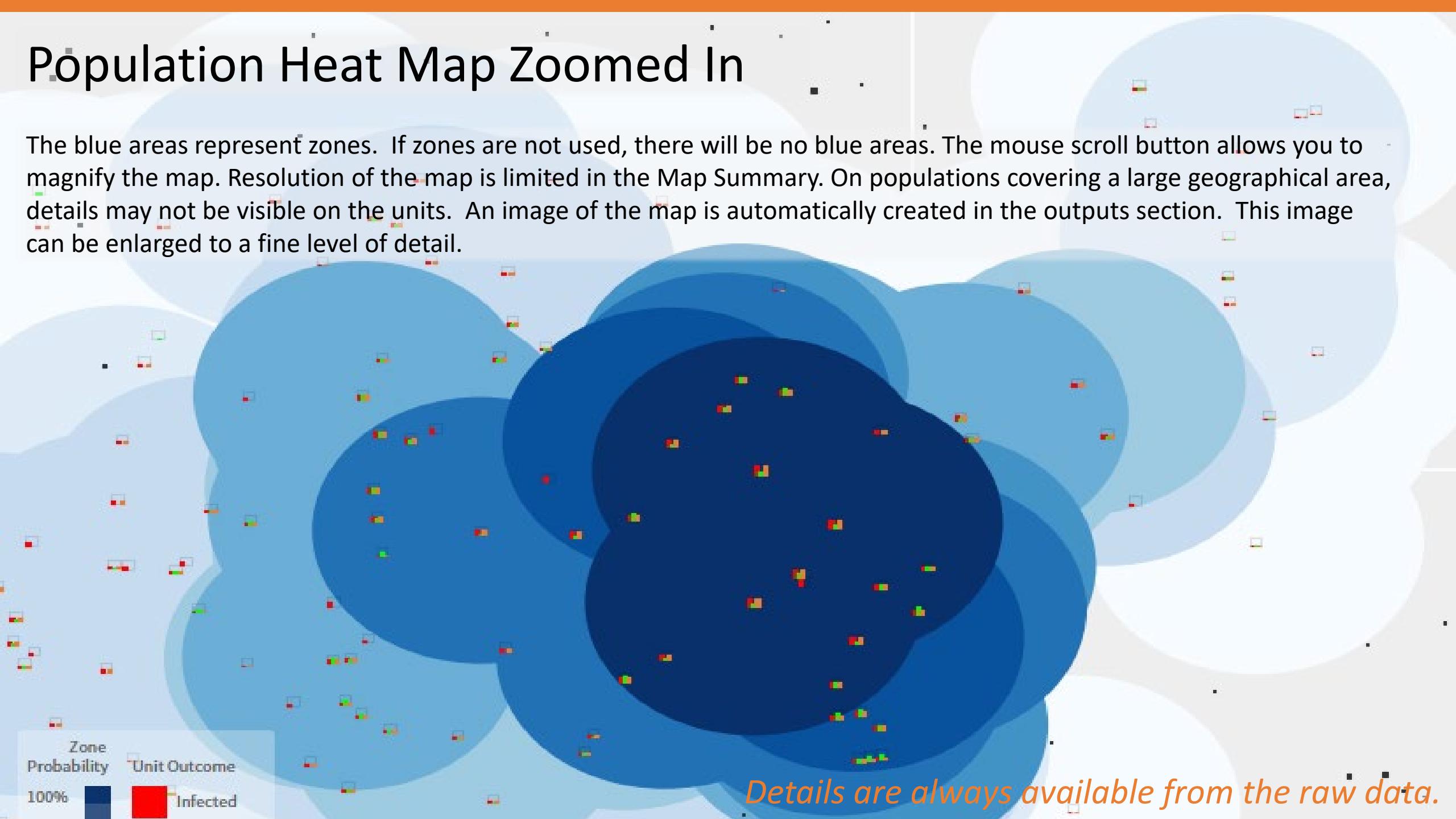
The grey box in the center of Results Home displays a relational layout of the units included in the population file. The image shows the population units as they are related to each other based on a coordinate system, but they are not geo-referenced or projected for a GIS system. For example, the population of Texas would show the shape of Texas, but there is not a true reference to any geospatial data layers of Texas.

The units appear as black square symbols. The size of the square relates to the number of animals in the unit, so a smaller square has fewer animals, and a larger square has more animals. The Population Heat Map is a summary of all iterations.



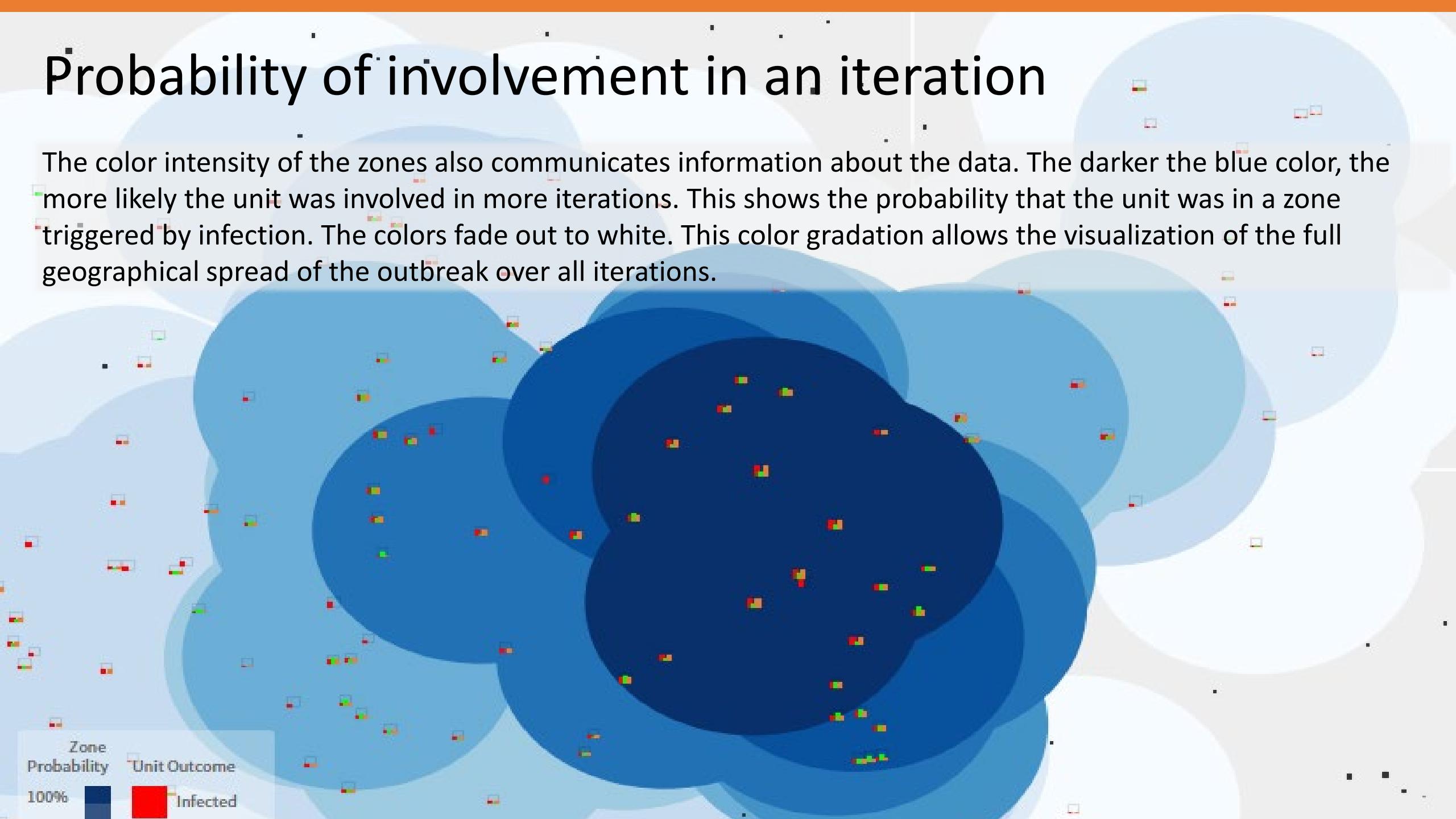
Population Heat Map Zoomed In

The blue areas represent zones. If zones are not used, there will be no blue areas. The mouse scroll button allows you to magnify the map. Resolution of the map is limited in the Map Summary. On populations covering a large geographical area, details may not be visible on the units. An image of the map is automatically created in the outputs section. This image can be enlarged to a fine level of detail.



Probability of involvement in an iteration

The color intensity of the zones also communicates information about the data. The darker the blue color, the more likely the unit was involved in more iterations. This shows the probability that the unit was in a zone triggered by infection. The colors fade out to white. This color gradation allows the visualization of the full geographical spread of the outbreak over all iterations.

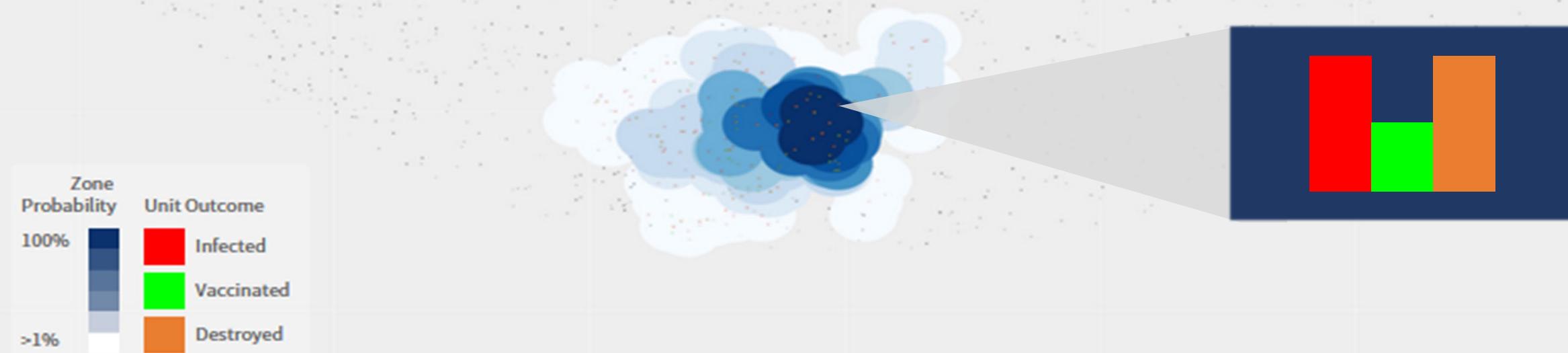


Population Heat Map– Control Measures

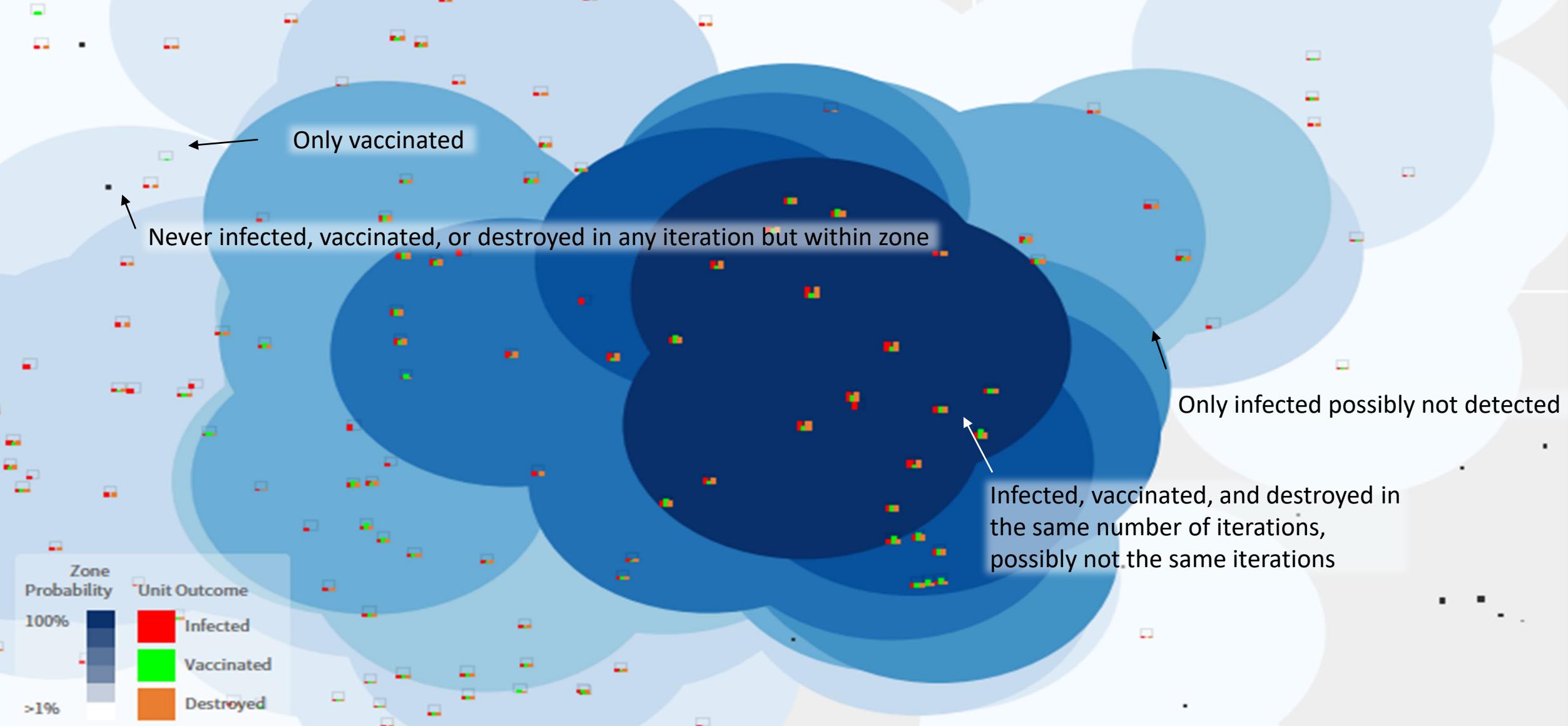
The Population Map is a summary of all iterations. The units that have at least one event show small graph boxes instead of black squares.

The graphs represent how often events happen in the iterations. In the example graph, 10 iterations were run. This unit was infected in all 10 iterations. This unit was also destroyed in all 10 iterations.

In 5 of the iterations, the unit was vaccinated. That is a clue that the parameter *Vaccinate detected units* was turned on in this example.



Here are some examples of the small graphs and control measure events that happened in this scenario. The legend at the bottom describes the events and the color associated to the event.



To be clear, a summary visualization of the data doesn't provide all the details. It does present a quick overview to start understanding what is in the data. We will continue to explore the data in other ways.



Selected Variables Summary

On the right side of Results Home, there is a panel with a subset of *variables* calculated for the median. These variables were selected because they are frequently used by epidemiologists to determine the severity of an outbreak. Combined with the Population Heat Map, this output allows a quick view to determine the scope of the outbreak.

Simulation Version: 3.5.0	
Unit (Animal) Summary	
Median Infected Units (Animals)	29 (8309)
Median Units (Animals) Infected at First Detection	6 (1219)
Median Depopulated Units (Animals)	24 (6848)
Median Vaccinated Units (Animals)	20 (6577)
Event Summary	
Median Outbreak Duration in Days (end of control activities)	76
Median Duration of Disease Spread in Days	76
Median Day of First Detection	9
Median Day of First Vaccination	12
Median Day of First Destruction	15
Zone Summary	
Median Total Area of High risk in km ²	3163.57
Median Number of Distinct High risk Zones	1
Median Total Area of Medium risk in km ²	1313.88
Median Number of Distinct Medium risk Zones	1

The Data Dictionary can provide field level definitions, use the ? Panel in the ADSM application to find the Data Dictionary.

Navigation Tabs



Keeping track of how many animals are in each status has been important for a long time. Managing these details is especially important in simulation.

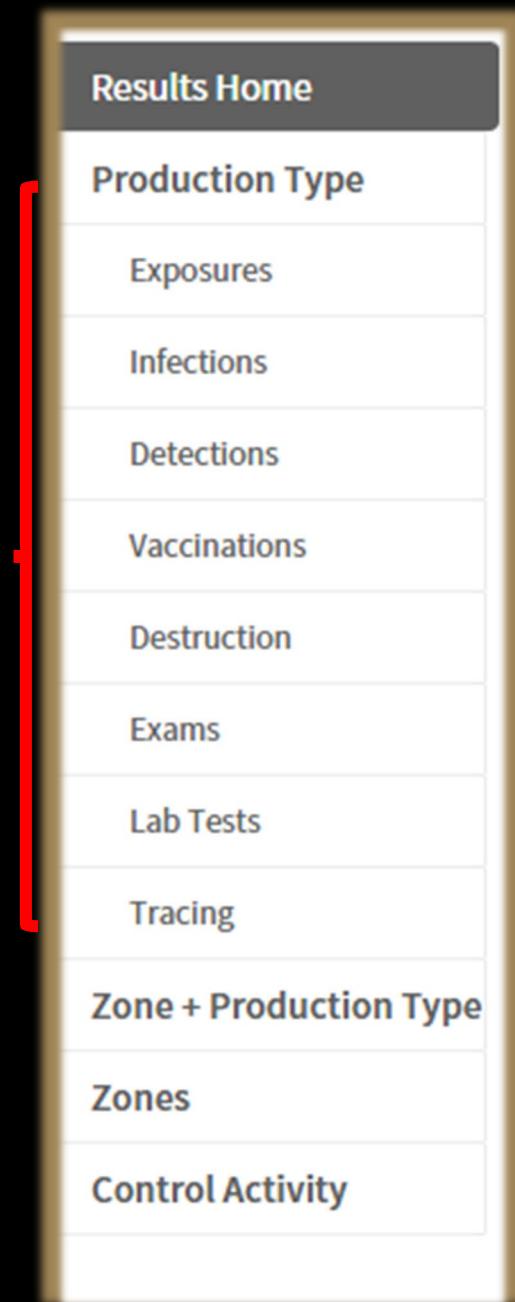
Navigation tabs allow a more detailed view of each type of observation that was generated by the simulation. These variables are tracked by the time step unit, usually a day.



On the left side of Results Home, the Navigation tabs organize the *output variables* from ADSM that are created by day of the iteration. ADSM creates **244** fields in the output tables. These tables are organized into logical groups.

Results by Production Type are broken down into logical subsets due to the large number of variables.

Some *variables* are only available in the raw data due to the difficulty in providing a clear visualization.



Understanding Variables

ADSM Documentation

Helpful links...

[Quick Start Guide](#)

[Model Specifications](#)

[Basics of Stochastic Modeling](#)

[Lexicon of Disease Spread Modelling Terms](#)

[PDF Overview](#)

[PDF White Paper](#)

[Results Overview](#)

[Data Dictionary](#)

Refer to the [wiki](#) for additional information



SQL

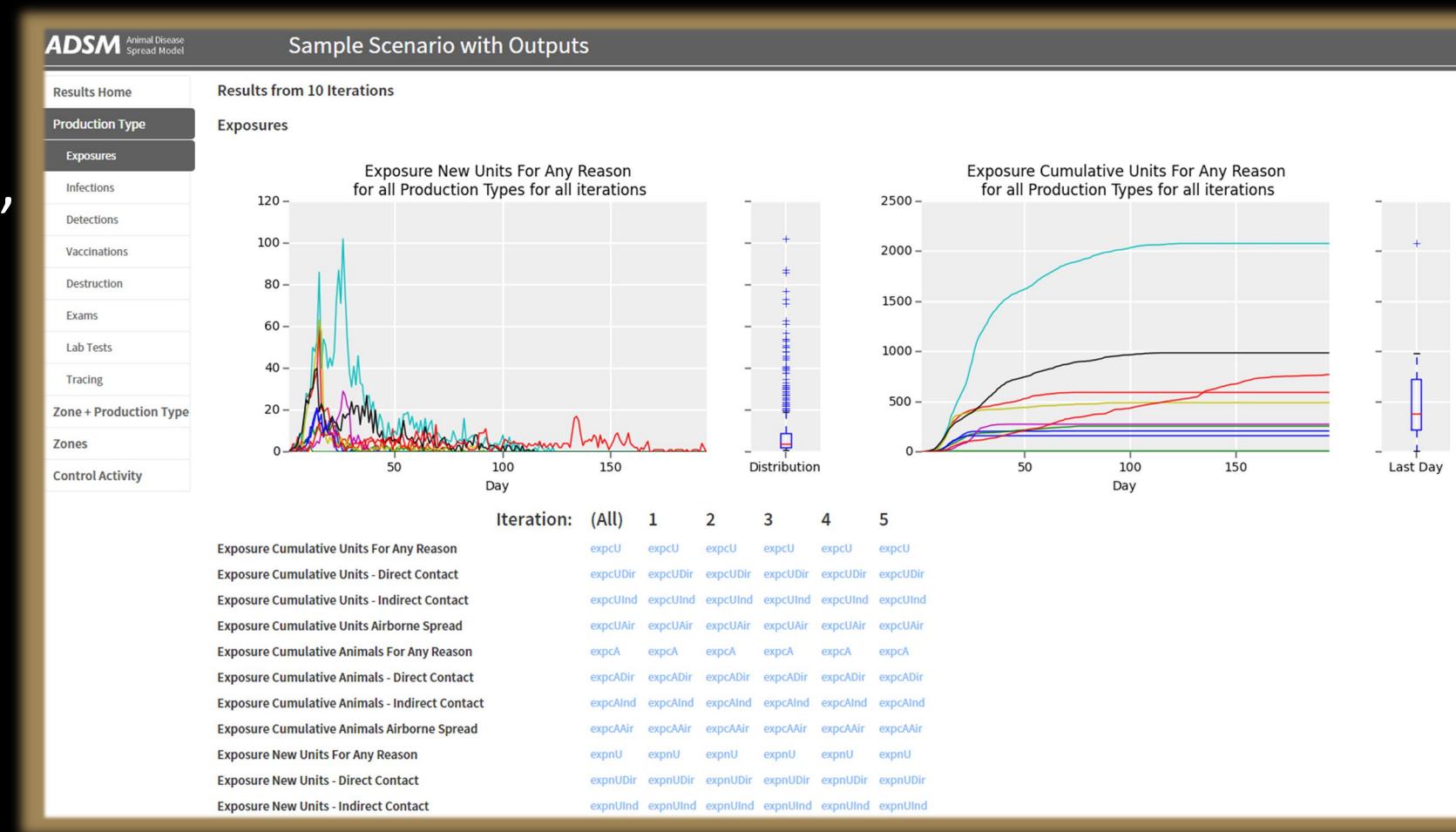
Because there are many *output variables*, this training will not provide an extended definition on each variable as it is referenced.

Use the Help (?) Panel to open the Data Dictionary if you need to review a definition. The data gives a day-by-day count of events, broken down by production type when possible. To show a single example, we will focus on exposure.

Details are always available from the raw data.

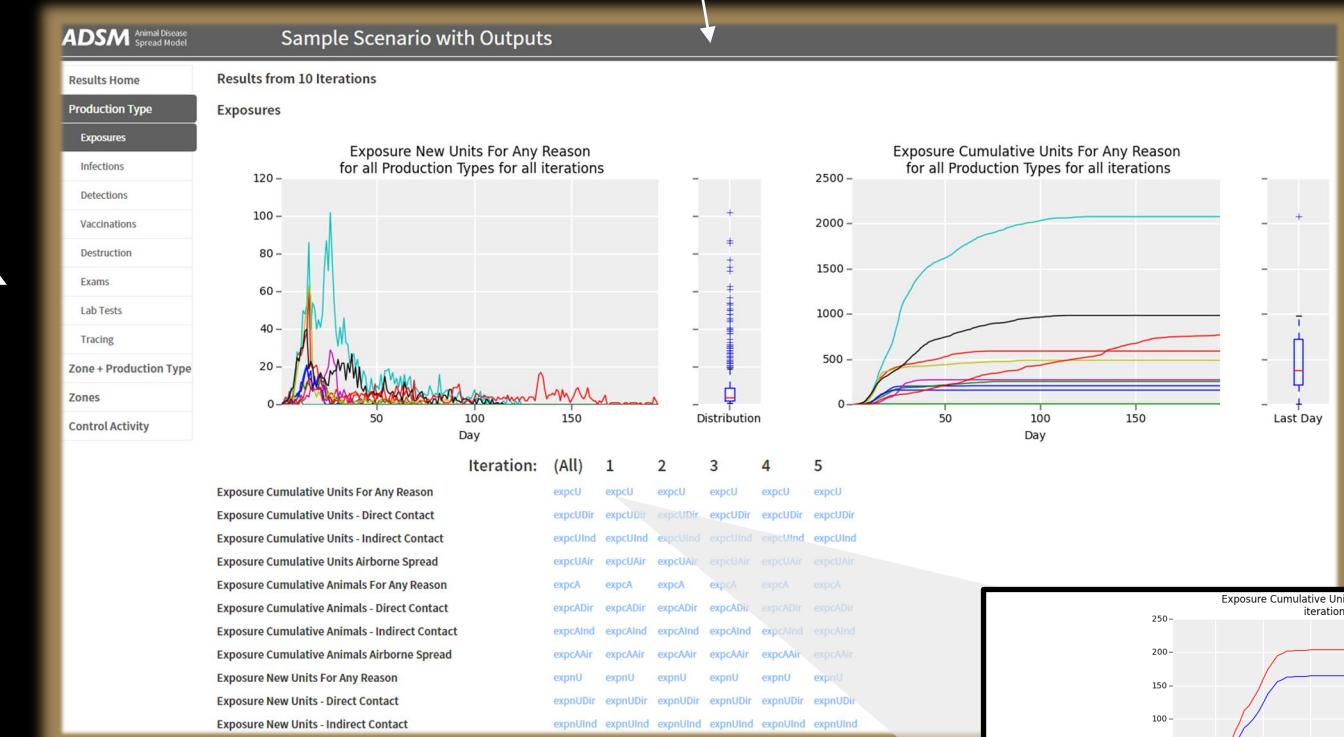
Exposure example - 10 iterations

When less than 20 iterations are completed, visualizations are shown as string graphs. Looking at a small set of iterations allows a simplified view of a trend.



Exposure after 10 iterations

The string graph on the left is a summary of data for daily new Exposures by Direct, Indirect and Airborne contact. This allows you to evaluate the number of unit-to-unit contacts that are occurring throughout the simulation. Note that not every exposure results in disease spread.



Clicking on any of the variables will give you the graph of the specific data for that variable.

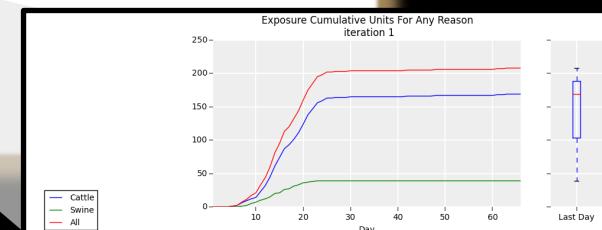
Variable Name here

Click here on link

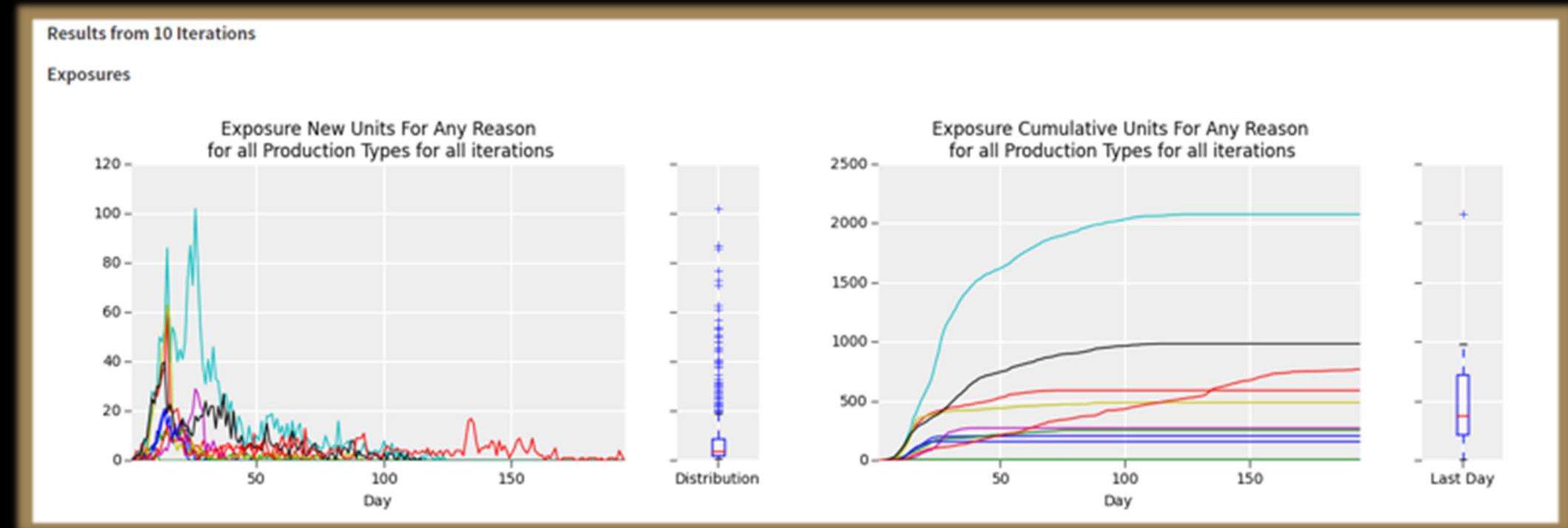
The string graph on the right is a summary of data for *Exposures by Direct, Indirect, and Airborne contacts* as they accumulate by day. Lines go flat when exposures stop happening.



The iterations under columns 1, 2, 3, 4, and 5 allow you to view the production type level data of the first 5 iterations that completed.

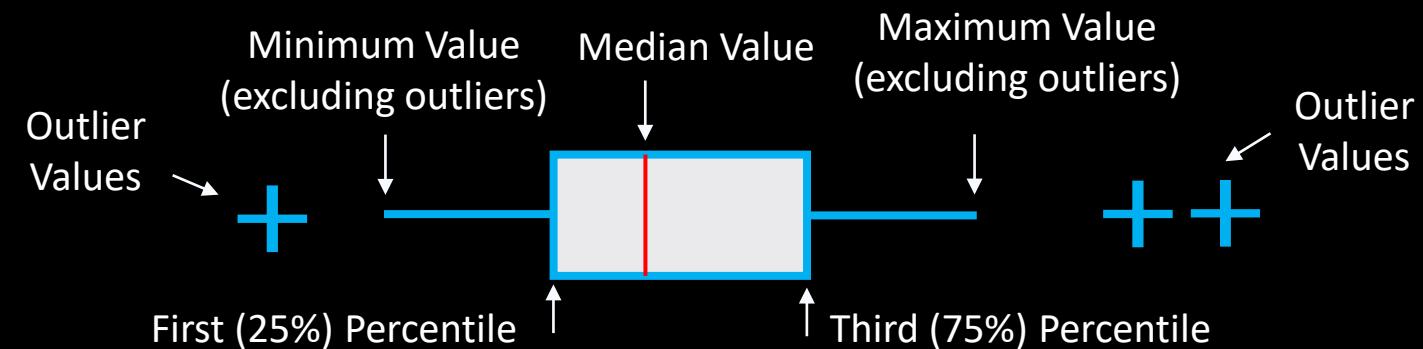


Exposure after 10 iterations



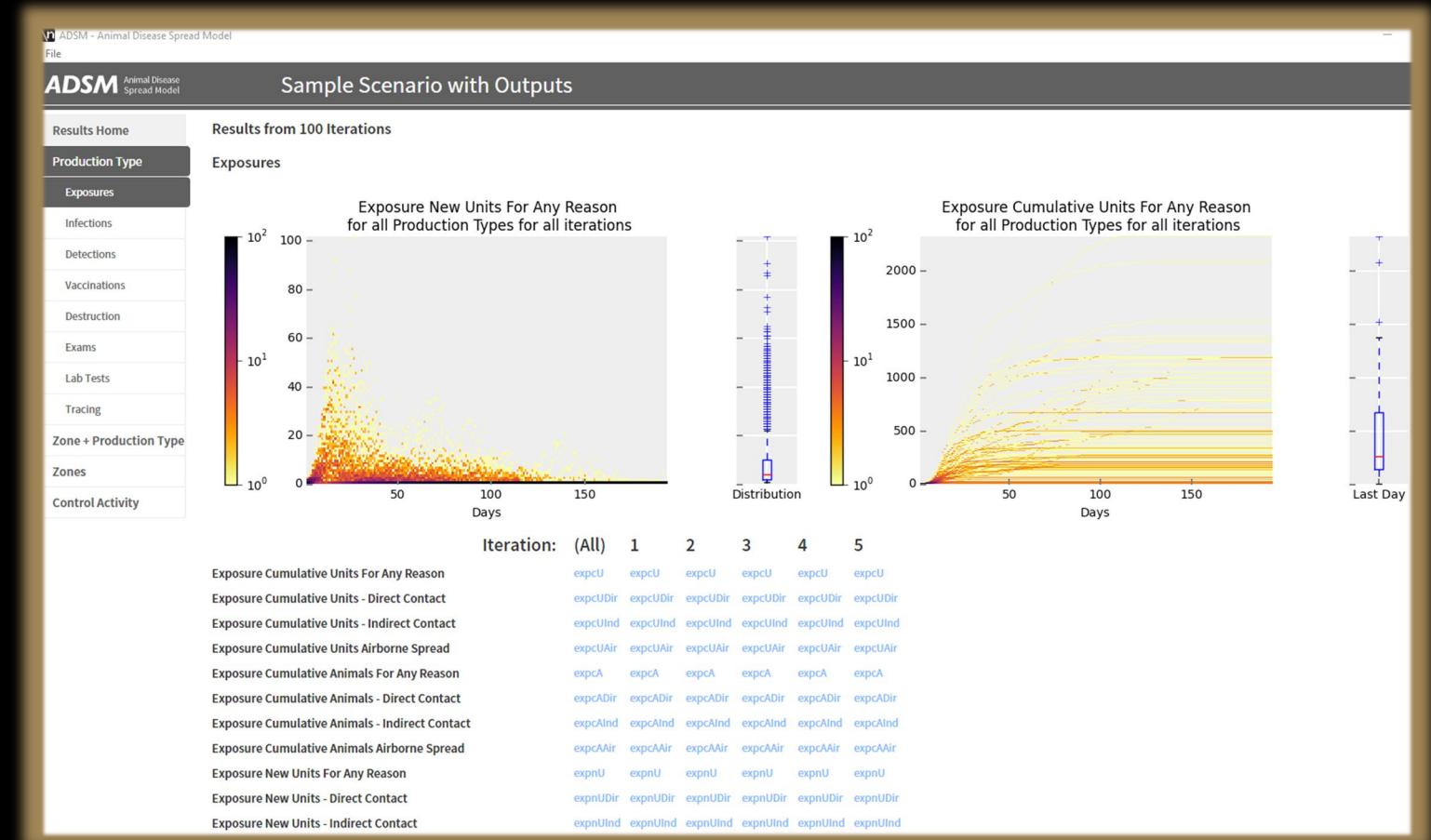
Both graphs have a box and whisker plot to the right of the graph.

How to read a box and whisker plot:



Exposure as an example - 100 iterations

When more than 20 iterations are completed, visualizations are shown as reverse heat maps. Looking at a large set of iterations allows a clear view of the outliers as seen by the contrasting coloration.

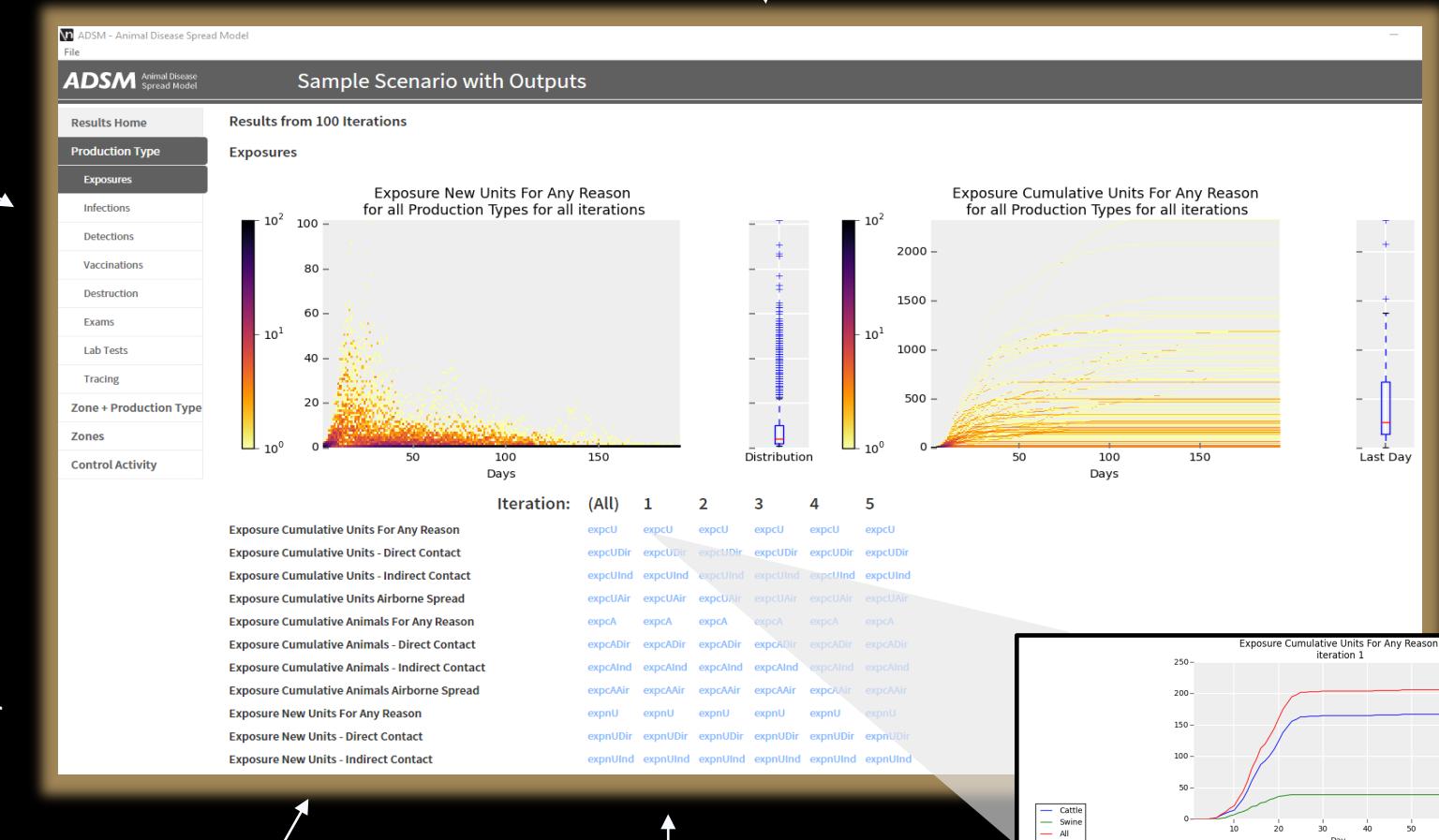


Exposure after 100 iterations

The reverse heat map on the left is a summary of data for daily new Exposures for Direct, Indirect, and Airborne contact. This allows you to evaluate the number of unit-to-unit contacts that are occurring throughout the simulation. The graph shows both the number of exposures that occur each day (data points on graph) as well as how often they occur among all iterations (heat map coloration). Note that not every exposure causes disease spread.

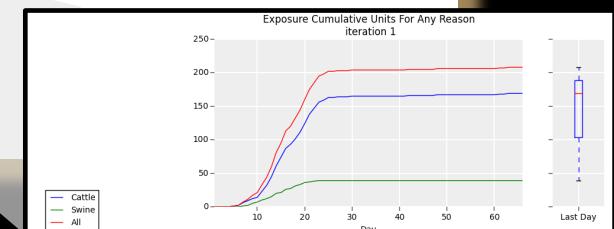
Clicking on any of the variables will give you the graph of the specific data for that variable.

Both graphs have a legend to the left of the graph and a box and whisker plot to the right of the graph.



The reverse heat map on the right is a summary of *Exposures for Direct, Indirect, and Airborne contacts* as they accumulate by day. Lines go flat when exposures stop happening.

The iterations under 1, 2, 3, 4, and 5 allow you to view the production type level data of the first 5 iterations that completed.

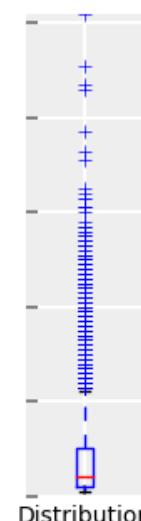
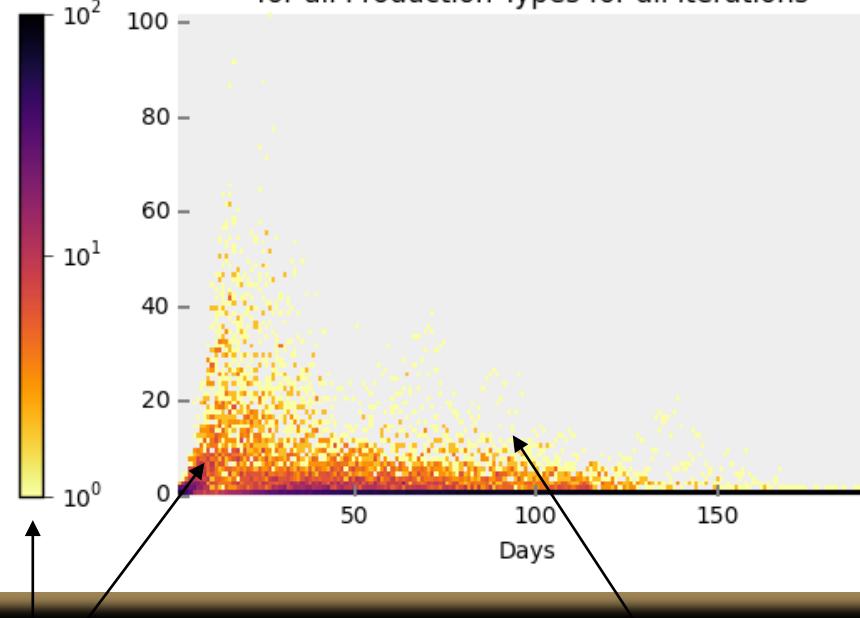


Exposure after 100 iterations

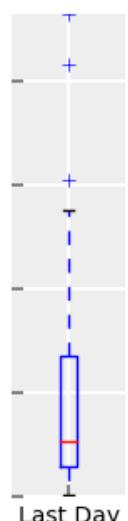
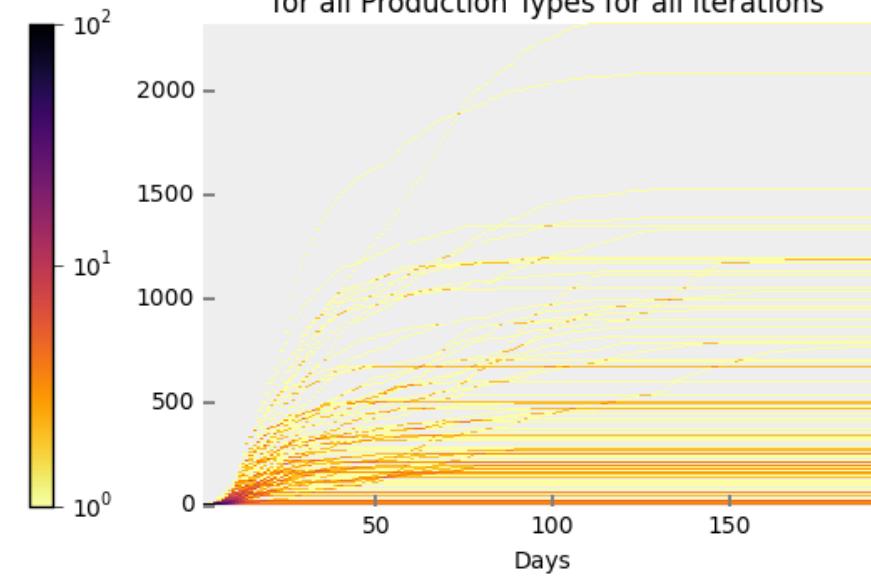
Results from 100 Iterations

Exposures

Exposure New Units For Any Reason
for all Production Types for all iterations



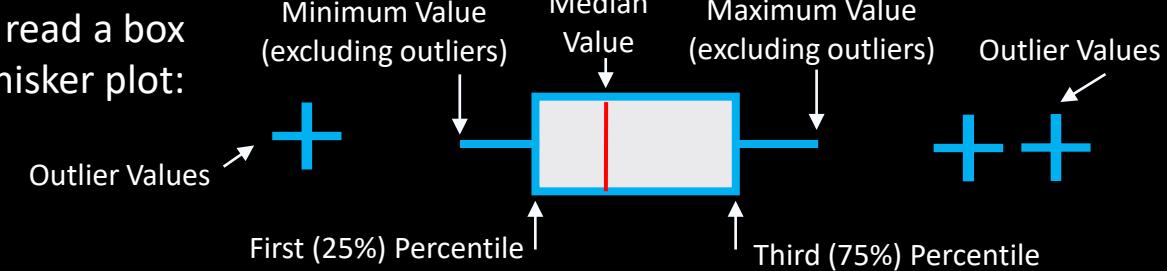
Exposure Cumulative Units For Any Reason
for all Production Types for all iterations



Heat Map = the frequency that specific exposure types occurred across all iterations (the darkest color means that unit-to-unit contact type occurred in every iteration).

Data points = number of exposure contacts that occurred on a specific day of the simulation.

How to read a box and whisker plot:



Fields in the Visualizations

The fields have a shortened name in the database. Some examples are:

expcU = Exposure Cumulative Units for Any reason

expcUDir = Exposure Cumulative Units – Direct contact

expcUInd = Exposure Cumulative Units – Indirect contact

The data is reported at both a ***Unit*** count and an ***Animal*** count level.

Output is also broken down into **New** values on a given day, as well as **Cumulative** values. It is further broken down into details that are relevant to a particular variable. In this example, **exposure** can happen through ***Direct*** contact, ***Indirect*** contact or ***Airborne*** spread.

A data dictionary is available to provide a more detailed definition of each output variable. The data dictionary is created in the format of the database output tables. ADSM is using the data in the database to provide these visualizations.

Exposure Cumulative Units For Any Reason
Exposure Cumulative Units - Direct Contact
Exposure Cumulative Units - Indirect Contact
Exposure Cumulative Units Airborne Spread
Exposure Cumulative Animals For Any Reason
Exposure Cumulative Animals - Direct Contact
Exposure Cumulative Animals - Indirect Contact
Exposure Cumulative Animals Airborne Spread
Exposure New Units For Any Reason
Exposure New Units - Direct Contact
Exposure New Units - Indirect Contact
Exposure New Units Airborne Spread
Exposure New Animals For Any Reason
Exposure New Animals - Direct Contact
Exposure New Animals - Indirect Contact
Exposure New Animals Airborne Spread

Note: there are a few fields available in the database that are not visualized.



Exposure

- Cumulative Units For Any Reason
- Cumulative Units - Direct Contact
- Cumulative Units - Indirect Contact
- Cumulative Units Airborne Spread
- Cumulative animals For Any Reason
- Cumulative animals - Direct Contact
- Cumulative animals - Indirect Contact
- Cumulative animals Airborne Spread
- New Units For Any Reason
- New Units - Direct Contact
- New Units - Indirect Contact
- New Units Airborne Spread
- New animals For Any Reason
- New animals - Direct Contact
- New animals - Indirect Contact
- New animals Airborne Spread

Adequate Exposure



Adequate fields are not visualized

Infection

- Cumulative Units For Any Reason
- Cumulative Units Initially
- Cumulative Units - Direct Contact
- Cumulative Units - Indirect Contact
- Cumulative Units Airborne Spread
- Cumulative animals For Any Reason
- Cumulative animals Initially
- Cumulative animals - Direct Contact
- Cumulative animals - Indirect Contact
- Cumulative animals Airborne Spread
- New Units For Any Reason
- New Units Initially
- New Units - Direct Contact
- New Units - Indirect Contact
- New Units Airborne Spread
- New animals For Any Reason
- New animals Initially
- New animals - Direct Contact
- New animals - Indirect Contact
- New animals Airborne Spread

All these fields are captured Daily by Production Type



Detection

- Detection Cumulative Units For Any Reason
- Detection Cumulative Units Clinical
- Detection Cumulative Units from Lab Tests
- Detection Cumulative animals For Any Reason
- Detection Cumulative animals Clinical
- Detection Cumulative animals from Lab Tests
- Detection New Units For Any Reason
- Detection New Units Clinical
- Detection New Units from Lab Tests
- Detection New animals For Any Reason
- Detection New animals Clinical
- Detection New animals from Lab Tests

Destruction



- New Units For Any Reason
- New Units because of Ring
- New Units because of Detection
- New Units Initially
- New Units because of Direct Forward Trace
- New Units because of Indirect Forward Trace
- New Units because of Direct Back Trace
- New Units because of Indirect Back Trace
- New animals For Any Reason
- New animals because of Ring
- New animals because of Detection
- New animals Initially
- New animals because of Direct Forward Trace
- New animals because of Indirect Forward Trace
- New animals because of Direct Back Trace
- New animals because of Indirect Back Trace
- Cumulative Units For Any Reason
- Cumulative Units because of Ring
- Cumulative Units because of Detection
- Cumulative Units Initially
- Cumulative Units because of Direct Forward Trace
- Cumulative Units because of Indirect Forward Trace
- Cumulative Units because of Direct Back Trace
- Cumulative Units because of Indirect Back Trace
- Cumulative animals For Any Reason
- Cumulative animals because of Ring
- Cumulative animals because of Detection
- Cumulative animals Initially
- Cumulative animals because of Direct Forward Trace
- Cumulative animals because of Indirect Forward Trace
- Cumulative animals because of Direct Back Trace
- Cumulative animals because of Indirect Back Trace
- Wait Time Unit
- Wait Time Animal



Vaccination

- Cumulative Units For Any Reason
- Cumulative Units Initially
- Cumulative Units because of Ring
- Cumulative animals For Any Reason
- Cumulative animals Initially
- Cumulative animals because of Ring
- New Units For Any Reason
- New Units Initially
- New Units because of Ring
- New animals For Any Reason
- New animals Initially
- New animals because of Ring

Variables not visualized

- Wait Time Units
- Wait Time Units Max
- Wait Time Units Day with Max
- Wait Time Units Max Time
- Wait Time Units Average Time
- Wait Time Units Days in Queue
- Wait Time animals
- Wait Time animals Max
- Wait Time animals Day with Max
- Wait Time animals Max Time
- Wait Time animals Average Time
- Wait Time animals Days in Queue

All these fields are captured Daily by Production Type

Tracing



- Cumulative Units For Any Reason
- Cumulative Units For Any Reason Possible
- Cumulative Units - Direct Contact
- Cumulative Units - Direct Contact Possible
- Cumulative Units - Indirect Contact
- Cumulative Units - Indirect Contact Possible
- Cumulative animals For Any Reason
- Cumulative animals For Any Reason Possible
- Cumulative animals - Direct Contact
- Cumulative animals - Direct Contact Possible
- Cumulative animals - Indirect Contact
- Cumulative animals - Indirect Contact Possible
- New Units For Any Reason For Any Reason
- New Units For Any Reason Possible
- New Units - Direct Contact For Any Reason
- New Units - Direct Contact Possible
- New Units - Indirect Contact For Any Reason
- New Units - Indirect Contact Possible
- New animals For Any Reason For Any Reason
- New animals For Any Reason Possible
- New animals - Direct Contact For Any Reason
- New animals - Direct Contact Possible
- New animals - Indirect Contact For Any Reason
- New animals - Indirect Contact Possible

Testing



- Cumulative Units For Any Reason
- Cumulative Units because of Direct Forward Trace
- Cumulative Units because of Indirect Forward Trace
- Cumulative Units because of Direct Back Trace
- Cumulative Units because of Indirect Back Trace
- Cumulative animals For Any Reason
- Cumulative animals because of Direct Forward Trace
- Cumulative animals because of Indirect Forward Trace
- Cumulative animals because of Direct Back Trace
- Cumulative animals because of Indirect Back Trace
- Cumulative Units True Positives
- Cumulative Units False Positives
- Cumulative Units True Negatives
- Cumulative Units False Negatives
- New Units For Any Reason
- New Units because of Direct Forward Trace
- New Units because of Indirect Forward Trace
- New Units because of Direct Back Trace
- New Units because of Indirect Back Trace
- New Units True Positives

Exam



- New Units For Any Reason
- New Units because of Ring
- New Units because of Direct Forward Trace
- New Units because of Indirect Forward Trace
- New Units because of Direct Back Trace
- New Units because of Indirect Back Trace
- New Units because of Detection
- New animals For Any Reason
- New animals because of Ring
- New animals because of Direct Forward Trace
- New animals because of Indirect Forward Trace
- New animals because of Direct Back Trace
- New animals because of Indirect Back Trace
- New animals because of Detection
- Cumulative Units For Any Reason
- Cumulative Units because of Ring
- Cumulative Units because of Direct Forward Trace
- Cumulative Units because of Indirect Forward Trace
- Cumulative Units because of Direct Back Trace
- Cumulative Units because of Indirect Back Trace

All these fields are captured Daily by Production Type

These fields are recorded daily, but grouped differently



By Zone

- Area of zone
- Perimeter of zone
- Number of zones



By Zone and Production Type

- Units in zone
- Unit days in zone
- Animal days in zone

These fields are recorded daily, across all production types

- Cost of Surveillance
- Cost of Vaccination Setup
- Cost of Vaccination
- Cost of Vaccination Subtotal
- Cost of Destruction Appraisal
- Cost of Destruction Euthanasia
- Cost of Destruction Indemnity
- Cost of Destruction Disposal
- Cost of Destruction Cleaning
- Cost of Destruction Subtotal
- Total Costs



- Disease Duration
- Outbreak Duration
- Destruction Wait Days Units Max
- Destruction Wait Days Units Max Day
- Destruction Wait Days Units Max Time
- Destruction Wait Days Units Average Time
- Destruction Wait Days Units in Queue
- Destruction Wait Days Animals Max
- Destruction Wait Days Animals Max Day
- Destruction Wait Time Animals Max Time
- Destruction Wait Time Animals Average Time
- Destruction Wait Days Animals in Queue
- Vaccination Occurred
- Vaccination Triggered
- Detection For Any Reason
- Destruction For Any Reason
- First Detection Units Infected
- First Detection Animals Infected



*Note: in some of the control activity variables, the data is a yes/no condition. These yes/no activity graphs are accurate, but less intuitive to interpret. We will do a more critical interpretation of data in **VERIFICATION AND VALIDATION**.*

Output Files



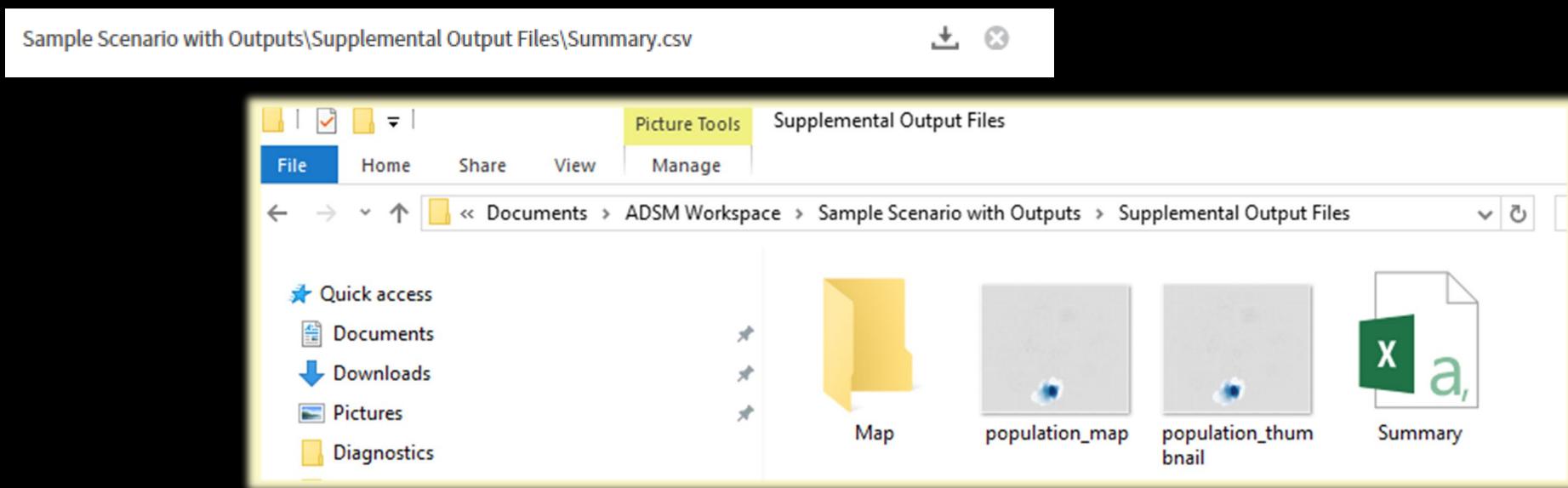
Generate Summary File

ADSM offers the option to generate a summary file at the completion of all iterations. This process can be completed using the button below the Population Heat Map. The summary file will automatically be saved into the ADSM Workspace file structure.



The arrows will circle while the file is calculating.

When complete, the file path will show in Results Home. It is not necessary to download again, but you can delete the file from this window if needed.



Summary File

The Summary File is a comma-separate value file. These actions make it easier to read:

- Expand the columns to fit the fields
- Sort the columns A – Z, which groups similar items together

The *Field Name* and a short *explanation* are followed by descriptive statistics. The Summary File has only the subset of fields that make sense to look at over a whole iteration. Summary statistics are provided, such as the *mean, standard deviation, minimum/maximum values, and the 5th/25th/50th/75th/95th percentile values.*

Here's a small example that matches the **100** iterations of the Sample Scenario.

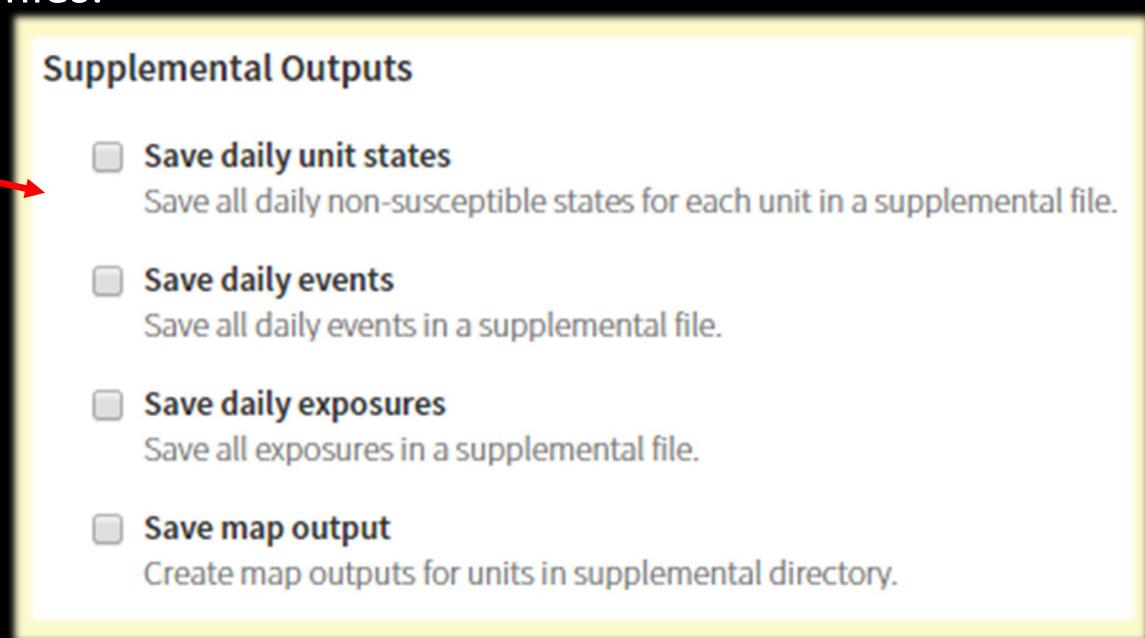
1	Field Name	Explanation	Mean	StdDev	Low	High	p5	p25	p50	p75	p95
56	expcAInd	Exposure Cumulative Animals - Indirect Contact	60633.76	61622.24	507	298885	1360	12662	39128	94831	179941
57	expcU	Exposure Cumulative Units For Any Reason	447.5	461.94	2	2326	8	135	256	664	1330
58	expcUAir	Exposure Cumulative Units Airborne Spread	219.09	211.52	0	967	0	66	141	298	639
59	expcUDir	Exposure Cumulative Units - Direct Contact	47.02	51.75	0	277	1	13	27	63	134
60	expcUInd	Exposure Cumulative Units - Indirect Contact	181.39	209.24	1	1082	5	35	95	293	522

Supplemental Output Files

Supplemental Output Files are the output records that give the detail by unit by day. One file per iteration is created for each file type requested. These records can add a whole new dimension to the data you have available for analysis. They also create large volumes of output and possibly large output files.

Supplemental Output Files are not created automatically due to the large volume of data they create. A good practice is to experiment with your scenarios at a small scale before starting a large project with many iterations and large export files.

Use these check boxes on the Output Settings tab to turn on the *Supplemental Outputs*. The [Apply] button will save your change.



Supplemental Output Files – 10 iterations

This example completed 10 iterations. If you scroll down on Results Home, the files are visible at the bottom. The files are saved in the ADSM Workspace Directory, so there is no need to download them.

ADSM Animal Disease Spread Model

Sample Scenario with Outputs

Results Home

Production Type

- Exposures
- Infections
- Detections
- Vaccinations
- Destruction
- Exams
- Lab Tests
- Tracing

Zone + Production Type

Zones

Control Activity

File Path	Action
Sample Scenario with Outputs\Supplemental Output Files\daily_events_6.csv	Download X
Sample Scenario with Outputs\Supplemental Output Files\daily_events_7.csv	Download X
Sample Scenario with Outputs\Supplemental Output Files\daily_events_8.csv	Download X
Sample Scenario with Outputs\Supplemental Output Files\daily_events_9.csv	Download X
Sample Scenario with Outputs\Supplemental Output Files\daily_exposures_1.csv	Download X
Sample Scenario with Outputs\Supplemental Output Files\daily_exposures_10.csv	Download X
Sample Scenario with Outputs\Supplemental Output Files\daily_exposures_2.csv	Download X
Sample Scenario with Outputs\Supplemental Output Files\daily_exposures_3.csv	Download X
Sample Scenario with Outputs\Supplemental Output Files\daily_exposures_4.csv	Download X
Sample Scenario with Outputs\Supplemental Output Files\daily_exposures_5.csv	Download X
Sample Scenario with Outputs\Supplemental Output Files\daily_exposures_6.csv	Download X
Sample Scenario with Outputs\Supplemental Output Files\daily_exposures_7.csv	Download X
Sample Scenario with Outputs\Supplemental Output Files\daily_exposures_8.csv	Download X
Sample Scenario with Outputs\Supplemental Output Files\daily_exposures_9.csv	Download X
Sample Scenario with Outputs\Supplemental Output Files\states_1.csv	Download X
Sample Scenario with Outputs\Supplemental Output Files\states_10.csv	Download X
Sample Scenario with Outputs\Supplemental Output Files\states_2.csv	Download X
Sample Scenario with Outputs\Supplemental Output Files\states_3.csv	Download X
Sample Scenario with Outputs\Supplemental Output Files\states_4.csv	Download X
Sample Scenario with Outputs\Supplemental Output Files\states_5.csv	Download X
Sample Scenario with Outputs\Supplemental Output Files\states_6.csv	Download X
Sample Scenario with Outputs\Supplemental Output Files\states_7.csv	Download X
Sample Scenario with Outputs\Supplemental Output Files\states_8.csv	Download X
Sample Scenario with Outputs\Supplemental Output Files\states_9.csv	Download X
Sample Scenario with Outputs\Supplemental Output Files\Sample Scenario with Outputs Map Output.zip	Download X

Name	Date	Type	Size	Tags
Map	3/29/2019 11:45 AM	File folder		
daily_events_1	3/29/2019 11:45 AM	Microsoft Excel C...	14 KB	
daily_events_2	3/29/2019 11:45 AM	Microsoft Excel C...	20 KB	
daily_events_3	3/29/2019 11:45 AM	Microsoft Excel C...	31 KB	
daily_events_4	3/29/2019 11:45 AM	Microsoft Excel C...	113 KB	
daily_events_5	3/29/2019 11:45 AM	Microsoft Excel C...	16 KB	
daily_events_6	3/29/2019 11:45 AM	Microsoft Excel C...	23 KB	
daily_events_7	3/29/2019 11:45 AM	Microsoft Excel C...	41 KB	
daily_events_8	3/29/2019 11:45 AM	Microsoft Excel C...	14 KB	
daily_events_9	3/29/2019 11:45 AM	Microsoft Excel C...	1 KB	
daily_events_10	3/29/2019 11:45 AM	Microsoft Excel C...	18 KB	
daily_exposures_1	3/29/2019 11:45 AM	Microsoft Excel C...	7 KB	
daily_exposures_2	3/29/2019 11:45 AM	Microsoft Excel C...	14 KB	
daily_exposures_3	3/29/2019 11:45 AM	Microsoft Excel C...	34 KB	
daily_exposures_4	3/29/2019 11:45 AM	Microsoft Excel C...	123 KB	
daily_exposures_5	3/29/2019 11:45 AM	Microsoft Excel C...	10 KB	
daily_exposures_6	3/29/2019 11:45 AM	Microsoft Excel C...	21 KB	
daily_exposures_7	3/29/2019 11:45 AM	Microsoft Excel C...	61 KB	
daily_exposures_8	3/29/2019 11:45 AM	Microsoft Excel C...	6 KB	
daily_exposures_9	3/29/2019 11:45 AM	Microsoft Excel C...	1 KB	
daily_exposures_10	3/29/2019 11:45 AM	Microsoft Excel C...	47 KB	
population_map	3/29/2019 11:45 AM	PNG File	318 KB	
population_thumb...	3/29/2019 11:45 AM	PNG File	107 KB	
Sample Scenario wi...	3/29/2019 11:45 AM	Compressed (zipp...	12,459 KB	
states_1	3/29/2019 11:45 AM	Microsoft Excel C...	30 KB	
states_2	3/29/2019 11:45 AM	Microsoft Excel C...	53 KB	
states_3	3/29/2019 11:45 AM	Microsoft Excel C...	88 KB	
states_4	3/29/2019 11:45 AM	Microsoft Excel C...	434 KB	
states_5	3/29/2019 11:45 AM	Microsoft Excel C...	16 KB	
states_6	3/29/2019 11:45 AM	Microsoft Excel C...	74 KB	
states_7	3/29/2019 11:45 AM	Microsoft Excel C...	184 KB	
states_8	3/29/2019 11:45 AM	Microsoft Excel C...	8 KB	
states_9	3/29/2019 11:45 AM	Microsoft Excel C...	1 KB	
states_10	3/29/2019 11:45 AM	Microsoft Excel C...	173 KB	

Supplemental Output Files – Daily States Iteration 1

Looking at iteration 1, the non-susceptible units start at day 1 and begin to count through each day of the outbreak as more units become infected. Note the susceptible units are not included in this file.

Why aren't susceptible units included? The output files could be extremely large if they contained that level of detail. You can assume units not shown in Daily_States were in a susceptible status.

The status code is the same code used in the population file to describe starting disease status. The Sample Scenario example has 1,099 records for iteration 1, which had a duration of 66 days.

The data dictionary provides field level definitions.

Disease State	Single Character Code
Susceptible	S
Latent	L
Subclinical	B
Clinical	C
Naturally Immune	N
Vaccine Immune	V
Destroyed	D

A	B	C	D	E	F
run	day	ID	status	Lat	Lon
1	1	1	19 L	33	-35.1214
2	1	2	19 L	33	-35.1214
3	1	3	19 L	33	-35.1214
4	1	4	19 L	33	-35.1214
5	1	5	19 L	33	-35.1214
6	1	6	19 L	33	-35.1214
7	1	6	1808 L	32.896	-35.0908
8	1	7	19 L	33	-35.1214
9	1	7	1808 B	32.896	-35.0908
10	1	7	1818 L	32.791	-35.2308
11	1	8	19 L	33	-35.1214
12	1	8	458 L	32.733	-35.3644
13	1	8	1808 B	32.896	-35.0908
14	1	8	1818 L	32.791	-35.2308
15	1	8	1830 L	32.753	-35.0608
16	1	9	19 B	33	-35.1214
17	1	9	458 L	32.733	-35.3644
18	1	9	1808 B	32.896	-35.0908
19	1	9	1818 L	32.791	-35.2308
20	1	9	1830 L	32.753	-35.0608
21	1	9	1867 L	32.947	-35.0622
22	1	10	19 B	33	-35.1214
23	1	10	458 L	32.733	-35.3644
24	1	10	1808 C	32.896	-35.0908
25	1	10			

Supplemental Output Files – Daily Events Iteration 1

Looking at iteration 1, the events by day and by units are detailed.

The Sample Scenario created 206 records for iteration 1.

The data dictionary provides field level definitions.

A	B	C	D	E	F	G	H	I	J	
1	Run	Day	Type	Reason	ID	Productio	Size	Lat	Lon	Zone
2	1	10	Detection	Clin	1808	Cattle	46	32.8963	-35.0908	
3	1	10	TraceInitiated	IndFwd	1808	Cattle	46	32.8963	-35.0908	
4	1	10	TraceInitiated	DirBack	1808	Cattle	46	32.8963	-35.0908	
5	1	10	TraceInitiated	IndBack	1808	Cattle	46	32.8963	-35.0908	
6	1	10	TraceInitiated	DirFwd	1808	Cattle	46	32.8963	-35.0908	
7	1	10	TraceFound	DirFrom18	1818	Cattle	290	32.7908	-35.2308	
8	1	10	TraceFound	DirTo1808	19	Cattle	107	32.9998	-35.1214	
9	1	10	TraceFound	DirTo1808	1818	Cattle	290	32.7908	-35.2308	
10	1	10	TraceFound	IndFrom18	19	Cattle	107	32.9998	-35.1214	
11	1	10	TraceFound	IndFrom18	19	Cattle	107	32.9998	-35.1214	
12	1	10	TraceFound	DirFrom18	1830	Cattle	30	32.7527	-35.0608	
13	1	10	TraceFound	IndFrom18	1839	Swine	415	32.9931	-35.2907	
14	1	10	TraceFound	IndFrom18	1893	Cattle	138	32.7563	-35.0415	
15	1	10	Exam	DirFwd	1818	Cattle	290	32.7908	-35.2308	
16	1	10	Exam	DirBack	19	Cattle	107	32.9998	-35.1214	
17	1	10	Exam	DirFwd	1830	Cattle	30	32.7527	-35.0608	
18	1	12	Detection	Test	19	Cattle	107	32.9998	-35.1214	High risk
19	1	12	Detection	Clin	458	Cattle	15	32.7328	-35.3644	Medium risk
20	1	12	Detection	Clin	19	Cattle	107	32.9998	-35.1214	High risk
21	1	12	TraceInitiated	IndBack	19	Cattle	107	32.9998	-35.1214	High risk
22	1	12	TraceInitiated	DirBack	19	Cattle	107	32.9998	-35.1214	High risk
23	1	12	TraceInitiated	IndBack	458	Cattle	15	32.7328	-35.3644	Medium risk

Supplemental Output Files – Daily Exposures Iteration 1

Looking at iteration 1, the exposures by day and by unit are detailed.

The Sample Scenario has 80 records for iteration 1.

The reason code “ini” means initial, or the index unit(s); therefore, it has no source of infection.

The data dictionary provides field level definitions.

A	B	C	D	E	F	G	H	I	J	K	L	M	N
Run	Day	Type	Reason	Source_ID	S_Product	S_Lat	S_Lon	S_Zone	Recipient	R_Product	R_Lat	R_Lon	R_Zone
1	1	0 Exposure	Ini						19 Cattle	32.9998	-35.1214		
	1	0 Infection	Ini						19 Cattle	32.9998	-35.1214		
4	1	5 Exposure	Dir		19 Cattle	32.9998	-35.1214		1808 Cattle	32.8963	-35.0908		
5	1	5 Infection							1808 Cattle	32.8963	-35.0908		
6	1	6 Exposure	Dir		1808 Cattle	32.8963	-35.0908		1818 Cattle	32.7908	-35.2308		
7	1	6 Infection							1818 Cattle	32.7908	-35.2308		
8	1	7 Exposure	Ind		1808 Cattle	32.8963	-35.0908		19 Cattle	32.9998	-35.1214		
9	1	7 Exposure	Dir		1808 Cattle	32.8963	-35.0908		1830 Cattle	32.7527	-35.0608		
10	1	7 Exposure	Dir		1818 Cattle	32.7908	-35.2308		458 Cattle	32.7328	-35.3644		
11	1	7 Infection							458 Cattle	32.7328	-35.3644		
12	1	7 Infection							1830 Cattle	32.7527	-35.0608		
13	1	8 Exposure	Dir		19 Cattle	32.9998	-35.1214		1867 Cattle	32.9465	-35.0622		
14	1	8 Exposure	Ind		1808 Cattle	32.8963	-35.0908		1893 Cattle	32.7563	-35.0415		
15	1	8 Infection							1867 Cattle	32.9465	-35.0622		
16	1	9 Exposure	Ind		19 Cattle	32.9998	-35.1214		1839 Swine	32.9931	-35.2907		
17	1	9 Exposure	Ind		1808 Cattle	32.8963	-35.0908		1839 Swine	32.9931	-35.2907		
18	1	9 Exposure	Dir		1818 Cattle	32.7908	-35.2308		1808 Cattle	32.8963	-35.0908		
19	1	9 Exposure	Ind		1808 Cattle	32.8963	-35.0908		19 Cattle	32.9998	-35.1214		
20	1	10 Exposure	Ind		19 Cattle	32.9998	-35.1214		233 Swine	32.8884	-35.0869		
21	1	10 Exposure	Dir		1867 Cattle	32.9465	-35.0622		1800 Cattle	32.8295	-35.0451		
22	1	10 Infection							1800 Cattle	32.8295	-35.0451		
23	1	11 Exposure	Ind		1830 Cattle	32.7527	-35.0608	High risk	233 Swine	32.8884	-35.0869	High risk	
24	1	11 Exposure	Ind		1808 Cattle	32.8963	-35.0908	High risk	233 Swine	32.8884	-35.0869	High risk	
25	1	12 Exposure	Ind		19 Cattle	32.9998	-35.1214	High risk	233 Swine	32.8884	-35.0869	High risk	

Supplemental Output Files – Map Iteration 1

The Map output makes a file folder called Map which contains many files that can represent the outbreak spatially on a weekly basis.

Map contains both disease state and zone areas.

The data dictionary provides field level definitions.

Sample Scenario with Outputs > Supplemental Output Files > Map				
Name	Date modified	Type	Size	
weekly_gis_1_day0001.dbf	3/29/2019 11:45 AM	DBF File	128 KB	
weekly_gis_1_day0001.shp	3/29/2019 11:45 AM	SHP File	109 KB	
weekly_gis_1_day0001.shx	3/29/2019 11:45 AM	SHX File	32 KB	
weekly_gis_1_day0008.dbf	3/29/2019 11:45 AM	DBF File	128 KB	
weekly_gis_1_day0008.shp	3/29/2019 11:45 AM	SHP File	109 KB	
weekly_gis_1_day0008.shx	3/29/2019 11:45 AM	SHX File	32 KB	
weekly_gis_1_day0015.dbf	3/29/2019 11:45 AM	DBF File	128 KB	
weekly_gis_1_day0015.shp	3/29/2019 11:45 AM	SHP File	109 KB	
weekly_gis_1_day0015.shx	3/29/2019 11:45 AM	SHX File	32 KB	
weekly_gis_1_day0022.dbf	3/29/2019 11:45 AM	DBF File	128 KB	
weekly_gis_1_day0022.shp	3/29/2019 11:45 AM	SHP File	109 KB	
weekly_gis_1_day0022.shx	3/29/2019 11:45 AM	SHX File	32 KB	
weekly_gis_1_day0029.dbf	3/29/2019 11:45 AM	DBF File	128 KB	
weekly_gis_1_day0029.shp	3/29/2019 11:45 AM	SHP File	109 KB	
weekly_gis_1_day0029.shx	3/29/2019 11:45 AM	SHX File	32 KB	
weekly_gis_1_day0036.dbf	3/29/2019 11:45 AM	DBF File	128 KB	
weekly_gis_1_day0036.shp	3/29/2019 11:45 AM	SHP File	109 KB	
weekly_gis_1_day0036.shx	3/29/2019 11:45 AM	SHX File	32 KB	
weekly_gis_1_day0043.dbf	3/29/2019 11:45 AM	DBF File	128 KB	

Raw Data



The daily data behind all the visualizations in ADSM is stored in a SQLite database. Database files can be accessed with tools that use Structure Query Language (SQL) to ask the database questions. A SQL query tool is built into ADSM, called SQL Explorer. It is available on the [SQL Panel](#).

A database has the same tables for every scenario, but each one is filled with the specific *parameters* and *outputs* for the given scenario.



ADSM Workspace > Sample Scenario with Outputs				
Name	Date modified	Type	Size	
Supplemental Output Files	8/28/2019 12:09 PM	File folder		
Sample Scenario with Outputs	8/28/2019 12:09 PM	Data Base File	2,174 KB	

Before going into SQL Explorer, there are some example queries already packaged with ADSM.

A database has the same tables for every scenario, but each one is filled with the specific parameters and outputs for the given scenario. We can write the question once and execute it on any database.

Save any new queries you write into a .txt file to transfer between scenarios.

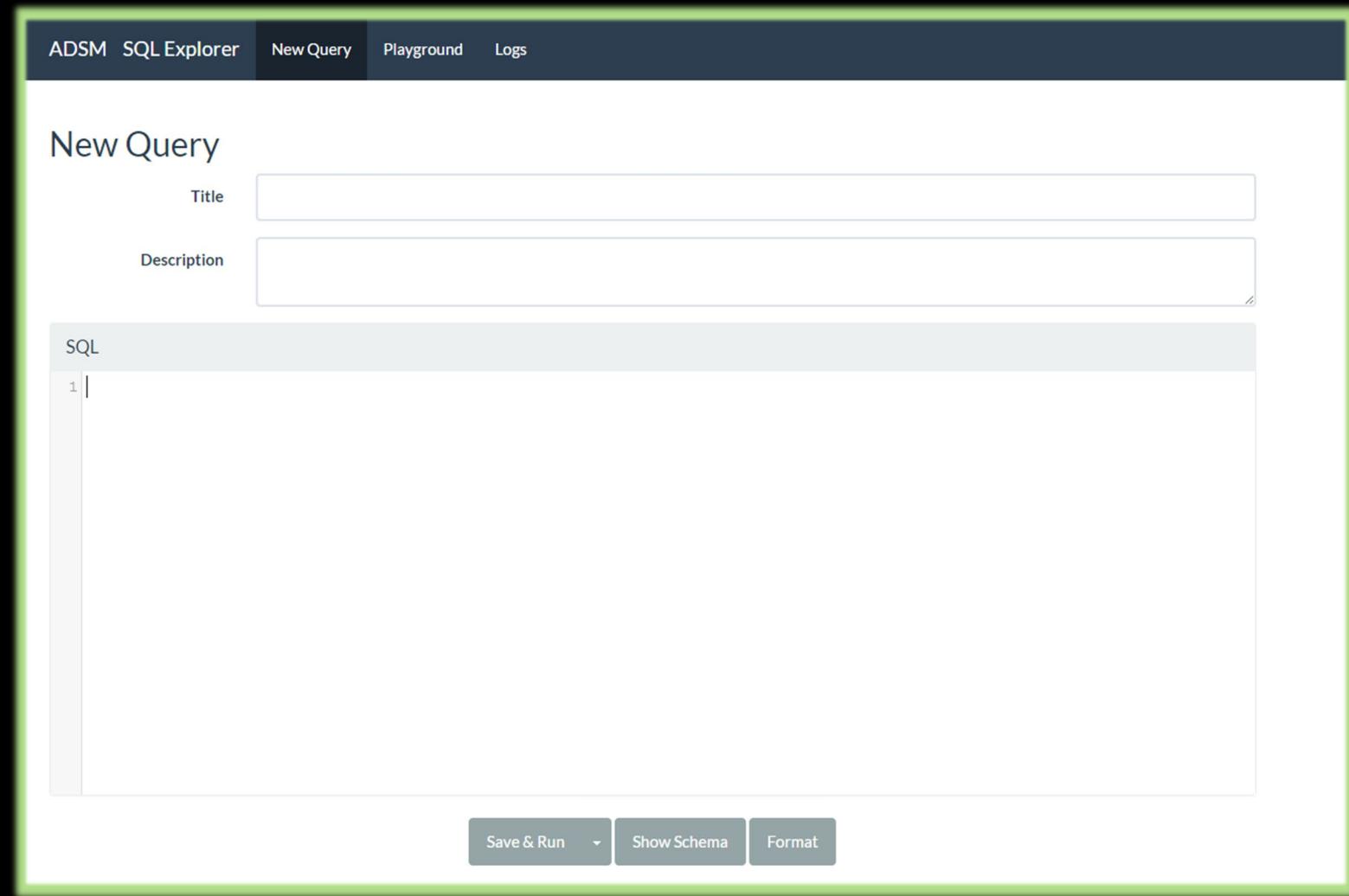
Name	Date modified	Type	Size
Example Database Queries	11/13/2018 3:09 PM	File folder	
Example R Code	11/13/2018 3:09 PM	File folder	
Sample Scenario	2/25/2019 9:25 AM	File folder	
Sample Scenario with Outputs	3/29/2019 11:45 AM	File folder	
SampleOutputNetwork	2/19/2019 1:36 PM	File folder	
settings	3/29/2019 11:45 AM	File folder	
Supplemental Output Files	2/12/2019 3:56 PM	File folder	
Test1	3/27/2019 1:35 PM	File folder	
Texas_2_119	3/28/2019 2:11 PM	File folder	
Blank	3/29/2019 9:30 AM	XML Document	0 KB
Population_Grid	3/29/2019 9:30 AM	XML Document	5 KB
Sample_population	3/29/2019 9:30 AM	XML Document	1,959 KB



The SQL panel brings up SQL Explorer. An empty window appears to create a new query.

Not familiar with writing a query?

Copy and paste one of the examples from the Example Database Queries directory or see the example on the next page.



Use the [ADSM] button to return to ADSM.

Here is a first attempt to run a query. The queries in the Example Database Queries will have documentation at the top as shown in this example. Now that there is SQL code in place, hit [Save and Run] at the bottom.

The screenshot shows the ADSM SQL Explorer interface with a dark blue header bar containing tabs for 'ADSM', 'SQL Explorer', 'New Query', 'Playground', and 'Logs'. The 'New Query' tab is active. Below the header, the title 'New Query' is displayed. Under the 'Title' section, the text 'Production Type with descriptive name' is entered. In the 'Description' section, the text 'Query to link Production Type name to population file, instead of showing only numeric ID' is provided. The main area is labeled 'SQL' and contains the following code:

```
1 | -----
-- Sample Query: Production Type with descriptive name
-- Date: 3/19/2015
-- By: Schoenbaum, Missy
-- Notes: where clause 1=1 allows for easy editing of subsequent clauses
-- Where clause rowid < 100 allows for return of a subset of
-- data, which is quicker when tuning
-- -- allows for line to be commented (omitted)
-----
SELECT u.User_notes, pt.name, -- this is the description name, not an identifier
u.initial_state, u.initial_size, Latitude, Longitude
FROM ScenarioCreator_unit u
JOIN ScenarioCreator_productiontype pt
ON u.production_type_id = pt.id
-- Example of WHERE clause
WHERE 1=1 AND u.ROWID < 100 AND u.initial_state = 'L' -- upper case surrounded by ' is required
```

At the bottom of the interface, there are three buttons: 'Save & Run', 'Show Schema', and 'Format'.

This query can be cut and pasted into your SQL Window. Add a Title before running.

Scrolling down, there are now results for the Production Type name at the bottom of the screen. That's a simple example of accessing the raw data behind ADSM. Using the pull-down on the Save button allows you to quickly export your results set.

The screenshot shows a database query interface with the following details:

- SQL Query (Top Panel):**

```
6 --      Notes: where clause 1=1 allows for easy editing of subsequent clauses
7 --      where clause rowid < 100 allows for return of a subset of data, which is quicker when tuning
8 --
9 -----
10 SELECT ---
11 u.User_notes,
12 pt.name,    -- this is the description name, not an identifier
13 u.initial_state,
14 u.initial_size,
15 latitude,
16 longitude
17 FROM ScenarioCreator_unit u
18 join ScenarioCreator_productiontype pt
19 on u.production_type_id = pt.id
```
- Buttons (Top Right):** Save & Run, Show Schema, Format
- Preview Tab (Bottom Left):** Pivot
- Pivot Preview (Bottom Right):**
 - Execution time: 2.00 ms
 - Showing 98 of 98 total rows.
 - Table Headers: user_notes, name, initial_state, initial_size, latitude, longitude
 - Data Rows (Sampled):

user_notes	name	initial_state	initial_size	latitude	longitude
2	Swine	S	89	33.41808	-35.2526
3	Cattle	S	141	36.78172	-36.36554
4	Cattle	S	341	32.93898	-35.34563
5	Cattle	S	114	36.31128	-35.21025
6	Cattle	S	155	33.27371	-35.20067
7	Cattle	S	161	36.59603	-36.28207
8	Cattle	S	827	34.54935	-32.81917
9	Cattle	S	355	35.55098	-31.74311
10	Cattle	S	46	32.79245	-34.2104



There are many ways to explore the results set using SQL. It is worth taking a few minutes to learn a little SQL to be able to manipulate your outputs rapidly to observe what happened in your simulation.

What's Next?



A large black and white longhorn cow stands in a grassy field. The cow has very long, curved horns and is looking towards the right. The background is a green, slightly hilly landscape.

In this training, we covered:

- ➊ Results Home – visualization of a summary of the scenario outputs
- ➋ Navigation Tables – visualizations of individual output variables
- ➌ Output files
 - Summary - descriptive statistics of the scenario output
 - Supplemental Outputs – Unit level detailed data on disease states, events, and exposures
- ➍ Raw Data – detailed data at a daily level

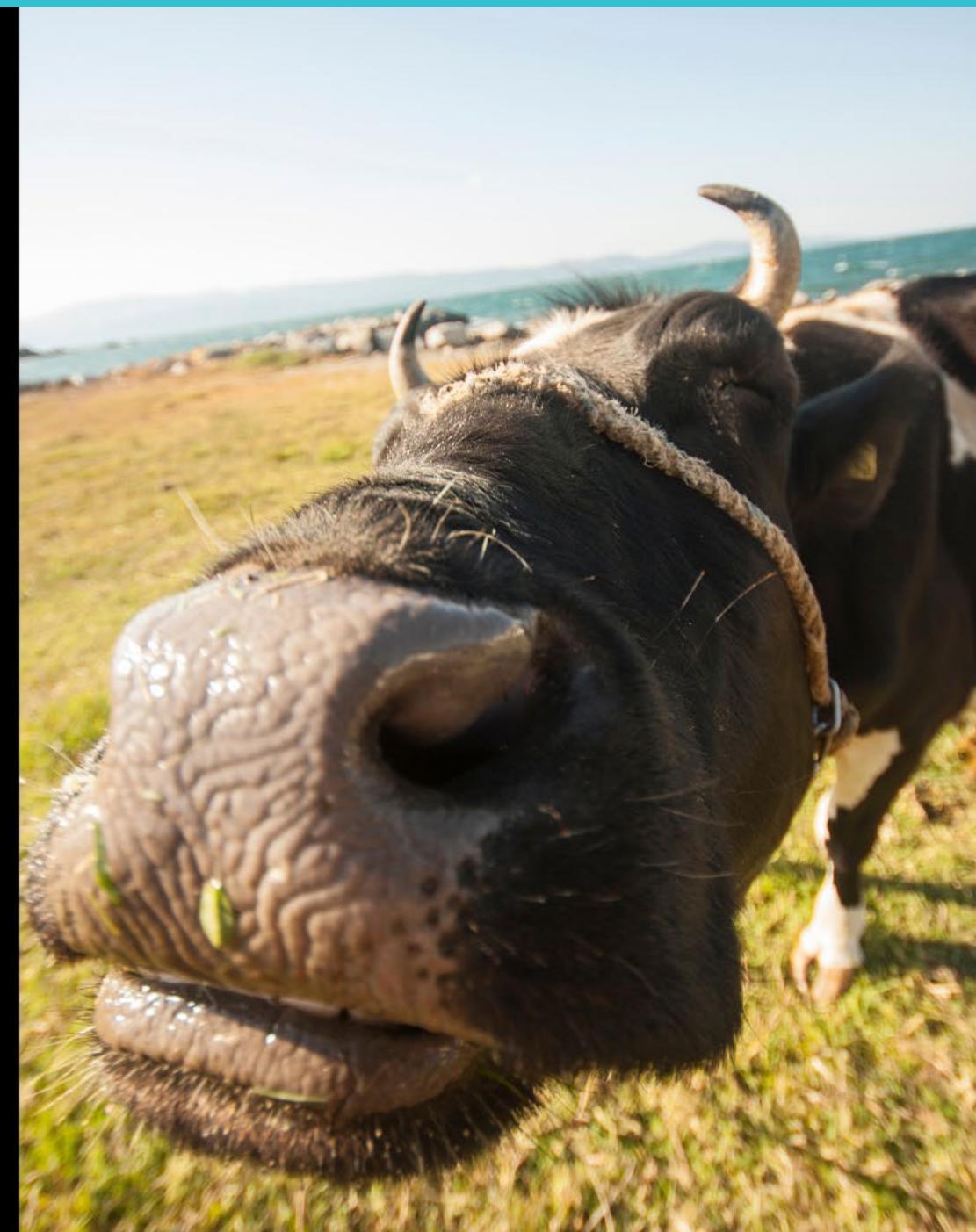
There is a lot of data to understand out of every scenario you run.

Results Summary

As noted at the beginning, understanding the results of ADSM is going to be a 2-step process.

This training module has presented the simplified version of what the results look like, and where they are located.

In the next training, **VERIFICATION AND VALIDATION**, more emphasis will be placed on understanding how the parameters that you input created the simulation outputs and allowing you to determine if those outputs are a valid representation of the disease systems you are attempting to simulate.





Join the flock!

Learn more about ADSM or try an example

ADSM is currently available at <https://github.com/NAVADMC/ADSM/releases/latest>

Try the sample scenario

<https://github.com/NAVADMC/ADSM/wiki/A-Quick-Start-Guide:-Running-the-sample-scenario>

Read the wiki pages link

<https://github.com/NAVADMC/ADSM/wiki>

Additional training materials will be posted at <http://navadmc.github.io/ADSM/>

Training includes:

Overview

Populations and Production Types

Getting Started

Disease Parameters

Control Parameters

Output Settings and Run

Results – Model Output

Verification and Validation

Vaccination Strategy

Administration



The outcome of an ADSM simulation (as with any computer simulation model) depends heavily on the quality of the scenario input parameters; the assumptions of the modeler who created the scenario; and the capabilities and limitations of the model framework itself. The utility of disease models like those created with ADSM critically depends on input and interpretation of experts familiar with the behavior of disease within populations, and with the limitations, assumptions, and output of the model. While ADSM is available as a service to animal health communities, the ADSM team does not necessarily endorse results obtained with the ADSM application or any conclusions drawn from such results. Note that the parameters provided in the Sample Scenario are simple examples to clarify concepts in the application. These parameters do not represent any real population or disease event.



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Photo credits

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