MHASpread workshop: Welcome & introductions

Use of transmission models to simulate the spread of livestock diseases

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Acknowledgement/Funding

NC STATE UNIVERSITY

PANAFTOSA
Centro Panamericano de Fiebre Aftosa
y Salud Pública Veterinaria

What we do!

1. Studying routes of between-farm disease transmission *main goal* in targeting of control strategies to minimise the spread of disease.

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1. Studying routes of between-farm disease transmission *main goal* in targeting of control strategies to minimise the spread of disease.

2. Emphasis on the *role of farm-level biosecurity* on disease transmission.

FFAR Foundation for Food and Agriculture Research

USDA APHIS

USDA NIFA United States Department of Agriculture National Institute of Food and Agriculture

FUNDESA Fundo de Desenvolvimento e Defesa Sanitária Animal

pork checkoff.

SHIC Swine Health Information Center

Team

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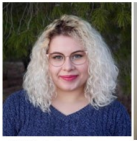

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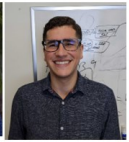

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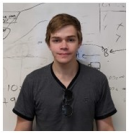

Will Gardner

Christian Fleming

Participating institutions

1. Brazil (INDEA/MT,IAGRO/MS,IDARON/RO)
2. Ecuador (AGROCALIDAD)
3. Paraguay (SENACSA)
4. Uruguay (MGAP)
5. Bolivia (SENASAG)
6. Argentina (SENASAG)
7. PANAFTOSA
8. USFM

MHASpread: A multi-host animal spread stochastic multilevel model (version 2.0.0) workshop

MHASpread

Material for the short course at RS

The course will provide focus on how to use MHASpread R package to simulate foot and mouth disease (FMD) epidemics within your country.

Aims of the workshop

1. Learn how to use the MHASpread v.2.0.0 package.

Material for the short course at RS

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2. Overview of the model's initial conditions, outputs, and interpretation.

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Aims of the workshop

1. Learn how to use the MHASpread v.2.0.0 package.
2. Overview of the model's initial conditions, outputs, and interpretation.
3. MHASpread to simulate FMD countermeasure actions (depopulation, vaccination, traceability, movement restrictions, and standstill).

Timetable and instructions

Timetable

Day 1

- Review of FMD modeling outbreaks, the application of the MHASpread R package.
- In an overview of the regional antigen bank, BANVACO.
- Emergency stockpile system in the Rio Grande do Sul Brazil.
- Introduction to compartmental models
- Prepare your data.

Day 2

- Hands-on MHASpread.
- Simulating FMD epidemics without control actions.

Timetable and workshop instructions

Day 3

- The simulation of FMD epidemics with index cases in swine, cattle, and small ruminants.
- Implement control actions.

Day 4

- Implement control actions (alternative scenarios).
- Run simulation with your own data.

Day 5

- Take home messages and discuss finding from your own data.

Workshop instructions

README.md

Workshop: Use of transmission models to simulate the spread of livestock diseases

About this workshop

In this four-day workshop, you will have an introduction to a range of mathematical models used to simulate the spread of livestock diseases. We will focus on the application of such epidemiological models and demonstrate with real data, how you can use mathematical transmission models to make informed decisions before, during, and after an animal health emergency.

We use the MHASpread: A multi-host animal spread stochastic multilevel model (version 0.1.0) which is an R package to be used throughout the training. The MHASpread allows for explicit specification of species-specific disease transmission probability, among other important transmission dynamics of disease infecting multiple species, such as FMD. This model considers the entry and exit of animals given between-farm animal movements, movements into slaughterhouses, births, and, deaths, for each species. You will learn how to use MHASpread, including the simulation of the introduction, and dissemination of FMD in the state of Rio Grande do Sul, Brazil. You will have access to highly specialized computational and epidemiological tools within an easy-to-use workflow. For the second half of the workshop, you will learn how similar models are used in the preparation of ASF in Rio Grande do Sul, Brazil, and in the United States. We will demonstrate how the "PigSpread" model works. PigSpread is also a mathematical model specially developed to be used in the dynamics of the disease of swine.

Workshop web-page

Workshop instructions

1. Group 1 (Cattle farm) will utilize cattle as initial infection (María Natalia Aznar; Ana Carolina Schmidt; Felipe Peixoto de Arruda; Diego Viali; Fernando Endrigo Garcia)
2. Group 2 (Swine farm) will utilize swine as initial infection (André de Medeiros C. Lins; Daniel Gareca Vaca; Guilherme Marques; Luz Jacqueline Aguilar Narváez)
3. Group 3 (Multispecies farm) with cattle, swine and small ruminants, infection will start in cattle (Álvaro Manuel Moreta Romero; Pablo Charbonnier; Walter Oliveira Cartaxo; Rodrigo Garcia)
4. Group 4 (Multispecies farm) with cattle and small ruminants, infection will start in cattle (Carlos Ramón Ramirez; Débora Beatriz Máas; Marcio Alex Petró; Bethania Silva Santos)

Workshop confidentiality and liability

Legal

You will have access to innovation source codes, under number 2023-011 MHASpread.

1. Please review the MHASpread code use and sharing agreement; please sign, place and date if you agree with the terms and conditions.

Number of attendees that submitted their assignments.

1. Homework (1) %.
2. Homework (2) %.
3. Homework (3) %.

Thanks for listening

Questions?