OutCost Tool – A tool to support countries in planning emergency response

Daniel BELTRÁN ALCRUDO, Damián TAGO PACHECO & Jordi CASAL FÀBREGA

6 April 2022
The OUTbreak COSting Tool: OutCosT

Key features

- New FAO corporate tool (SET, LMT, ATLASS...)
- Excel-based, to estimate:
  - Direct $ cost of disease outbreaks and their control (112 items, broken down by farm type and who pays)
  - Other impacts (qualitatively): human health, environment, animal welfare, socio-economic, trading and political response
- Actual epidemics or hypothetical scenarios
- For the moment, only for swine diseases
Structure of the presentation

Origin and future of the tool (Daniel BELTRÁN ALCRUDO, FAO REU)
- Tool development and validation
- Training, certification and pool of experts
- Future developments

Uses of the tool (Damián TAGO PACHECO, FAO RAP)
- What it can do and what it cannot do
- Potential uses of the tool (i.e. scenarios)
- How it fits/compares with other existing tools

The tool (Jordi CASAL FÁBREGA, UAB)
- Sections of the tool, Excel spreadsheet & Guidelines
- Input data requirements
- Outputs and final report
- Time it takes, expertise it requires
History of the tool

- 2016-17 - First steps linked to the lumpy skin disease (LSD) epidemic in the Balkans
  - Letter of Agreement (LoA) with UAB (February-July 2017)

- 2018-2019 - LSD Preparedness in Belarus, Moldova and Ukraine

- 2019-2021 – African swine fever (ASF) preparedness in the Balkans
  - LoA with UAB
  - Excel tool and Manual
## Validation

<table>
<thead>
<tr>
<th>Country</th>
<th>Colombia (Atlantic Coast)</th>
<th>North Macedonia</th>
<th>The Philippines</th>
<th>Vietnam (Lao Cai)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Disease</strong></td>
<td>CSF</td>
<td>ASF</td>
<td>ASF</td>
<td>ASF</td>
</tr>
<tr>
<td><strong>Year</strong></td>
<td>2015/16</td>
<td>Scenario</td>
<td>2019</td>
<td>2020</td>
</tr>
<tr>
<td><strong>Farms in affected area</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>96,606</td>
<td>2,889</td>
<td>862,200</td>
<td>55,647</td>
</tr>
<tr>
<td></td>
<td>151,785</td>
<td>17,451</td>
<td>2,365,780</td>
<td>43,999</td>
</tr>
<tr>
<td></td>
<td>395,938</td>
<td>115,931</td>
<td>10,343,468</td>
<td>230,723</td>
</tr>
<tr>
<td><strong>Outbreaks</strong></td>
<td>91</td>
<td>18</td>
<td>18,221</td>
<td>976</td>
</tr>
<tr>
<td><strong>Census in outbreaks (sows/fatteners)</strong></td>
<td>706 / 1,675</td>
<td>151 / 28</td>
<td>28,913/179,681</td>
<td>833 / 2,697</td>
</tr>
<tr>
<td><strong>Affected animals (including dead)</strong></td>
<td>1,141</td>
<td>150</td>
<td>208,595</td>
<td>3,530</td>
</tr>
<tr>
<td><strong>Dead animals</strong></td>
<td>961</td>
<td>36</td>
<td>1,484/ 9,224</td>
<td>-</td>
</tr>
<tr>
<td><strong>Stamping out</strong></td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
</tbody>
</table>

### Neighbouring and at-risk farms:

| Investigated | 1,720 | 549 | na | - |
| Stamped out  | -     | -   | na | - |
| Immobilized  | 1,720 | 549 | na | 976 |

### General population

| Increase of surveillance (farms / animals) | 77 / 215 | 628 / 10,982 | 2,423 / ? | - |
| Surveillance in wildlife                  | No       | Yes          | No         | No |
| Number of vaccinated farms*               | 264,778  | -            | -          | - |
OutCosT training

- Guidelines not enough for self-learning
- Generate a pool of experts:
  - Veterinarians and economists
  - Range of languages and countries
- 1st Training on 25-29 April 2022 (9 h):
  - Up to 20 trainees
  - Prioritizing those future users
  - Certified
  - Online, through FAO Virtual Learning Centre (VLC)
  - Webinars + Forum + Exercise + Test
  - Replicable
  - Community of practice
  - Re-run based on demand
Future developments

- Additional trainings
- Additional countries/outbreaks assessed
- Additional animal species: OutCosT-PIG, OutCosT-Ruminants, OutCosT-Poultry...
- Additional languages (*ad hoc*)
- Promotion: brochure, website...
What can OutCost do? (and cannot do)
The problem(s)

• How expensive is responding to ASF outbreaks?
  • In countries with decentralized systems, are local authorities prepared?
  • How much can the government save (actual spending) if further spread is contained?
• What is the impact of ASF at the production node?
• Who pays for what?
The solution

The ASF outbreak costing tool

Outbreak management

- Preparedness
- Resource allocation

Awareness raising

- Prevention
- Resource mobilization
Outbreak management

Preparedness & Resource allocation

- Allocate enough resources to rapidly respond to outbreaks
- Scenarios to estimate budgetary needs in case the disease spreads to other regions
The solution – Objectives

Examples of interesting scenarios:

• Based on the actual costs of responding to an outbreak in a specific area, what are the financial needs if the disease spreads to neighboring districts?

• What are the resources needed to implement culling with compensation? Given the effectiveness of such strategy, do benefits compensate costs?
  
  • Who looses and who wins?
The solution – Objectives

- Advocacy to mobilize resources internally (Ministry of Finance) or internationally (donors, development agencies)
- Promote collaborations with private sector

Awareness raising

Prevention &
Resource mobilization
What the tool is NOT...

• The tool is **NOT** designed to estimate the impact of ASF in a comprehensive way. Instead, it focuses on **materialized costs** due to ASF outbreaks
  • Focuses on pig owners and Government (central and local)
  • Do not address macro-economic impacts (GDP, trade)

• The tool is **NOT** designed for conducting complex analyses but rather to support the government to improve planning
  • Easy-to-use is one of the prioritized features of the tool
How does this tool compare with others?

• To estimate the impacts of ASF in a comprehensive way, explore other approaches
  • SELIA – Socioeconomic and Livelihood Impact Assessment: Developed by University of Queensland (CGIAR, ILRI) and looking at livelihood impacts along the Value Chain
How does this tool compare with others?

• To assess biosecurity measures in place and the risk of ASF, there are multiple scoring tools that can be explored

• ASF Combat (Boehringer Ingelheim): “Online management and biosecurity assessment tool aimed at reducing ASF introduction risk level”

• BioCheck (University of Gent): “Scientific risk-based and independent scoring system to evaluate the quality of your on-farm biosecurity”
The tool
The tool: Excel spreadsheet & Guidelines

OutCosT. OUTbreak COSTing Tool (Last updated: March 2022)
A tool to calculate the cost of a disease and its control in a country/territory
Contact (in case of questions): REU-VLC@fao.org

Choose a language: English

The objective of this spreadsheet is the quantification of the cost of a swine disease.
The Excel file contains different sheets:
- Inputs: Animal population, outbreaks characteristics & measures applied and their costs
- Breakdown: costs of the disease
- Overall cost: Summary of the costs of the disease for the country
- More costs: Summary of the costs per farm
- Evaluation of qualitative costs: Qualitative evaluation of indirect and non monetary costs
- Report 1 to Report 5 and Annex 1 to 3: Sheets prepared to be printed or exported as pdf file
  To print/ create pdf file: Select the sheets "Report-#" and/or Annex-# and use the command "print"
  (You can select multiple sheets using "Ctrl" at the same time that you select the sheets you want)

The model is deterministic (it does not calculate a range of costs)
The tool: Excel spreadsheet & Guidelines

1. General setting (white)

2. Data on livestock population and production (green)
   - Livestock data
   - Production parameters (without disease) and prices in pig production
   - Salaries

3. Data on Outbreaks and Control measures applied in affected farms (orange)
   3.1. Detected Outbreaks
      - Time spent on "Outbreak detection"
      - Outbreaks: suspected and confirmed farms, and clinical cases
      - Production losses and costs due to the disease
      - Cost of sampling and testing
      - Extra-work due to the presence of the disease
   3.2. Control measures in affected farms and its cost
      - Stamping out (including culling and carcass disposal)
      - Pest control, cleaning, and disinfection
      - Treatments
      - Extra-work due to the application of treatments and/or other control activities
      - Movement ban
      - Farms without animals and restocking
      - Time spent on travelling to visit farms (veterinarians)

4. Control measures applied in neighbouring and/or at-risk farms (dark blue)
   - Time spent for visiting neighbouring and/or at-risk farms
   - Farms investigated and applied control measure

5. Control and surveillance in general population (light blue)
   - Vaccination
   - Costs of vaccination (including the time spent on it)
   - side effects of Vaccination
   - Control measure in wildlife
   - Surveillance in livestock
   - Surveillance in wildlife and vectors (including the time spent on it)
   - Prices of tests used for surveillance
   - Time spent on “Coordination tasks”

6. Training, communication, and other control activities (brown)
   - Checkpoints (control of movements)
   - Border control (increased over the normal control measures)
   - Training
   - Awareness materials and communication
The tool: Excel spreadsheet & Guidelines

<table>
<thead>
<tr>
<th>Livestock data:</th>
<th>Growthers (except Backyard)</th>
<th>1 - Industrial</th>
<th>2 - Commercial</th>
<th>3 - Family</th>
<th>4 - Backyard</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Shear farms</td>
<td>Parental units</td>
<td>Shear farms</td>
<td>Parental units</td>
</tr>
<tr>
<td># sows-to-finish sows</td>
<td>20</td>
<td>100</td>
<td>300</td>
<td>300</td>
<td>300</td>
</tr>
<tr>
<td># sows-to-finish sows</td>
<td>20</td>
<td>100</td>
<td>300</td>
<td>300</td>
<td>300</td>
</tr>
<tr>
<td># sows-to-finish sows</td>
<td>20</td>
<td>100</td>
<td>300</td>
<td>300</td>
<td>300</td>
</tr>
<tr>
<td>Average amount per farm</td>
<td>2,600,000</td>
<td>1,100</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Production parameters</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sows (eweles production)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age at the end of period (days)</td>
<td>26.0</td>
<td>50.0</td>
<td>126.0</td>
<td>8</td>
<td>15</td>
</tr>
<tr>
<td>Cost of feed (Kg of feed)</td>
<td>0.10</td>
<td>0.50</td>
<td>2.08</td>
<td>0.24</td>
<td>0.24</td>
</tr>
<tr>
<td>Calving rate</td>
<td>0.10</td>
<td>0.05</td>
<td>0.84</td>
<td>0.24</td>
<td>0.24</td>
</tr>
<tr>
<td>Survival</td>
<td>0.90</td>
<td>1.00</td>
<td>0.90</td>
<td>0.82</td>
<td>0.82</td>
</tr>
</tbody>
</table>
### Input data requirements

Data on Outbreaks and Control measures applied in affected farms (orange)

#### 3.1. Detected Outbreaks
- Time spent on “Outbreak detection”
- Outbreaks: suspected and confirmed farms, and clinical cases
- Production losses and costs due to the disease
- Cost of sampling and testing
- Extra-work due to the presence of the disease

#### 3.2. Control measures in affected farms and its cost
- Stamping out (including culling and carcass disposal)
- Pest control, cleaning, and disinfection
- Treatments
- Extra-work due to the application of treatments and/or other control activities
- Movement ban
- Farms without animals and restocking
- Time spent on travelling to visit farms (veterinarians)
Examples has a census of 333,000 sows and 348,000 fatteners and finishers distributed in 87,000 farms. The outbreaks affected 171 farms in 2021.

Main applied control/eradication measures are:
- Partial stamping out
- Disinfection
- Vaccination

<table>
<thead>
<tr>
<th>Total cost</th>
<th>Total cost for the country</th>
<th>Percentage</th>
<th>Cost per farm in the country</th>
</tr>
</thead>
<tbody>
<tr>
<td>Outbreaks</td>
<td>3,416,237</td>
<td>26.2%</td>
<td>393</td>
</tr>
<tr>
<td>Connected farms</td>
<td>9,090,062</td>
<td>69.8%</td>
<td>1,045</td>
</tr>
<tr>
<td>Vaccination treatments</td>
<td>224,430</td>
<td>1.7%</td>
<td>26</td>
</tr>
<tr>
<td>Surveillance (farms)</td>
<td>128,676</td>
<td>1.0%</td>
<td>14.8</td>
</tr>
<tr>
<td>Wildlife</td>
<td>14,472</td>
<td>0.1%</td>
<td>1.7</td>
</tr>
<tr>
<td>Others</td>
<td>149,235</td>
<td>1.1%</td>
<td>17.2</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>13,023,111</strong></td>
<td><strong>100%</strong></td>
<td><strong>1,496,9</strong></td>
</tr>
</tbody>
</table>

**Total cost**
## Outputs and final report

Cost by groups of farms:

### Up to 4 types

<table>
<thead>
<tr>
<th>Category</th>
<th>Total cost</th>
<th># Farms</th>
<th>Total cost</th>
<th>Sows /fatteners</th>
<th>Veterinary Services</th>
<th>Farmers</th>
<th>Others</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Direct costs</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Diagnostics</td>
<td>1,733</td>
<td>27</td>
<td>3,204</td>
<td>2,715</td>
<td>7,389</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Vaccines</td>
<td>3,503</td>
<td>30</td>
<td>3,906</td>
<td>3,556</td>
<td>11,280</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Inoculation</td>
<td>295</td>
<td>5</td>
<td>1,385</td>
<td>1,129</td>
<td>11,280</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Indirect costs</td>
<td>2,018</td>
<td>28</td>
<td>3,295</td>
<td>2,181</td>
<td>14,191</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td><strong>Indirect costs</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Analytical</td>
<td>287</td>
<td>2</td>
<td>3,726</td>
<td>3,726</td>
<td>3,726</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td><strong>Total cost by type of farms</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Industrial</td>
<td>7,389</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>7,389</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Commercial</td>
<td>3,556</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>3,556</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Family</td>
<td>11,280</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>11,280</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td><strong>Total cost for each group</strong></td>
<td>15,169</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>15,169</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

**Sector that assumes the costs**

*Detailed cost categories*
## Outputs and final report

### Mean cost of an outbreak

<table>
<thead>
<tr>
<th></th>
<th>Industrial</th>
<th>Commercial</th>
<th>Family</th>
<th>Backyard</th>
</tr>
</thead>
<tbody>
<tr>
<td>Direct disease Costs</td>
<td>211,705</td>
<td>264,103</td>
<td>101,857</td>
<td>13,268</td>
</tr>
<tr>
<td>Outbreak investigation</td>
<td>7,898</td>
<td>11,770</td>
<td></td>
<td>12,460</td>
</tr>
<tr>
<td>Stamping out: compensations</td>
<td>760,105</td>
<td>248,253</td>
<td>114,356</td>
<td>9,494</td>
</tr>
<tr>
<td>Stamping out: Other costs</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cleaning and disinfection</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Indirect Costs</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Mean cost of outbreaks (depending on the type of farms)

<table>
<thead>
<tr>
<th></th>
<th>Industrial</th>
<th>Commercial</th>
<th>Family</th>
<th>Backyard</th>
</tr>
</thead>
<tbody>
<tr>
<td>Farrow to weaning farms</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fattener units</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Backyard farms</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Total costs of outbreaks per type of farms

<table>
<thead>
<tr>
<th></th>
<th>Industrial</th>
<th>Commercial</th>
<th>Family</th>
<th>Backyard</th>
</tr>
</thead>
<tbody>
<tr>
<td>Direct disease Costs</td>
<td>211,705</td>
<td>264,103</td>
<td>101,857</td>
<td>13,268</td>
</tr>
<tr>
<td>Outbreak investigation</td>
<td>7,898</td>
<td>11,770</td>
<td></td>
<td>12,460</td>
</tr>
<tr>
<td>Stamping out: compensations</td>
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<tr>
<td>Stamping out: Other costs</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cleaning and disinfection</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Indirect Costs</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Cost in connected farms:

<table>
<thead>
<tr>
<th></th>
<th>Industrial</th>
<th>Commercial</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inspection and analysis</td>
<td>170,601</td>
<td>186,678</td>
</tr>
<tr>
<td>Stamping out (compensat.)</td>
<td>3,722,500</td>
<td>1,437,500</td>
</tr>
</tbody>
</table>

### The cost of the outbreaks per sectors

<table>
<thead>
<tr>
<th></th>
<th>Veterinary Service</th>
<th>Farmers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Outbreaks</td>
<td>1,199,053</td>
<td>2,217,183</td>
</tr>
<tr>
<td>Connected farms</td>
<td>7,155,709</td>
<td>1,858,270</td>
</tr>
<tr>
<td>Vaccination /treatments</td>
<td>224,000</td>
<td>430</td>
</tr>
<tr>
<td>Surveillance (farms)</td>
<td>128,676</td>
<td>0</td>
</tr>
<tr>
<td>Wildlife</td>
<td>14,472</td>
<td>0</td>
</tr>
<tr>
<td>Awareness</td>
<td>128,975</td>
<td>0</td>
</tr>
</tbody>
</table>
Breakdown of 112 different costs:

- Totals
- Per type of farms,
- Per sectors
Other (non-economic) costs:

- Socio-economic vulnerability
- Human Health
- Environment
- Animal Welfare
- Social Behavior
- Trading
- Political response
A draft of the report can be created automatically using a Word template.
It is simple... but it can be arduous:
A lot of data needed: Up to 436 inputs (some of them not necessary in most cases). Some of them can be easy to obtain (but for others probably the user would need advice). (The user can decide to skip some sections)

The default values can be useful in some cases

**Type of data:**
- Livestock (census and productive parameters)
- Data of the outbreaks
- Prices of animals and goods
- Costs of the control measures
- Time needed for different operations

**Time required:**
- Several days...

**Expertise:**
- Knowing the characteristics of production in the country
- Access to data and network of contacts
Contributors to OutCosT-PIG development

• **Tool development:**
  - UAB: Jordi Casal, Giovanna Ciaravino
  - FAO: Daniel Beltran-Alcrudo, Damián Tago Pacheco

• **Country validation:**
  - Colombia: Pilar Pineda
  - North Macedonia: Blagojco Tabakovsky
  - Philippines: Imelda Santos, Carolyn Benigno
  - Vietnam: Tran Huynh

• **Others:**
  - Madhur Dhingra, Melissa Mclaws, Eran Raizman, Cecilia Murguia and Claudia Ciarlantini
Thank you