

A photograph of a chicken coop. In the foreground, a brown and black speckled chicken with a red comb is perched on the edge of a long metal trough filled with yellow feed. The trough is part of a wooden structure. In the background, several other chickens are visible in similar cages, and the coop's interior is dimly lit with wooden beams and pipes.

Animal Disease Spread Model

Getting Started: Installing ADSM, starting a scenario, and uploading a population

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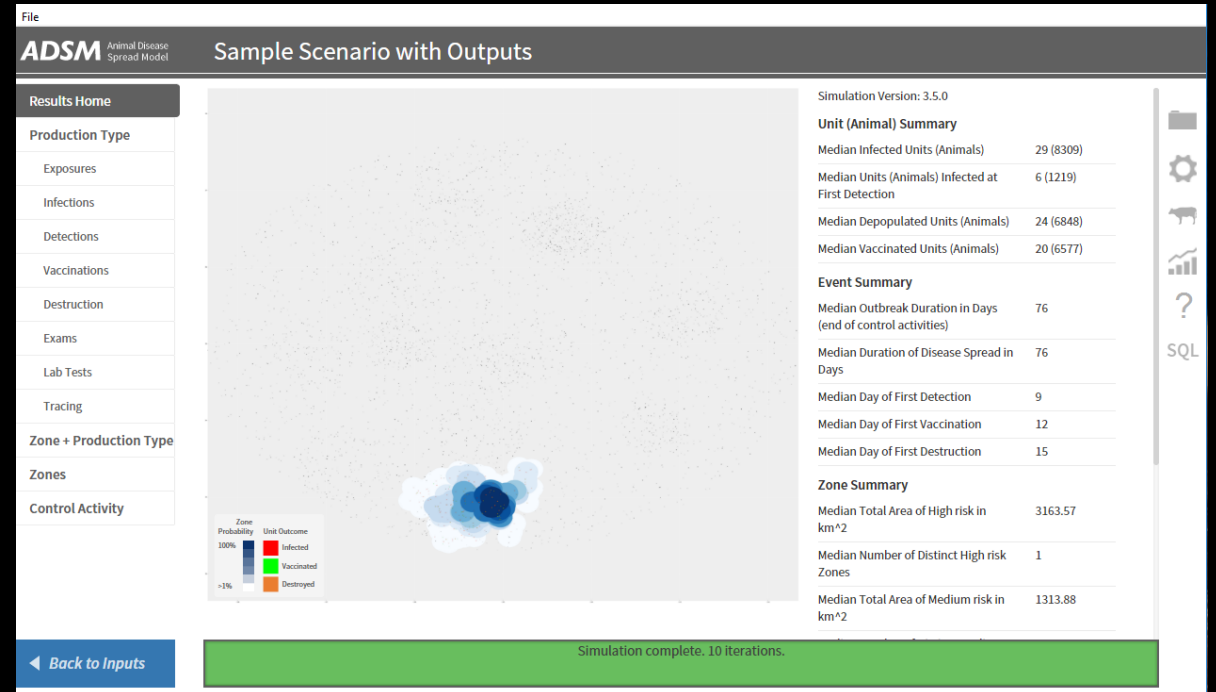
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Document Conventions

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/>

Installing ADSM



Downloading ADSM

ADSM is currently available at

<https://github.com/NAVADMC/ADSM/releases/latest>

The Install process will create a menu item and a new folder in your file structure called the ADSM Workspace. The default location for the ADSM Workspace is in the “My Documents” folder.

Users may select to put the ADSM Workspace into a different folder or run on a portable storage device (e.g., flash drive).



Using Portable Storage

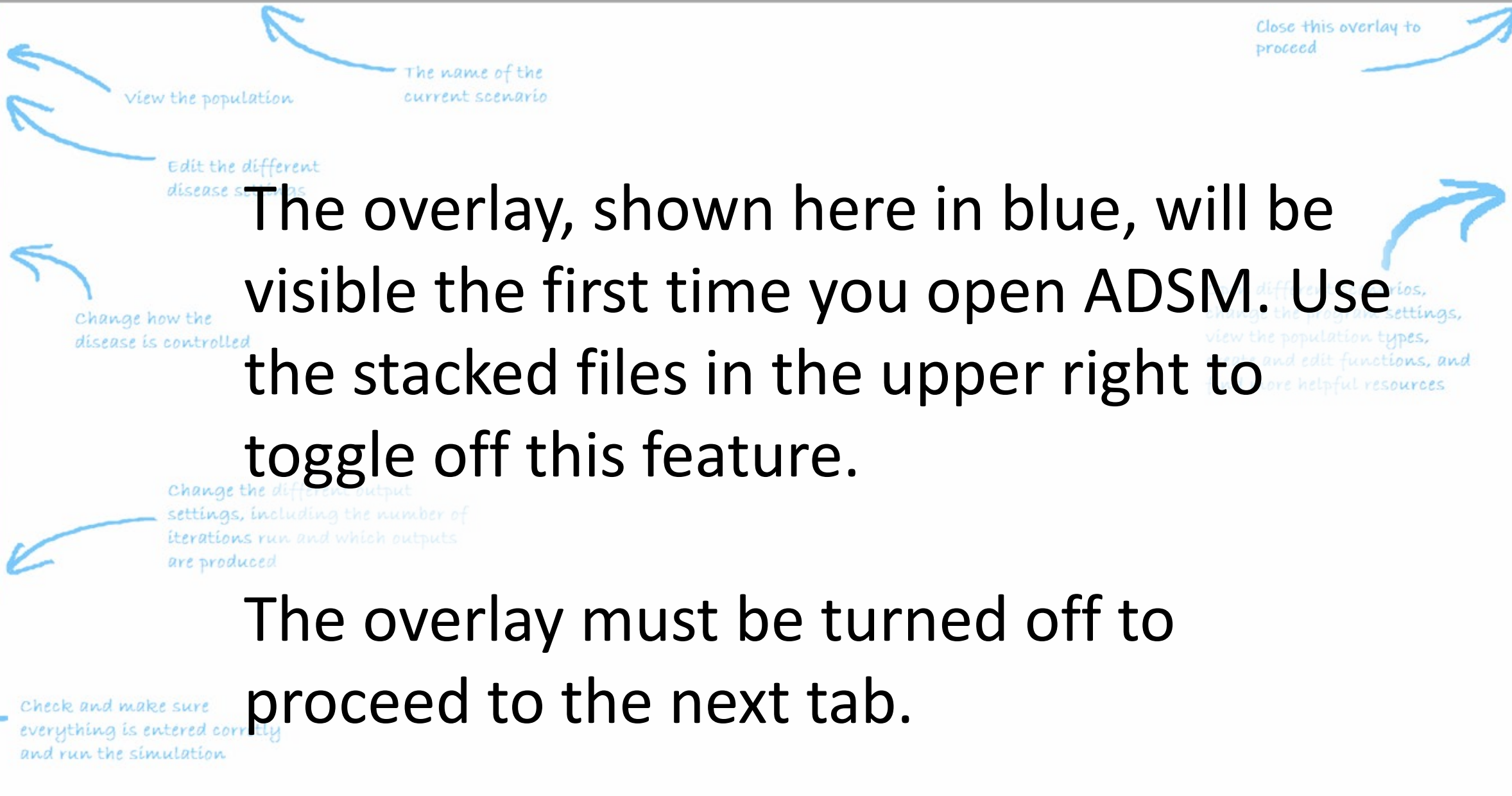
The purpose of having a portable application is to allow you to put the application wherever you want.

Be aware that an application installation on a USB flash drive and having your ADSM workspace on the USB flash drive could slow down the application when it is executing a scenario. In fact, it can slow down so much that a “Database Locked” error can occur.

To work around this, you can put your output (ADSM Workspace) on the portable drive and the ADSM application on another (Desktop), or vice versa.



- o Description
- tion
- Progression
- Progression
- Spread
- W Disease Spread
- is
- ol Protocol
- ation Triggers
- ation Rings
- ation Global
- uction Global
- Protocols
- Effects
- Effects
- Settings



The overlay, shown here in blue, will be visible the first time you open ADSM. Use the stacked files in the upper right to toggle off this feature.

The overlay must be turned off to proceed to the next tab.

Administrative Panel





The Administrative Panel contains:

- ⚙ Project Panel
- ⚙ Settings Panel
- ⚙ Production Type Panel
- ⚙ Functions Panel
- ⚙ Documentation Panel
- ⚙ SQL Panel



SQL

The training called *ADSM ADMINISTRATION* will cover the Administrative Panel in detail.

Navigation Tabs





Scenario Description

Population

Disease

Disease Progression

Assign Progression

Disease Spread

Review Disease Spread

Controls on

Control Protocol

Vaccination Triggers

Vaccination Rings

Vaccination Global

Destruction Global

Assign Protocols

Zones

Zone Effects

Assign Effects

Output Settings

Edit the Scenario

Navigation tabs, located in the left panel of the application, are used to enter scenario-specific parameters about disease transmission and control activities.

Tabs are presented in logical order, but no specific order is required for parameter entry.

The navigation tab provides a visual cue to signal which parameter blocks you have completed. The tab will be yellow if the parameter entry is incomplete and green if the parameter entry is complete for that tab.

Not all parameters are required to run the simulation, so the application may be able to run with yellow tabs. Validating the scenario will prompt a message to help you understand what is missing and if you can proceed with running the simulation.

Cancel

Apply



Scenario Description

Population

Disease

Disease Progression

Assign Progression

Disease Spread

Review Disease Spread

Controls

on

Control Protocol

Vaccination Triggers

Vaccination Rings

Vaccination Global

Destruction Global

Assign Protocols

Zones

Zone Effects

Assign Effects

Output Settings

Edit the Scenario

Description

This file contains a sample scenario for an outbreak of a highly contagious disease. This file may serve as an example that can be modified for other uses, but parameters in this file should not be considered definitive or accurate for any particular disease or situation.

The description of the scenario.

The Scenario Description box allows you to provide documentation on the simulation you are running.

A scenario breaks down into 3 main components for input into the simulation:

Population Parameters

Disease Parameters

Control Parameters

Cancel

Apply



Scenario Description

Population

Disease

Disease Progression

Assign Progression

Disease Spread

Review Disease Spread

Controls

Control Protocol

Vaccination Triggers

Vaccination Rings

Vaccination Global

Destruction Global

Assign Protocols

Zones

Zone Effects

Assign Effects

Output Settings

Validate Scenario ▶

Depending on the type of question that you are trying to answer, you can modify these main components and do comparisons:

For example, changing the Population and keeping all the other parameters the same would let you find if the disease and control strategies behave differently in different geographical areas that might have different animal densities.

Another example could be keeping the Population and Disease parameters the same and changing Control parameters to evaluate the effect of different control strategies on an outbreak.

Working through the parameters that feed into a model provides a useful exercise in understanding all the complexities to consider when using simulation to evaluate disease spread and control options.



Starting a New Scenario



Let's get started on this journey.



Starting a Scenario

Initially, the scenario opens to a blank scenario.

A *description* field is provided to enter details about the simulation.

Use *description* to document the scenario, such as the question you are trying to answer, where the population came from, or other important information that would be useful when you refer to this scenario.

[Apply] **before** you leave the page to save changes.

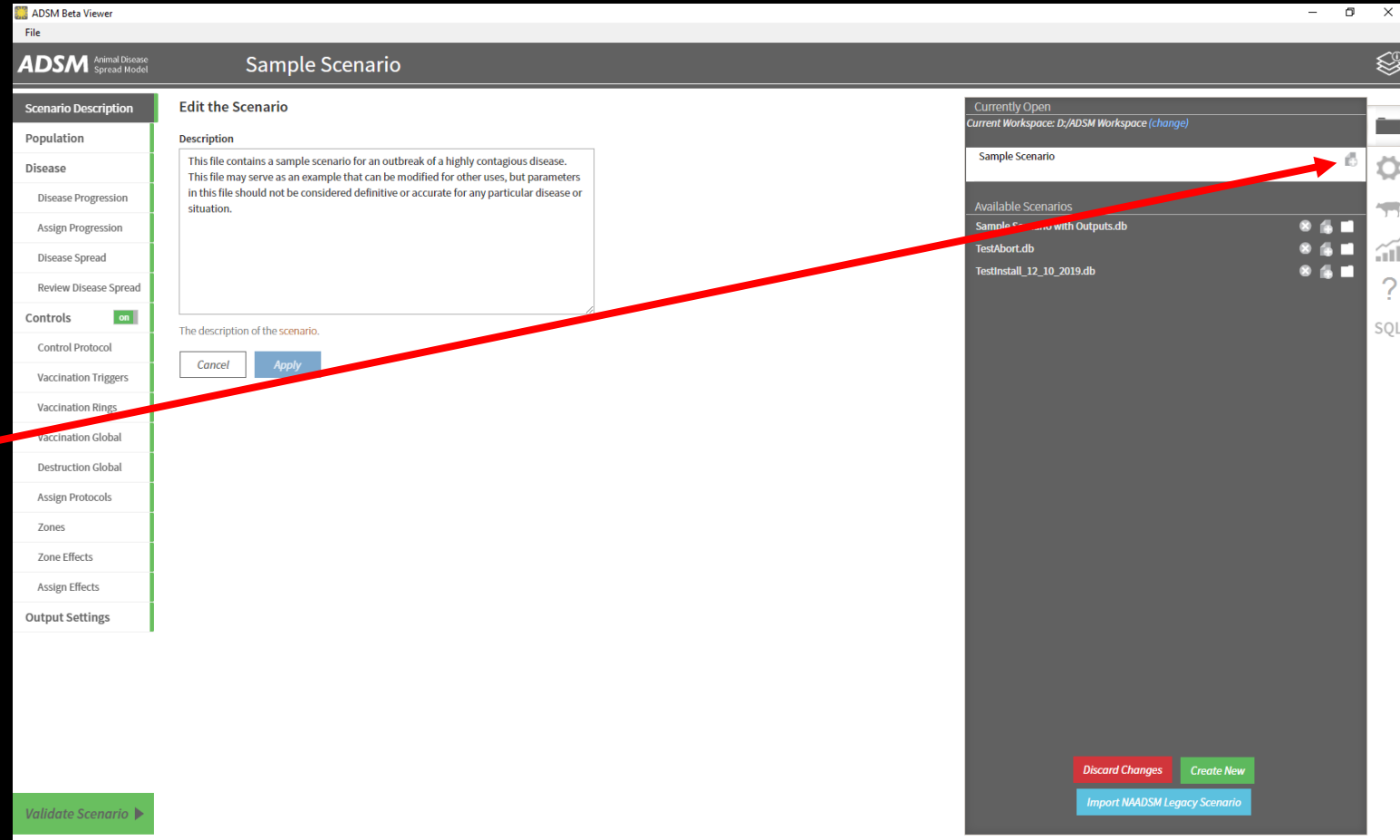
The screenshot displays the ADSM (Animal Disease Spread Model) interface. At the top, the title bar reads "ADSM Animal Disease Spread Model" and "Blank". Below the title bar is a "File" menu. The main interface is divided into two columns. The left column is a sidebar with a list of menu items: "Scenario Description" (highlighted in dark grey), "Population", "Disease", "Disease Progression", "Assign Progression", "Disease Spread", "Review Disease Spread", "Controls" (with a green "on" toggle), "Control Protocol", "Vaccination Triggers", "Vaccination Rings", "Vaccination Global", "Destruction Global", "Assign Protocols", and "Zones". At the bottom of the sidebar is a yellow button labeled "Validate Scenario" with a right-pointing arrow. The right column is titled "Edit the Scenario" and contains a "Description" label above a large, empty text input field. Below the input field is a small text label: "The description of the scenario." At the bottom of the right column are two buttons: "Cancel" and "Apply".

Saving and Duplicating Scenarios

The very first time you open ADSM, the scenario file will be automatically named "Untitled.db".

Use the Project Panel and select the *Save As* icon to rename the scenario file to a name of your choosing, then save.

You can use this same process to duplicate a scenario and select [Save As] to a name that is meaningful to you.



Note that save will overwrite an existing file if the same name is used

This scenario has been saved as “TrainingScenario”.

A description has been added and saved, using the [Apply] button.

Let’s move on and add a population by selecting the Population tab.

ADSM - Animal Disease Spread Model

File

ADSM TrainingScenario *changes not saved to file... Save*

Scenario Description

- Population
- Disease
- Disease Progression
- Assign Progression
- Disease Spread
- Review Disease Spread

Controls on

- Control Protocol
- Vaccination Triggers
- Vaccination Rings
- Vaccination Global
- Destruction Global
- Assign Protocols
- Zones

Edit the Scenario

Description

This Scenario will be used for training materials. It was create 8/12/2019 by the ADSM Development Team. It will include a synthetic population of cattle and swine, as found in the Sample Scenario. This population maps to somewhere in the Atlantic Ocean. Note that no parameters in the Sample Scenario or training materials should be taken as an example of a real disease.

The description of the scenario.

[Validate Scenario](#) ▶

Population Tab

If you need to add a population, the window looks like this.

The screenshot shows the ADSM interface for a 'TrainingScenario'. The 'Population' tab is active, displaying options to 'Load a Population'. A 'Choose File' button is present, along with a 'No file chosen' status and an 'Import a Population (XML or CSV)' button. Below this, a list of 'Available Population Files' includes 'pop_circle_6_extrafield.csv', 'Population_Grid.xml', and 'Sample_population.xml', each with a download icon. The left sidebar shows various scenario settings, and a 'Validate Scenario' button is at the bottom.

If a population is already loaded, as in the Sample Scenario, the window displays the population.

The screenshot shows the ADSM interface for a 'Sample Scenario'. The 'Population' tab is active, displaying a map of the population distribution and a table of population data. The map shows a circular distribution of green dots representing the population, with a legend indicating 'Swine', 'Cattle', and 'Infected'. Below the map, there are filter controls for 'Production Type', 'Initial State', 'Initial Size', 'Longitude', and 'Latitude'. The table on the right lists the first 100 units, showing their production type, latitude, longitude, initial state, initial size, and unit ID. A 'Validate Scenario' button is at the bottom.

Production type	Latitude	Longitude	Initial state	Initial size	Unit id
Cattle	32.99984	-35.12144	Latent	107	19
Swine	33.41808	-35.2526	Susceptible	89	2
Cattle	36.78172	-36.36554	Susceptible	141	3
Cattle	32.93898	-35.34563	Susceptible	341	4
Cattle	36.31128	-35.21025	Susceptible	114	5
Cattle	33.27371	-35.20067	Susceptible	155	6
Cattle	36.59603	-36.28207	Susceptible	161	7
Cattle	34.54935	-32.81917	Susceptible	827	8
Cattle	35.55098	-31.74311	Susceptible	355	9
Cattle	32.79245	-34.2104	Susceptible	46	10
Cattle	35.76083	-37.81564	Susceptible	518	11
Cattle	34.47019	-36.0473	Susceptible	356	12
Cattle	36.11096	-35.13854	Susceptible	100	13
Cattle	34.92398	-33.8703	Susceptible	904	14
Swine	36.0872	-34.33728	Susceptible	142	15
Cattle	34.83321	-32.90607	Susceptible	191	16
Cattle	37.38944	-35.13237	Susceptible	156	17
Cattle	36.50795	-36.37611	Susceptible	228	18
Cattle	33.89553	-34.55941	Susceptible	327	20
Cattle	33.95002	-35.69487	Susceptible	55	21
Cattle	34.00686	-35.59949	Susceptible	169	22
Swine	34.5475	-35.05291	Susceptible	841	23
Cattle	36.01563	-34.36979	Susceptible	31	24
Cattle	37.40086	-35.21244	Susceptible	115	25
Cattle	35.26371	-36.31808	Susceptible	56	26
Cattle	33.10394	-32.70794	Susceptible	55	27
Cattle	36.89481	-34.46319	Susceptible	81	28
Cattle	33.92407	-33.14195	Susceptible	20	29

A prompt will ask you to choose the population file. There are 2 different actions that can happen when loading a population.

1) If your population source file is outside the ADSM Workspace, select [Choose File] and a navigation window will open. Navigate to the location of the file that is to be imported. Select the file, and the filename will replace the text “No file chosen”. Use [Import a Population] and the file import will begin.

Depending on the size of the population and the speed of your PC, this import could take a while. The Development Team’s test file with 363,000 units takes about 10 minutes.

2) If the population source file has already been moved into the ADSM Workspace, the import will begin as soon as you select it from the list of available files.

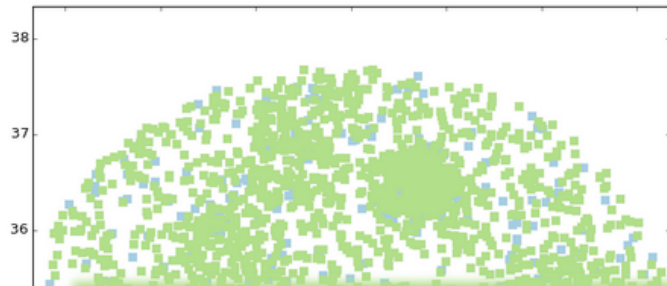
In this example there are several population files already copied into the ADSM Workspace.

The screenshot shows the ADSM - Animal Disease Spread Model interface. The top navigation bar includes the ADSM logo and the title 'TrainingScenario' with a status indicator 'changes not saved to'. A left sidebar contains a menu with items: Scenario Description, Population (highlighted), Disease, Disease Progression, Assign Progression, Disease Spread, Review Disease Spread, Controls (with a green 'on' toggle), Control Protocol, Vaccination Triggers, Vaccination Rings, Vaccination Global, Destruction Global, Assign Protocols, and Zones. The main content area is titled 'Load a Population' and features a 'Choose File' button (displaying 'No file chosen') and an 'Import a Population (XML or CSV)' button with an upload icon. Below this, a message states: 'You can import a file from anywhere on your computer and it will be added to the ADSM Workspace.' A section titled 'Available Population Files:' lists three files: 'pop_circle_6_extrafield.csv', 'Population_Grid.xml', and 'Sample_population.xml'. At the bottom of the interface is a yellow 'Validate Scenario' button with a right-pointing arrow.



- Scenario Description
- Population**
- Disease
 - Disease Progression
 - Assign Progression
 - Disease Spread
 - Review Disease Spread
- Controls on
 - Control Protocol
 - Vaccination Triggers
 - Vaccination Rings
 - Vaccination Global
 - Destruction Global
 - Assign Protocols
 - Zones
 - Zone Effects
 - Assign Effects
- Output Settings

Population File: Sample_Pop_Big.xml (3,957 units) [Replace Population](#)



Production type	Latitude	Longitude	Initial state	Initial size	Unit id
Cattle	32.99984	-35.12144	Latent	107	19
Swine	33.41808	-35.2526	Susceptible	89	2
Cattle	36.78172	-36.36554	Susceptible	141	3
Cattle	32.93898	-35.34563	Susceptible	341	4
Cattle	36.31128	-35.21025	Susceptible	114	5
Cattle	33.27371	-35.20067	Susceptible	155	6

Sample Population

If a population has already been added, as in the Sample Scenario, the population screen will display a visualization and details.

The [Edit Population] link in the bottom right corner allows changes to be made to the population file within the application.

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[Clear Filters](#)

Cattle	33.10394	-32.70794	Susceptible	55	27
Cattle	36.89481	-34.46319	Susceptible	81	28
Cattle	33.92407	-33.14195	Susceptible	20	29

Showing the first 100 Units. Use sort and filters to find specific Units.



[Edit Population](#)

- Scenario Description
- Population**
- Disease
 - Disease Progression
 - Assign Progression
 - Disease Spread
 - Review Disease Spread
- Controls on
 - Control Protocol
 - Vaccination Triggers
 - Vaccination Rings
 - Vaccination Global
 - Destruction Global
 - Assign Protocols
 - Zones
 - Zone Effects
 - Assign Effects
- Output Settings

Population File: Sample_Pop_Big.xml (3,957 units) [Replace Population](#)



Production type	Latitude	Longitude	Initial state	Initial size	Unit id
Cattle	32.99984	-35.12144	Latent	107	19

Replace Population

The population can also be replaced using the [Replace Population] link at the top.

If parameter blocks have already been created, they will be retained. However, assignments to specific production types, Vaccination Triggers and Vaccination Rings parameters will be deleted.

The deletion happens to the parameters that are associated to a specific production type. This functionality provides maximum flexibility in changing a population and retaining most parameters. The parameters can be re-assigned to the new production types when the new population is imported.

Cattle	36.89481	-34.46319	Susceptible	81	28
Cattle	33.92407	-33.14195	Susceptible	20	29

Showing the first 100 Units. Use sort and filters to find specific Units.

[Edit Population](#)

Scenario Description

Population

Disease

Disease Progression

Assign Progression

Disease Spread

Review Disease Spread

Controls

Control Protocol

Vaccination Triggers

Vaccination Rings

Vaccination Global

Destruction Global

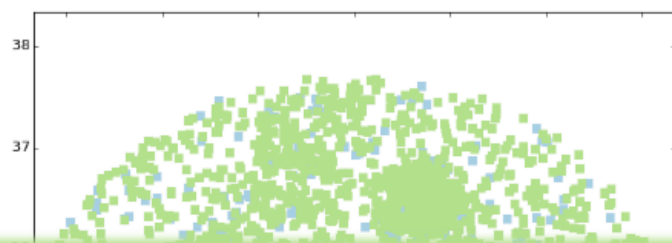
Assign Protocols

Zones

Zone Effects

Assign Effects

Output Settings

Population File: Sample_population.xml (3,957 units) [Replace Population](#)

Production type	Latitude	Longitude	Initial state	Days in initial state	Days left in initial stz	Initial size	Unit id
Cattle	32.99984	-35.12144	Latent			107	19
Swine	33.41808	-35.2526	Susceptible			89	2
Cattle	36.78172	-36.36554	Susceptible			141	3
Cattle	32.93898	-35.34563	Susceptible			341	4

When editing the population, a new window opens that is like the main population window.

This edit method keeps accidental changes from happening in the main window. Changes can be made on any individual unit to any field in the population, such as changing the initial disease state or changing the production type.

Selecting [Apply] is necessary to save changes.

Latitude Min: Max:

Days in initial state Min: Max:

Days left in initial state Min: Max:

[Clear Filters](#)

Cattle	37.40086	-35.21244	Susceptible			115	25
Cattle	35.26371	-36.31808	Susceptible			56	26
Cattle	33.10394	-32.70794	Susceptible			55	27
Cattle	36.89481	-34.46319	Susceptible			81	28

Summary

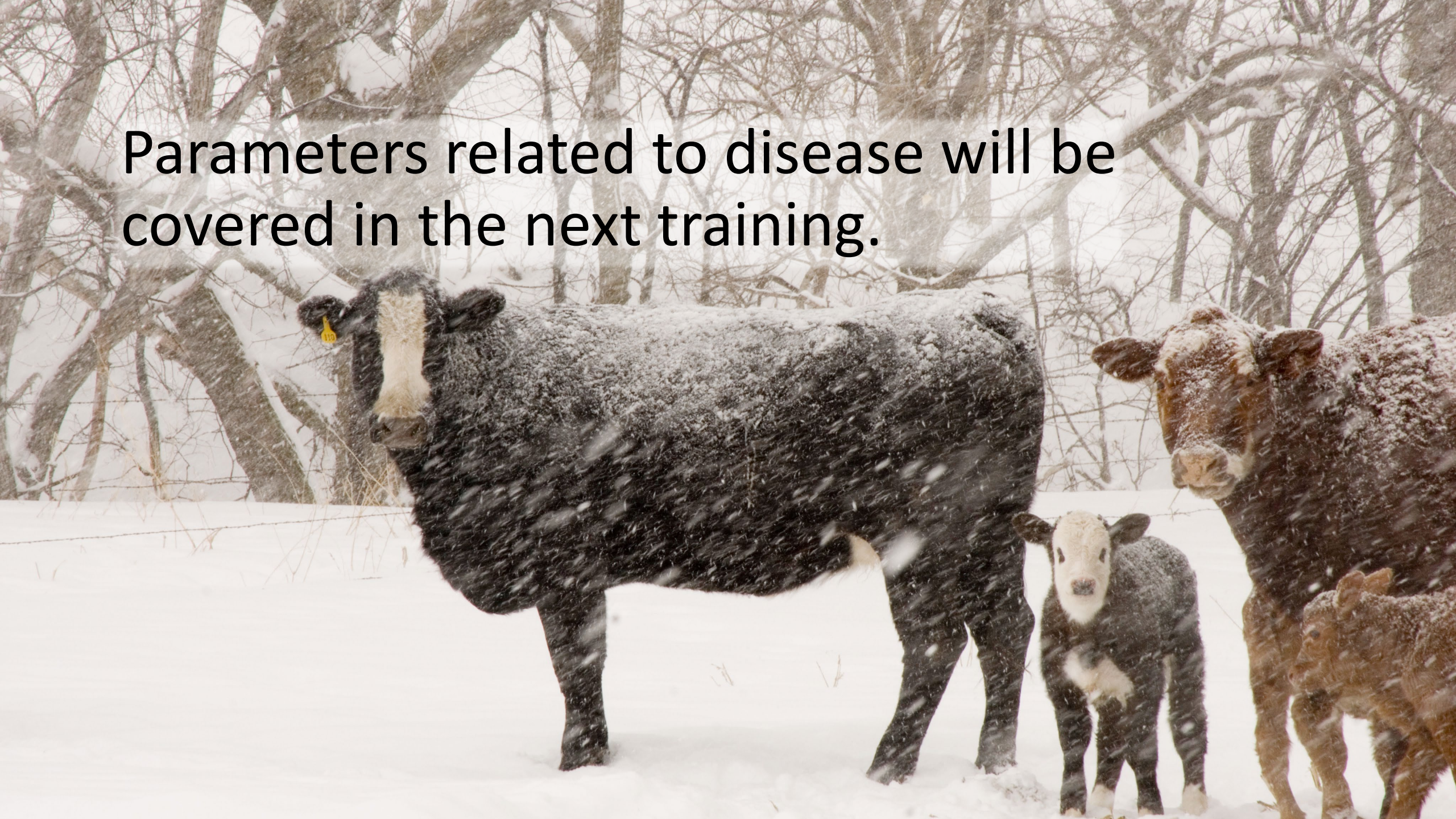
This training module has covered describing your scenario and managing your population.



What's Next



Parameters related to disease will be covered in the next training.





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

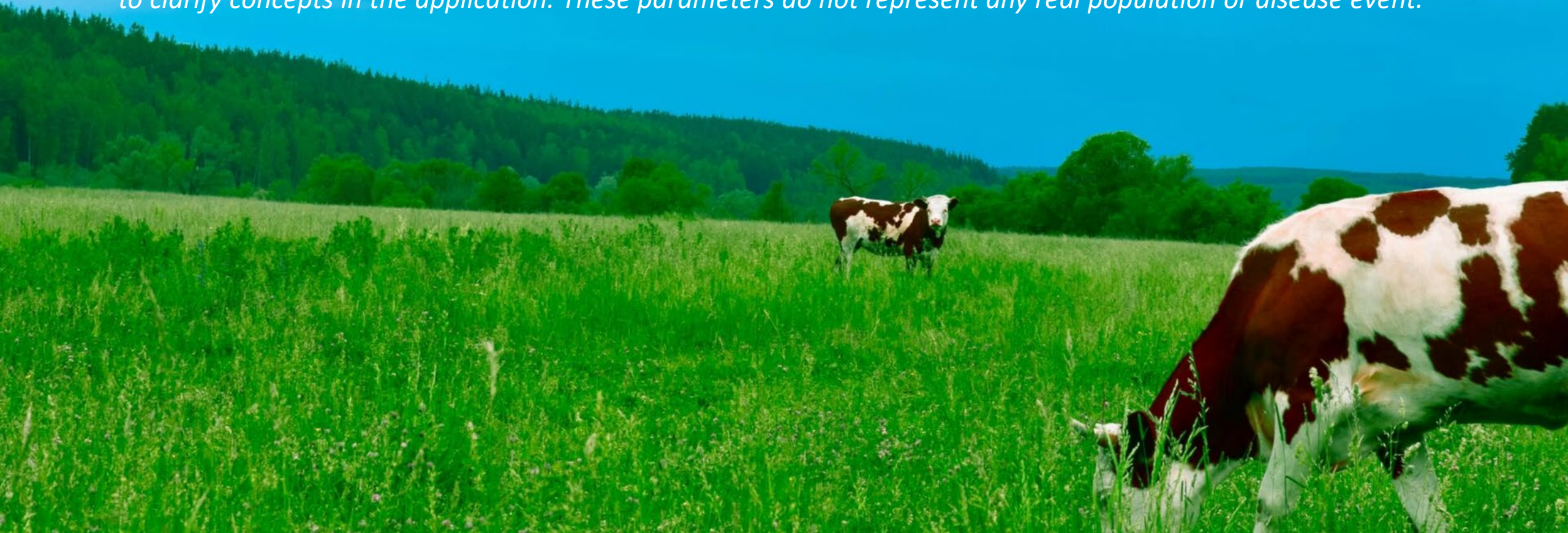
Detailed Evaluation of Results - Verification and Validation

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.



This work was funded in whole through Cooperative Agreement AP18VSCEAH00C005 with the University of Tennessee Department of Animal Science by the Animal and Plant Health Inspection Service, an agency of the United States Department of Agriculture.

Photo credits

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Pinecroft Farms, Woodstock CT, Mariah Chapman

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Animal Science