A Manual for the application of a Systems Dynamics user-friendly interface for Peste des petits ruminants (PPR) and Rift Valley Fever (RVF) animal diseases and Market Models

Sirak Bahta, Francis Wanyoike and Derek Chan

International Livestock Research Institute

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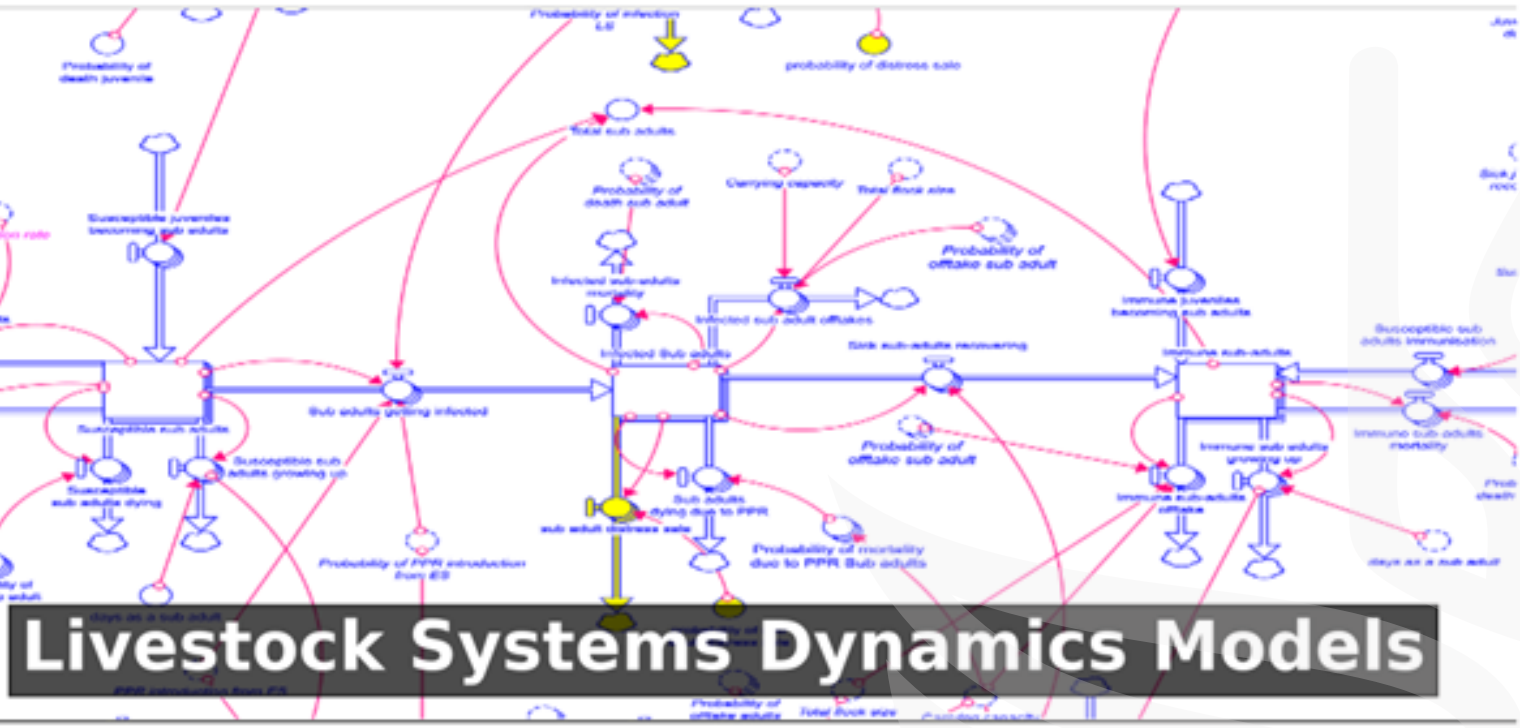

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Acknowledgements

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PPR Simulator

The PPR Simulation allows you to make strategic decisions to manage the spread of PPR (Peste des Petits Ruminants) among small ruminant populations. Through choices about vaccination and response timing, you can work to contain outbreaks and protect herd health. Your goal is to minimize infection rates, maintain herd immunity, and understand the impact of PPR on herd and economic health.

Simulation objectives

- Manage herd health by selecting optimal vaccination strategies and timing.
- Make informed decisions to reduce disease spread and increase immunity.

PPR Simulator instructions

1. **Access the Simulation**

Click the link below to open the PPR (Peste des Petits Ruminants) simulation app.

https://exchange.iseesystems.com/public/isra-ahmed/ppr-simulator/index.html#page1

2. **Run the Baseline Scenario**

- Read the guidelines then go to the next page.
- Select ***No Vaccination*** as your strategy.
- Click the ***Submit*** button to run the baseline scenario. This will be labelled as **Run1** on the results page.
- Wait for the simulation to end.
- Navigate through the results pages by using the top navigation bar to view:
    - Disease evolution.
    - Vaccination Indicators.
    - Financial Performance.
- Observe the baseline behaviour named Run1 across all three result pages.
- After reviewing the results, go to the next page and click **Try Again** to test additional scenarios.

3. **Adjust Your Strategy (Reactionary Vaccination Scenario)**

- Go to the next page (Decisions).
- Select ***Reactionary*** as your strategy.
- Set the **Vaccination Delay** to **5 days**.
- Click the ***Submit*** button to run the scenario. This will be labelled as **Run2** on the results page.
- Wait for the simulation to end.
- Navigate through the results pages by using the top navigation bar to view:
    - Disease evolution.
    - Vaccination Indicators.
    - Financial Performance.

- Observe the baseline behaviour named Run1 across all three result pages.
- After reviewing the results, go to the next page and click **Try Again** to test additional scenarios.

4. **Adjust Your Strategy (Regular Vaccination Scenario)**

- Go to the next page (Decisions).
- Select ***Regular*** as your strategy.
- Select **Vaccination Frequency per Year** to **twice** per year.
- Click the ***Submit*** button to run the scenario. This will be labelled as **Run3** on the results page.
- Wait for the simulation to end.
- Navigate through the results pages by using the top navigation bar to view:
    - Disease evolution.
    - Vaccination Indicators.
    - Financial Performance.
- Observe the baseline behaviour named Run1 across all three result pages.
- After reviewing the results, go to the next page and click **Try Again** to test additional scenarios or End Game to end the session.

5. **Compare Results**

- - Compare these new results with the baseline scenario, noting any changes in disease progression, immunity rates, and economic indicators.
- Take note of which strategies lead to the best outcomes for herd health and economic resilience.
- Review your observations. Compare how different strategies affect the KPIs and the overall outcomes. Consider questions like:
    - How does your vaccination strategy choice impact the herd and the financial performance?
    - How did changes in vaccination frequency impact disease control?
    - What effect did demand elasticity adjustments have on economic resilience?

Additional information:

You can test additional scenarios by adjusting the inputs.

**For reactionary vaccination, make sure to set the vaccination delay by adjusting the slider. You can adjust the slider after each run (submission).*

You can change variables like:

1. Vaccination Coverage: Set the proportion of susceptible animals vaccinated.
2. Vaccination Frequency: Select the number of vaccination campaigns per year.
3. Vaccination Threshold: Set the disease trigger point for starting vaccination.
4. Vaccination Capacity: set a maximum number of animals that can be vaccinated within a specific period (day).

- After each decision, click **Submit** to simulate and observe how your choices affect the key performance indicators.

RVF Simulator

The RVF Simulation allows you to make strategic decisions to manage the spread of RVF (Rift Valley Fever) among small ruminant populations. Through choices about vaccination and response timing, you can work to contain outbreaks and protect herd health. Your goal is to minimize infection rates, maintain herd immunity, and understand the impact of RFV on herd and economic health.

Simulation objectives

- Manage herd health by selecting optimal vaccination strategies and timing.
- Make informed decisions to reduce disease spread and increase immunity.

RVF Simulator instructions

1. **Access the Simulation**

Click the link below to open the RVF (Rify Valley Fever) simulation app.

https://exchange.iseesystems.com/public/isra-ahmed/rvf-simulator

2. **Run the Baseline Scenario**

- Read the guidelines, then go to the next page.
- Select ***No Vaccination*** as your strategy.
- Click the ***Submit*** button to run the baseline scenario. This will be labelled as **Run1** on the results page.
- Wait for the simulation to end.
- Navigate through the results pages by using the top navigation bar to view:
    - Economic Performance.
    - Disease evolution.
    - Vaccination Indicators.
- Observe the baseline behaviour named Run1 across all three result pages.
- After reviewing the results, go to the next page and click **Try Again** to test additional scenarios.

3. **Adjust Your Strategy (Reactionary Vaccination Scenario)**

- Go to the next page (Decisions).
- Select ***Reactionary*** as your strategy.
- Set the **Vaccination Delay** to **6 weeks**.
- Set the **Vaccination Threshold** to **200 animals.**
- Set Weekly **Vaccination Capacity** to **50,000 animals/week.**
- Set **Vaccination Coverage** to **0.5**.
- Click the ***Submit*** button to run the scenario. This will be labelled as **Run2** on the results page.
- Wait for the simulation to end.
- Navigate through the results pages by using the top navigation bar to view:

    - Disease evolution.
    - Vaccination Indicators.
    - Financial Performance.
- Observe the reactionary scenario behaviour named Run2 across all three result pages.
- After reviewing the results, go to the next page and click **Try Again** to test additional scenarios.

4. **Adjust Your Strategy (Regular Vaccination Scenario)**

- Go to the next page (Decisions).
- Select ***Regular*** as your strategy.
- Select **Vaccination Frequency per Year** to **Biannual**.
- Set Weekly **Vaccination Capacity** to **50,000 animals/week.**
- Set **Vaccination Coverage** to **0.5**.
- Click the ***Submit*** button to run the scenario. This will be labelled as **Run3** on the results page.
- Wait for the simulation to end.
- Navigate through the results pages by using the top navigation bar to view:
    - Disease evolution.
    - Vaccination Indicators.
    - Financial Performance.
- Observe the regular vaccination scenario behaviour named Run3 across all three result pages.
- After reviewing the results, go to the next page and click **Try Again** to test additional scenarios or End Game to end the session.

5. **Compare Results**

- Compare these new results with the baseline scenario, noting any changes in disease progression, immunity rates, and economic indicators.
- Take note of which strategies lead to the best outcomes for herd health and economic resilience.
- Review your observations. Compare how different strategies affect the KPIs and the overall outcomes. Consider questions like:
    - How does your vaccination strategy choice impact the herd and the financial performance?
    - How did changes in vaccination frequency impact disease control?
    - What effect did demand elasticity adjustments have on economic resilience?

Additional information:

You can test additional scenarios by adjusting the inputs.

**For reactionary vaccination, make sure to set the vaccination delay by adjusting the slider. You can adjust the slider after each run (submission).*

You can change variables like:

5. Vaccination Coverage: Set the proportion of susceptible animals vaccinated.

6. Vaccination Frequency: Select the number of vaccination campaigns per year.
7. Vaccination Threshold: Set the disease trigger point for starting vaccination.
8. Vaccination Capacity: set a maximum number of animals that can be vaccinated within a specific period (day).

- After each decision, click **Submit** to simulate and observe how your choices affect the key performance indicators.

Somaliland Market Simulator

The Somaliland Simulator lets you explore strategic decisions to manage land health, the small ruminant population, and export performance amidst drought and trade challenges. Your goal is to balance the livestock population, maintain rangeland quality, and optimize exports.

Simulator objectives

- Make informed decisions to achieve sustainable herd sizes, protect rangeland quality, and support export demands.
- Make informed decisions to safeguard the country's livestock export markets and earnings.

Step 1: Choose a Role

Select one of two management roles:

1. **Pasture Management**
    - Focus on maintaining the health and size of herds and the quality of rangelands.
2. **Export Management**
    - Emphasize export performance and herd health through vaccination and sales strategies.

Review the guidelines for your role to understand your objectives and decision-making areas.

Step 2: Make Decisions

For Pasture and Land Resources Management

- **Control Flock Size**: Adjust the female offtake rate to balance herd growth and sustainability.
- **Influence land degradation through charcoal burning via altering Charcoal Demand**: Set the Per Capita Demand for Charcoal to understand its impact on land degradation.

For Export Management

- **Here, we can run the model under three scenarios:**
    - Without an export ban, the country adopts a very effective vaccination strategy, and there is, therefore, no risk of RVF outbreaks.
    - With a partial export ban (probably because the country adopts a partially effective vaccination strategy).
    - Total ban because no vaccination against RVF is done.

Step 3: Run the Simulation

- Each run advances time by 60 months (5 years), allowing you to see the long-term effects of your choices.

- **Observe Indicators**: Use the colour-coded indicators displayed at the top of the page to assess your impact on key areas, such as meat price, local demand, and small ruminant total population.
- **Review Results**: observe the result to examine key performance indicators and evaluate the impact of your decisions.

Activity:

Start the Simulation:

- Click on the link below to access the simulation app.

https://exchange.iseesystems.com/public/isra-ahmed/somaliland-simulation/index.html#page1

- Each player will take on one role: **Pasture Management** or **Export Management**.

Guidelines for testing parameters in pasture management role:

Scenario 1 (Baseline) Instructions:

- Establish a baseline scenario by using the default parameter values.
- Female offtake 0.2
- Per capita demand for charcoal 0.125
- Click on ***Submit*** five times to advance the simulation time by 60 months with every click
- Observe and record results after the end of the simulation to understand the baseline trends.
- Click on ***Try Again*** to test other scenarios.

Scenario 2 (increased levels of resource extraction)

- Set Female offtake to 0.5
- Set per capita demand for charcoal to 0.15
- Adjust the parameters to the values above.
- Click ***Submit*** five times to advance the simulation.
- Observe and record results after the end of the simulation to assess the impact of higher resource demand.
- Click on ***Try Again*** to test other scenarios.

Scenario 3 (lower levels of resource demand)

- Set Female Offtake to 0.1
- Set Per Capita Demand for Charcoal to 0.05
- Adjust the parameters to the above values.
- Click ***Submit*** five times to advance the simulation.
- Observe and record results after the end of the simulation.
- Click on ***Try Again*** to test other scenarios or ***End*** to finish the game.

Guidelines for testing parameters in export management role:

Scenario 1 (Baseline) Instructions:

- Establish a baseline scenario by using the Export setting (no export ban)
- Click on No export ban
- Click on ***Submit*** five times to advance the simulation time by 60 months with every click
- Observe and record results after the end of the simulation to understand the baseline trends.

Scenario 2 (Export ban) Instructions:

- Click on Export ban
- Click on ***Submit*** five times to advance the simulation time by 60 months with every click
- Observe and record results after the end of the simulation to understand the baseline trends.

Scenario 3 (Partial Export ban) Instructions:

- Click on Export
- Click on ***Submit*** five times to advance the simulation time by 60 months with every click
- Observe and record results after the end of the simulation to understand the baseline trends.

Explore Further Scenarios:

- Swap roles to explore the effects of the other role's decisions.
- Repeat the above steps for the new roles, then compare results and discuss your findings.

Final Discussion:

- Compare and discuss results across all scenarios with your colleagues. Which strategies were the most effective in balancing herd size, export performance, and land quality? Record your observations and any key takeaways.

Authors: Sirak Bahta, Francis Wanyoike and Derek Chan

SAPLING Initiative Lead: Isabelle Baltenweck - I. Baltenweck@cgiar.org

SAPLING Initiative Deputy Lead: Rekik Mourad - M.Rekik@cgiar.org

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Sustainable Animal Productivity