DISCONTOOLS: research gaps for improving infectious disease control in animals

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What is DISCONTOOLS?

1) **Disease database – 56 diseases**
2) **Gap analysis –** diagnostics, pharmaceuticals, vaccines
3) **Prioritisation model**

Stakeholder driven – Open-access - Flexible

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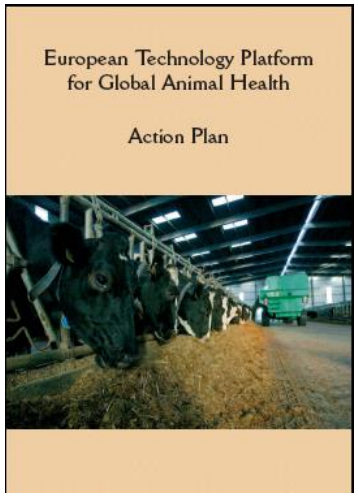
Background

ETPGAH - 2007



2008 - 2013

SEVENTH FRAMEWORK
PROGRAMME

2014 -

Support from European countries with AnimalhealthEurope providing secretariat support

animalhealth europe

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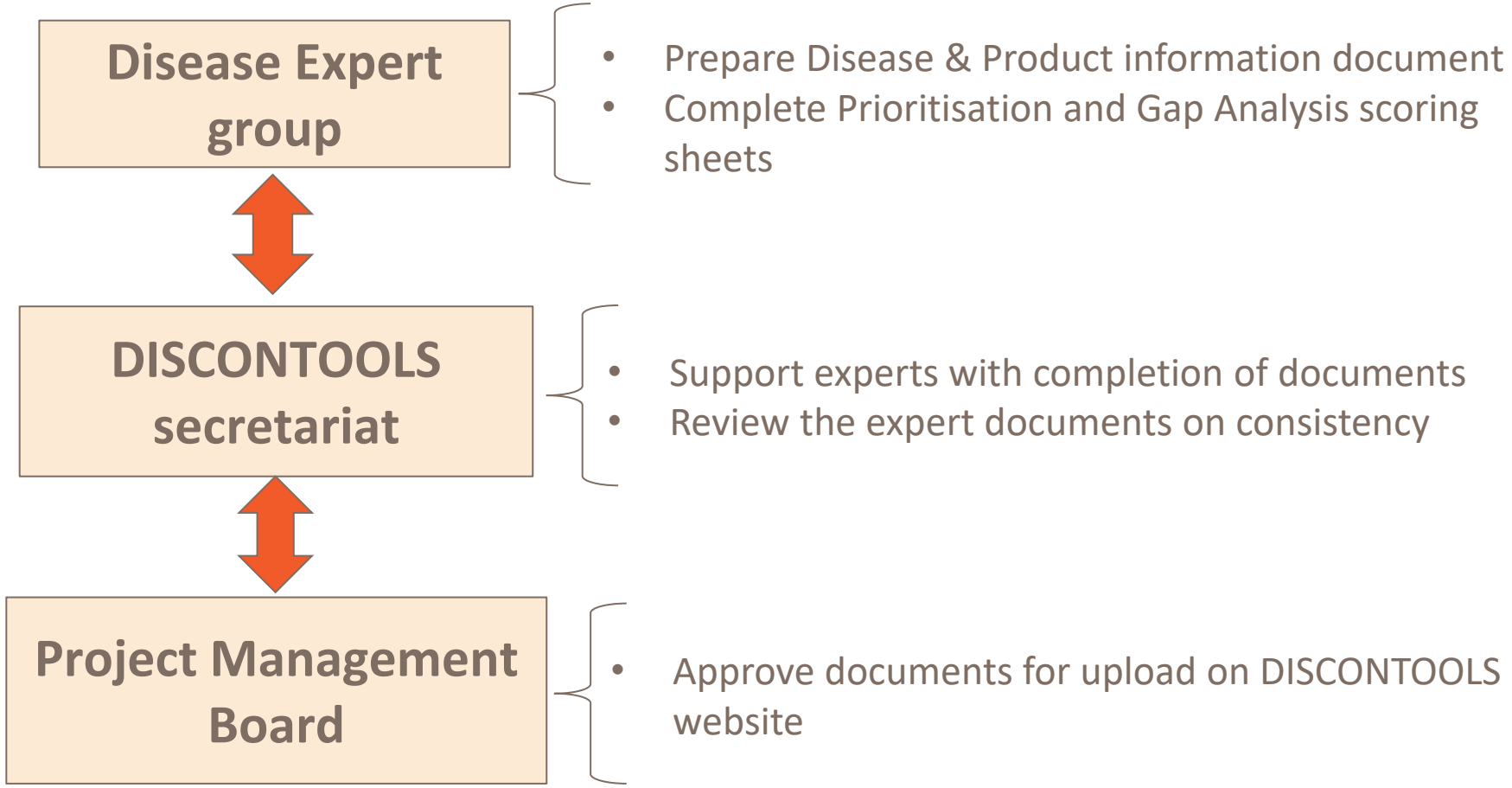
For whom?

Development of research agendas by public and private institutions

Development and evaluation of research proposals

Veterinary education programmes

Approval procedure



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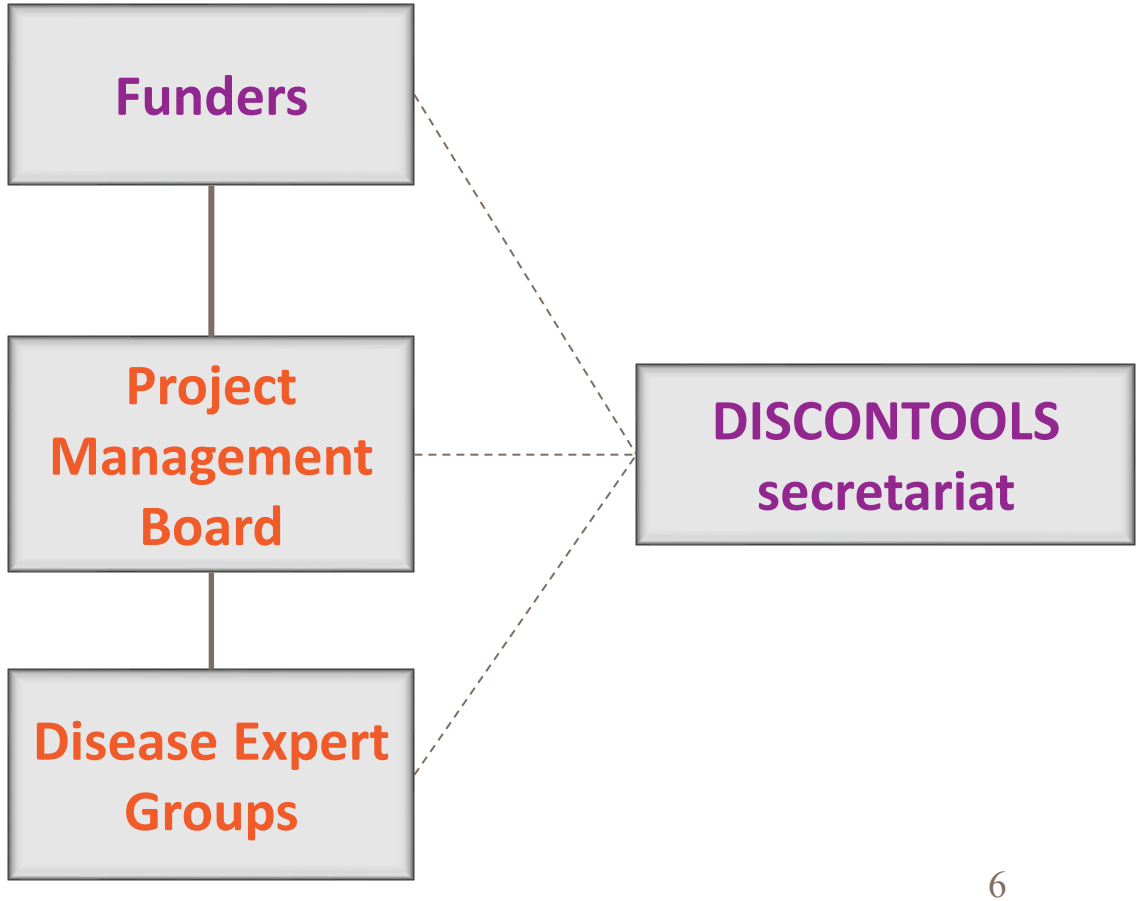
Governance

- National European funders of research
- Provide financing to the project
- Approve composition of Project Management board
- Approve all detailed and provisional budgets

Funders + AnimalhealthEurope, Diagnostics for Animals, CVOs, Copa-Cogeca FVE, EAEVE, Epizone, STAR-IDAZ IRC, EC (observer), WOAH (observer)

- Composed of members with expertise in epidemiology, laboratory diagnosis, trade/economics and a representative from industry
- At least one from outside of Europe



European Animal Health & Welfare Research
COLLABORATIVE WORKING GROUP

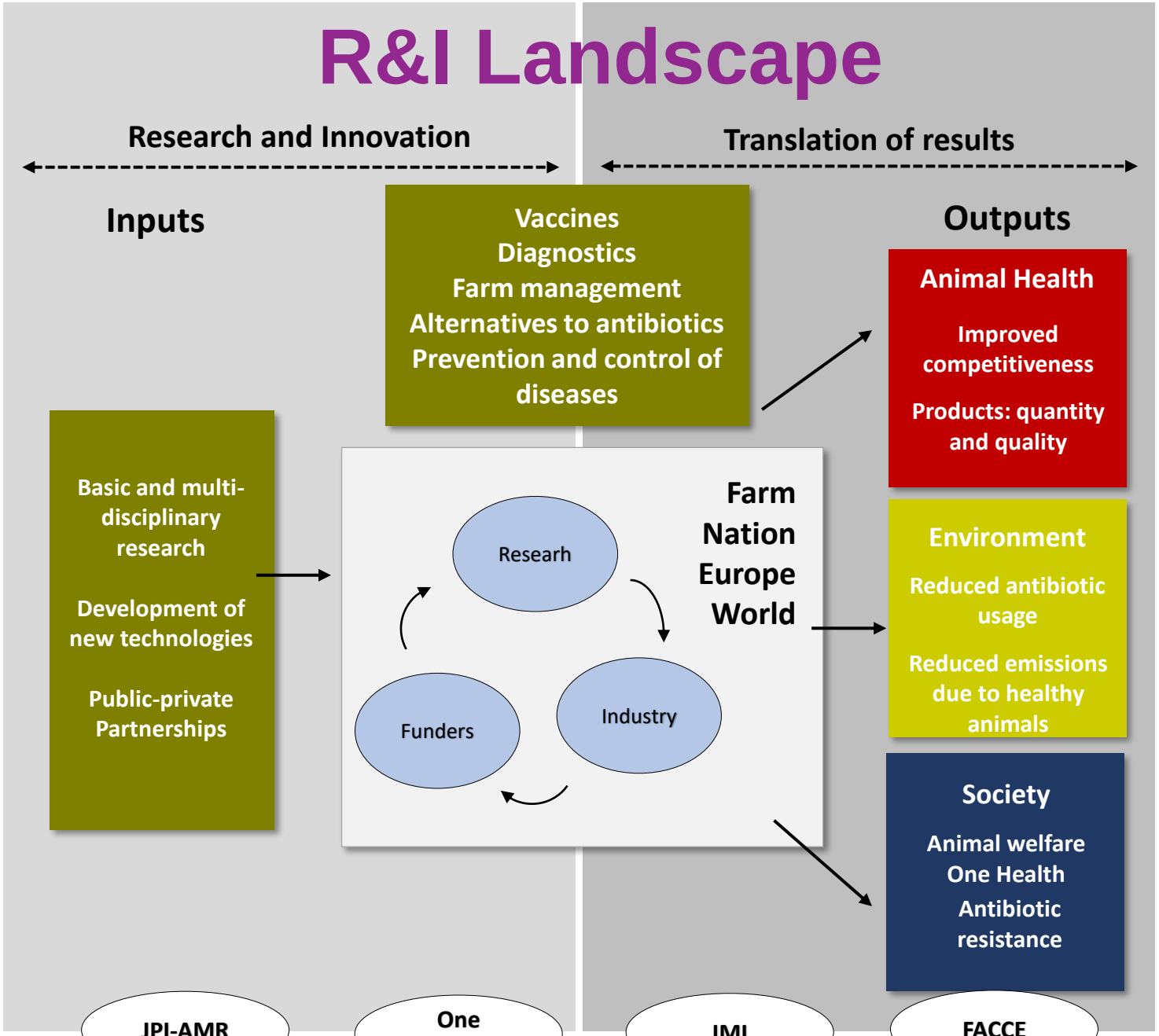
STAR-IDAZ
International Research Consortium on Animal Health

animalhealth europe

DIAGNOSTICS FOR ANIMALS
VETERINARY DIAGNOSTIC MANUFACTURERS

EU Partnership AH&W

R&I Landscape



icrad
International coordination of research on infectious animal disease

- Farmers
- Veterinarians
- Authorities
- WOAH
- WHO
- FAO
- Livestock industry
- Pharma industry

Find out more about the diseases

View report for a specific disease

Build report for several diseases

Step 1: select type of diseases

All diseases	Epizootic diseases	Food producing animal complexes	Zoonotic diseases
All	African Horse Sickness	African Swine Fever	African Trypanosomiasis (scores for Non Tse-Tse transmitted)
Anthrax	Avian Influenza	BHV-I (IBR)	Bluetongue
Bovine Spongiform Encephalopathy	Bovine Tuberculosis	BRSV	Brucellosis
BVDV	Campylobacter	Chlamydiosis (C. Abortus)	Classical Swine Fever

Step 2: select type of report

Disease & product analysis	Prioritisation model	Gap analysis	Scoring criteria

D&P analysis

Step 3: select criteria

- Control Tools
- Disease details
- Global challenges
- Main critical gaps
- Conclusion
- Sources of information
- STAR-IDAZ Research Road Maps

Create

- Control Tools
- Disease details
  - Description and characteristics
    - Pathogen
    - Variability of the disease
    - Stability of the agent/pathogen in the environment
  - Species involved
    - Animal infected/carrier/disease
    - Human infected/disease
    - Vector cyclical/non-cyclical
    - Reservoir (animal, environment)
  - Description of infection & disease in natural hosts
    - Transmissibility
    - Pathogenic life cycle stages
    - Signs/Morbidity
    - Incubation period
    - Mortality
    - Shedding kinetic patterns
    - Mechanism of pathogenicity
  - Zoonotic potential
    - Reported incidence in humans
    - Risk of occurence in humans, populations at risk, specific risk factors
    - Symptoms described in humans
    - Likelihood of spread in humans

Prioritisation model

Step 3: select criteria

Check all Uncheck all

- DISEASE KNOWLEDGE - 10 criteria
- IMPACT ON ANIMAL HEALTH AND WELFARE - 3 criteria
- IMPACT ON PUBLIC HEALTH - HUMAN HEALTH - 6 criteria
- IMPACT ON TRADE - 4 criteria
- CONTROL TOOLS - 3 criteria
  - Appropriate diagnostics
  - Appropriate vaccines
  - Appropriate pharmaceuticals
- IMPACT ON WIDER SOCIETY - 3 criteria

Create Report

Different outputs

1. Disease and product analysis
2. Gap analysis
3. Prioritisation model
4. Disease summary

Leishmaniasis

Last update : 11/05/2018

Control Tools

Diagnostics availability

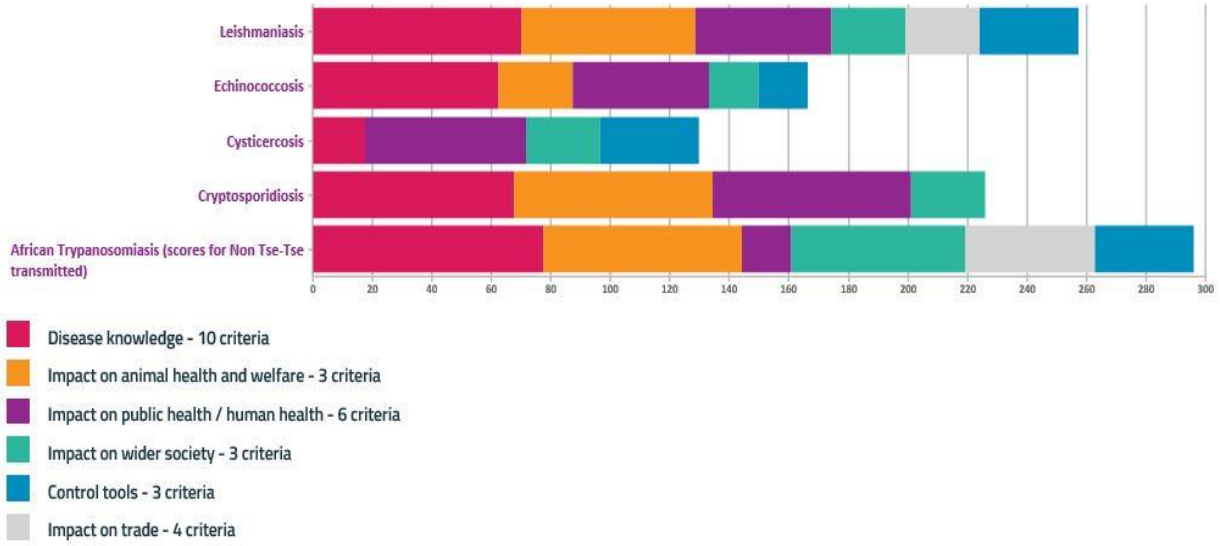
Commercial diagnostic kits available world

Yes for serological diagnosis, no for culture of the organis

Further info: List of animal health diagnostics

GAP: General need for diagnostics of higher sensitivity to

	Leishmaniasis
	Score
Diagnostics tools	
Availability	-2
Prevention and control - Differentiation of infected from vaccinated (DIVA)	1
Strategic reserve	-1
Capacity of production	-1
Affordable	-1
Quality/stability durability	-1
Sensitivity	1
Specificity	0
Reproducibility	2
Simplicity/ease of use	0
Speed	0



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Recently updated diseases

Zoonoses	Epizootics	Production diseases
• *Campylobacter* • *E. coli* (STEC)	• ASF	• *Mycoplasma bovis* • Ovine chlamydiosis

Vaccines

Diagnostics

Control strategies

Implementation

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Coming soon

- PCV2
- Poultry coccidiosis
- Nematodes (ruminants, pigs and poultry)

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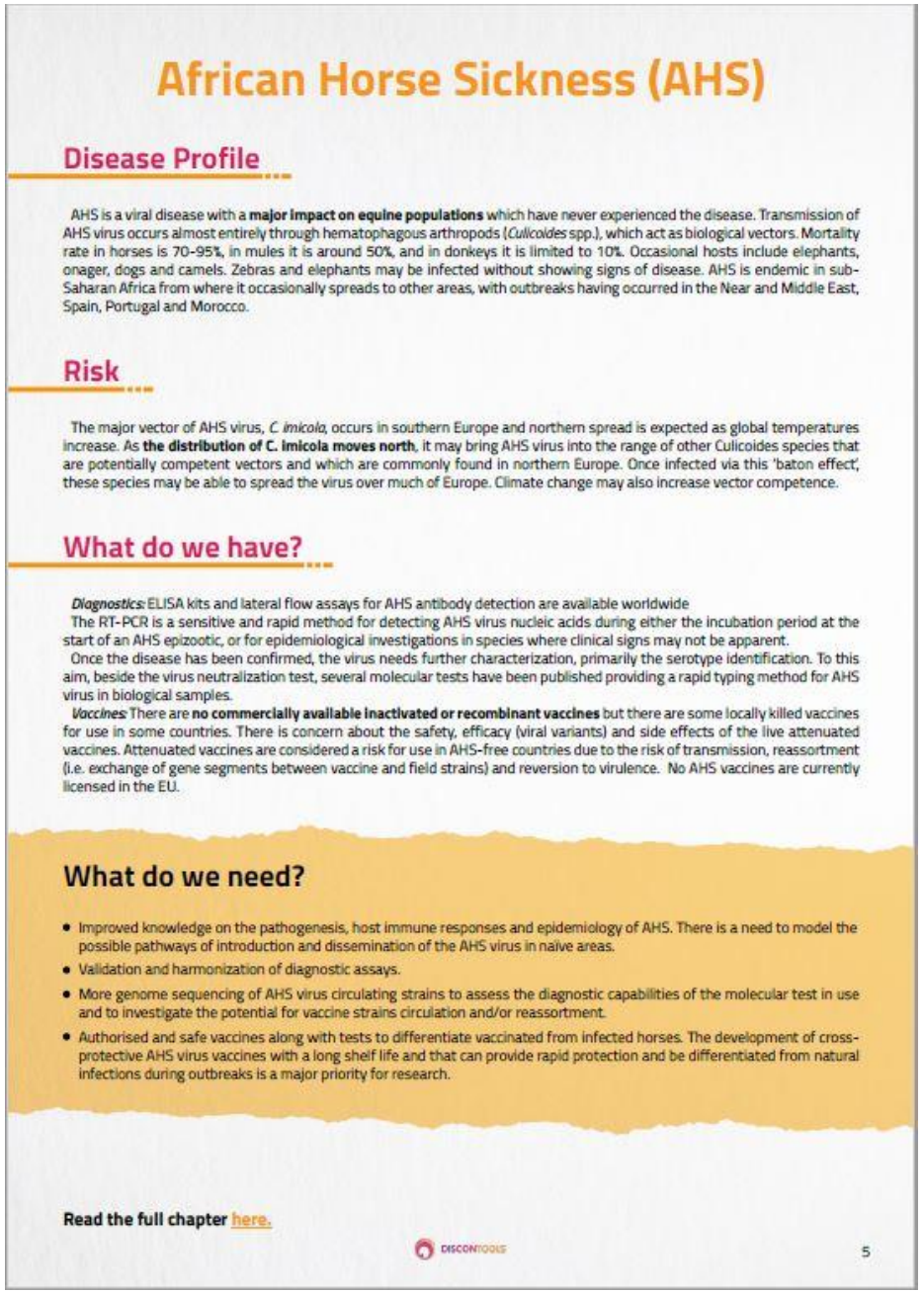
DISCONTOOLS e-book

- Disease Sheets (one page) for 53 infectious diseases
- Disease control tools available and those we need
- Available from Stakeholder forum > documents of interest
  - https://discontools.eu/index.php?option=com_attachments&task=download&id=271:Discontools-e-book



African Horse Sickness (AHS)

Disease Profile

AHS is a viral disease with a **major impact on equine populations** which have never experienced the disease. Transmission of AHS virus occurs almost entirely through hematophagous arthropods (*Culicoides* spp.), which act as biological vectors. Mortality rate in horses is 70-95%, in mules it is around 50%, and in donkeys it is limited to 10%. Occasional hosts include elephants, onager, dogs and camels. Zebras and elephants may be infected without showing signs of disease. AHS is endemic in sub-Saharan Africa from where it occasionally spreads to other areas, with outbreaks having occurred in the Near and Middle East, Spain, Portugal and Morocco.

Risk

The major vector of AHS virus, *C. imicola*, occurs in southern Europe and northern spread is expected as global temperatures increase. As **the distribution of C. imicola moves north**, it may bring AHS virus into the range of other Culicoides species that are potentially competent vectors and which are commonly found in northern Europe. Once infected via this 'baton effect', these species may be able to spread the virus over much of Europe. Climate change may also increase vector competence.

What do we have?

Diagnostics: ELISA kits and lateral flow assays for AHS antibody detection are available worldwide
The RT-PCR is a sensitive and rapid method for detecting AHS virus nucleic acids during either the incubation period at the start of an AHS epizootic, or for epidemiological investigations in species where clinical signs may not be apparent.
Once the disease has been confirmed, the virus needs further characterization, primarily the serotype identification. To this aim, beside the virus neutralization test, several molecular tests have been published providing a rapid typing method for AHS virus in biological samples.
Vaccines: There are **no commercially available inactivated or recombinant vaccines** but there are some locally killed vaccines for use in some countries. There is concern about the safety, efficacy (viral variants) and side effects of the live attenuated vaccines. Attenuated vaccines are considered a risk for use in AHS-free countries due to the risk of transmission, reassortment (i.e. exchange of gene segments between vaccine and field strains) and reversion to virulence. No AHS vaccines are currently licensed in the EU.

What do we need?

- Improved knowledge on the pathogenesis, host immune responses and epidemiology of AHS. There is a need to model the possible pathways of introduction and dissemination of the AHS virus in naive areas.
- Validation and harmonization of diagnostic assays.
- More genome sequencing of AHS virus circulating strains to assess the diagnostic capabilities of the molecular test in use and to investigate the potential for vaccine strains circulation and/or reassortment.
- Authorised and safe vaccines along with tests to differentiate vaccinated from infected horses. The development of cross-protective AHS virus vaccines with a long shelf life and that can provide rapid protection and be differentiated from natural infections during outbreaks is a major priority for research.

Read the full chapter here.

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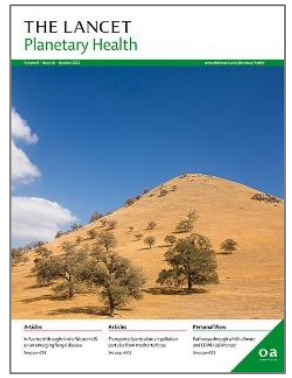

THE LANCET
Planetary Health

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Disease control tools to secure animal and public health in a densely populated world

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Paola De Benedictis, PhD • Prof Ingrid Hansson, DVM PhD • Prof Isabel Hennig-Pauka, DVM • et al. Show all authors

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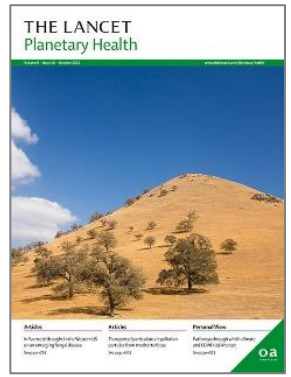
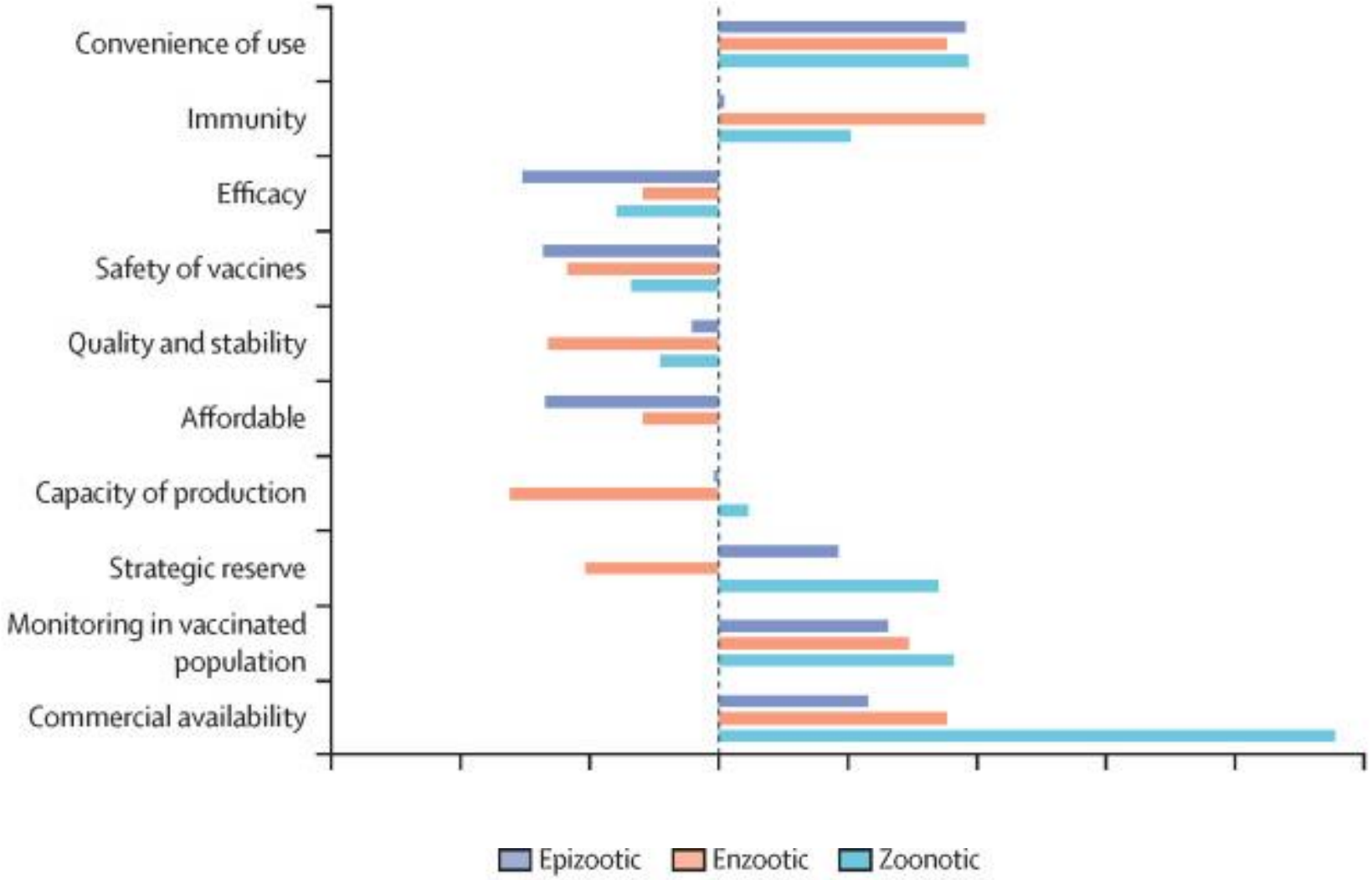
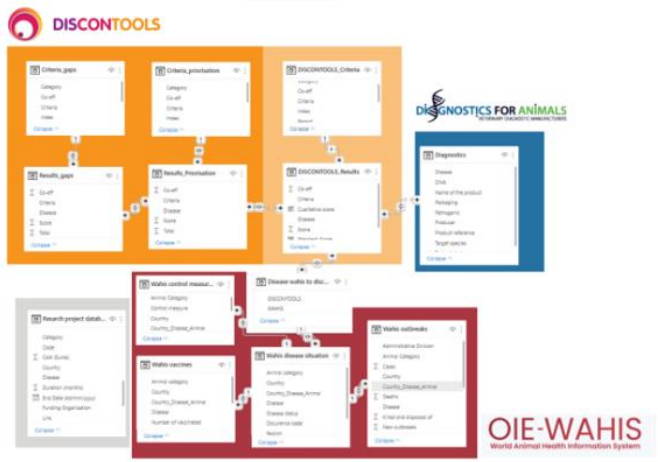
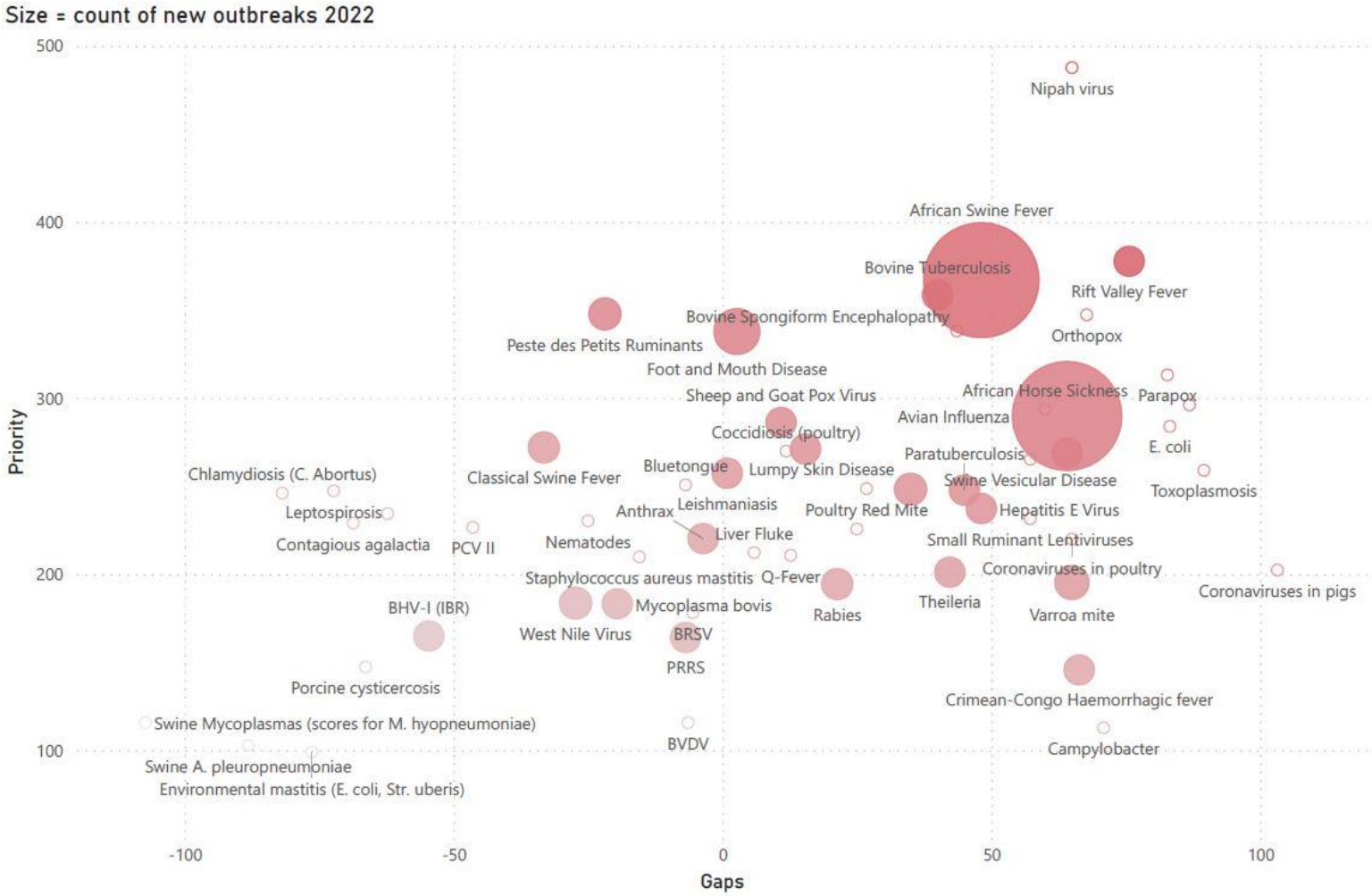


Vaccines



Combining data sources





Credits: Natalia Ciria, Universitat Autònoma de Barçelona

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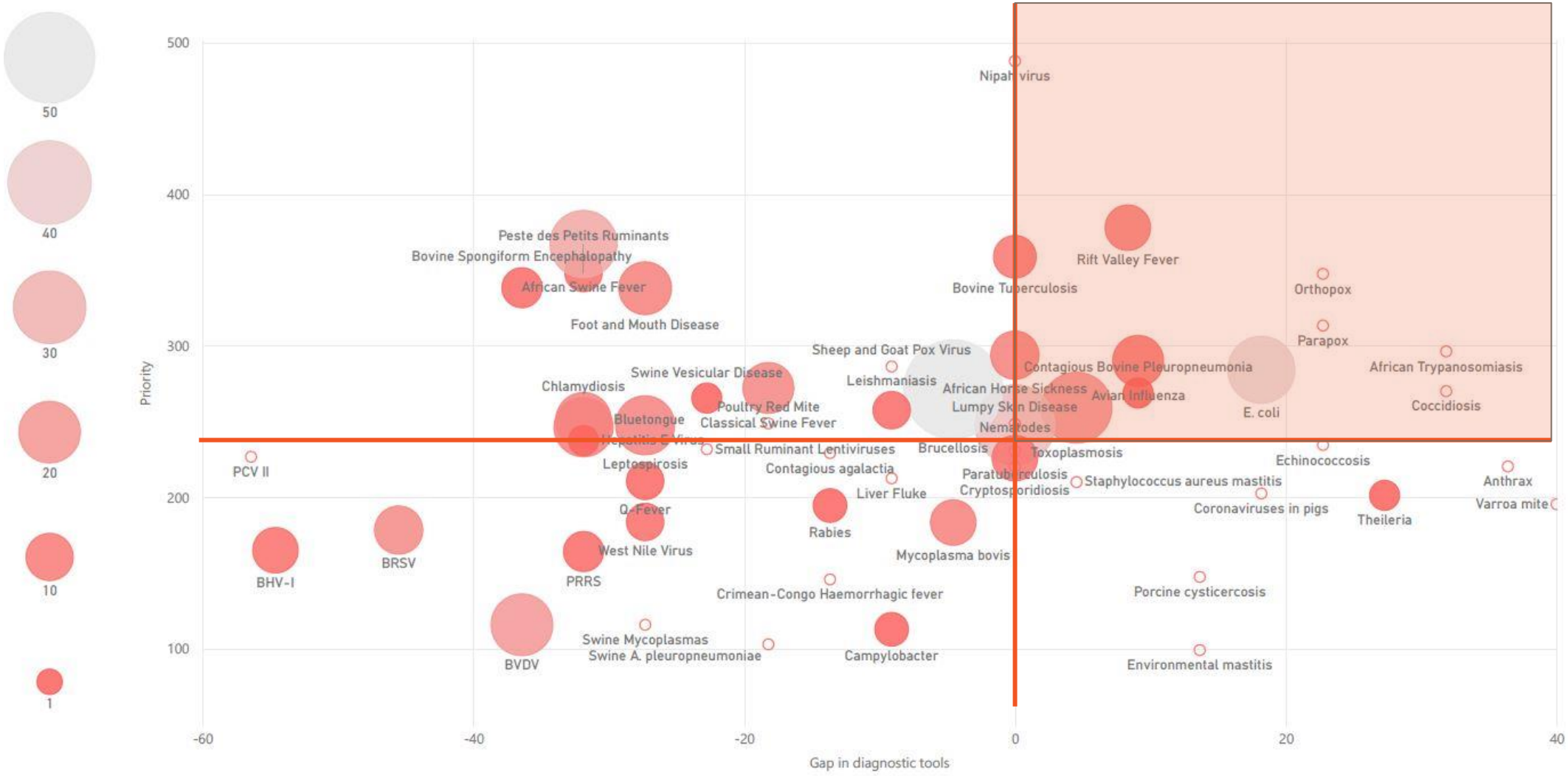
Count of diagnostics by priority and gap score diagnostics



Credits: Natalia Ciria, Universitat Autònoma de Barçelona

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Conclusion

- Database containing information on 56 diseases (and growing) with multiple uses
  - Research policy officers, researchers, industry, students, …
- Regular synthesis outputs
- Supported by 400+ community of experts and stakeholders
- Support to different players in animal health (Europe and globally).
- 9 new veterinary medicines of which 1 new active substance since 2020 (EMA, 2020-2022)

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Funders

Country	Funder of DISCONTOOLS
Austria	FFI Büro für Forschungsförderung und Innovation
Italy	Ministero della Salute
Belgium	FPS Health, Food Chain Safety and Environment
The Netherlands	Ministry of Agriculture, Nature and Food Quality
Spain	National Institute for the Agricultural and Food Research and Technology (INIA)
Switzerland	Federal Department of Home Affairs, Federal Food Safety and Veterinary Office, Division of Innovation
UK	Department for the Environment, Food and Rural Affairs (DEFRA)
UK	Biotechnology and Biological Sciences Research Council (UKRI-BBSRC)

Hosted and secretariat support from AnimalhealthEurope

Thank you - Register for updates!

Schweizerische Eidgenossenschaft
Confédération suisse
Confederazione Svizzera
Confederaziun svizra

Federal Department of Home Affairs FDHA
Federal Food Safety and
Veterinary Office FSVO

VISIT:
www.discontools.eu

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Further reading

- O'Brien et al., 2017. DISCONTOOLS: a database to identify research gaps on vaccines, pharmaceuticals and diagnostics for the control of infectious diseases of animals. *BMC Veterinary Research* 13:1
- DISCONTOOLS Supplement: Current research gaps for advancing control of infectious diseases in production animals. *Transboundary and Emerging Diseases* 65, S1
- Charlier et al., 2022. Disease control tools to secure animal and public health in a densely populated world. *Lancet Planetary Health* 6, e812-e824