African swine fever
Activities and Future Program of FAO

Daniel Beltran-Alcrudo, Animal Health Officer
FAO Regional Office for Europe and Central Asia, Hungary

Inception workshop of the project
"African Swine Fever emergency preparedness in the Balkans"

Belgrade, Serbia, 18-21 February 2019

1908 International Institute of Agriculture (Rome)

1945 FAO established (Canada)

1951 FAO moves to Rome (IIA)

193 Member Countries (and EU)

FAO's vision
A world free from hunger and malnutrition

Achieving food security for all is at the heart of FAO's efforts – to make sure people have regular access to enough high-quality food to lead active, healthy lives.

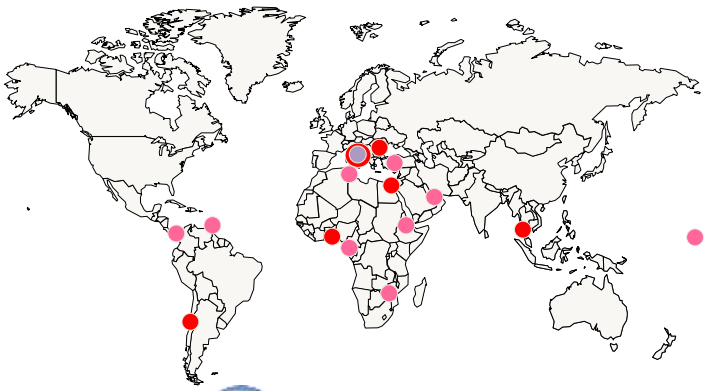
Our mandate is to improve nutrition, increase agricultural productivity, raise the standard of living in rural populations and contribute to global economic growth.

Larger Frameworks

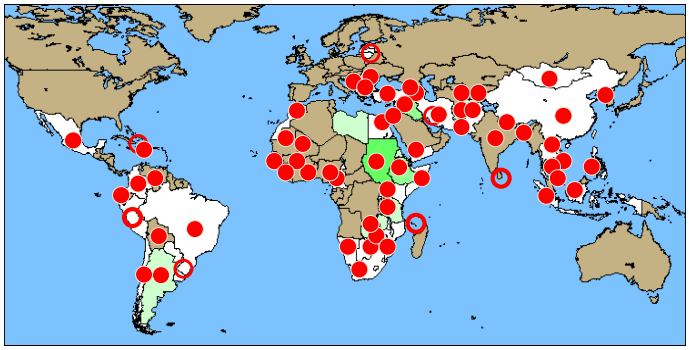
1. **Eliminate hunger, food insecurity, malnutrition**
2. **Make agriculture more productive and sustainable**
3. **Reduce rural poverty**
4. **Enable inclusive and efficient agricultural and food systems**
5. **Resilience to disasters**

UN
Sustainable Development Goals
2030

HQ and Regional Offices

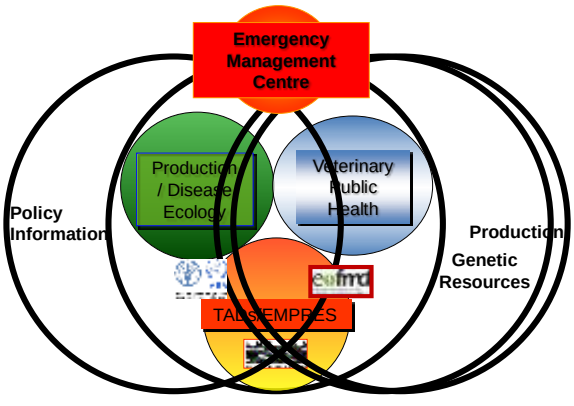


sub-Regional Offices



FAO Animal Health Network

Animal Production and Health at FAO



FAO Reference Centers

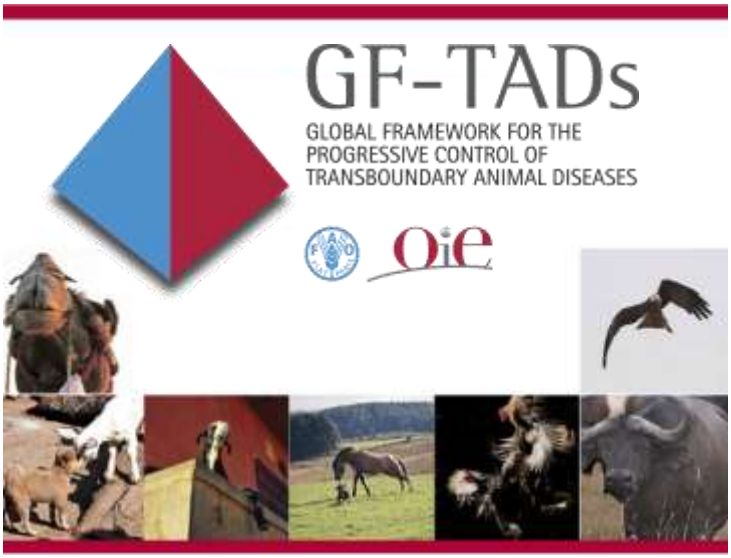
Overall collaborative framework

Global leader for food and agriculture	Global leader for animal health and welfare standards	Global leader for human health

Tripartite agreement
Collaborations
Joint priorities since 2010, including AMR, Rabies and Zoonotic Influenza

FAO-OIE-WHO
Global Early Warning System (GLEWS)

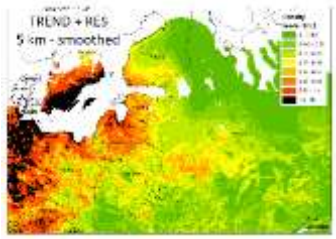
10



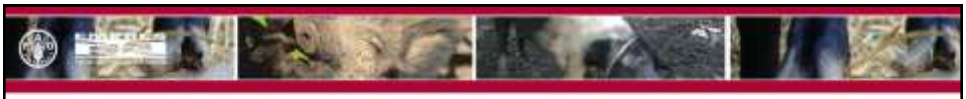
FAO Vision for the control of TADs

12

- Close monitoring (EMPRES-i)
- Regional Approach - Regional response plan
- Risk assessment for at risk countries
- Information sharing: lessons learnt and best practices
- Foster cooperation of all stakeholders: farmers, traders, processors, veterinarians, etc.
- Raising awareness
- Harmonization of vaccination protocols and other preventive and control measures
- Piloting new approaches for risk mitigation and outbreak control



Acivities on African swine fever



	TCP/ARM/3102 (NTE: 2009-12-31 00:00:00, LTU: AGAH) - Emergency Assistance for the Control of ASF	$ 436,865
	TCP/ARM/3205 (NTE: 2010-11-30 00:00:00, LTU: AGAH) - Emergency Assistance for the Control of ASF - Phase II of TCP/ARM/3102	$ 60,689
	TCP/AZE/3201 BABY01 (NTE: 2010-12-31 00:00:00, LTU: AGAH) - Assessment of ASF situation	$ 8,244
	TCP/BRA/0105 (NTE: 1981-06-15 00:00:00, LTU: n.a.) - Assistance for the Eradication of ASF	$ 29,000
	TCP/BRA/8801 (NTE: 1979-08-31 00:00:00, LTU: n.a.) - Support to the Eradication of ASF	$ 135,000
	TCP/BYE/3401 (NTE: 2015-12-31 00:00:00, LTU: AGAH) - Emergency assistance to control the ASF outbreak in Belarus	$ 420,000
	TCP/CPR/3501 (NTE: 2015-12-31 00:00:00, LTU: AGAH) - Developing Prevention and Control Strategies for ASF in China	$ 380,000
	TCP/DOM/8802 (NTE: 1979-08-31 00:00:00, LTU: n.a.) - ASF	$ 137,500
	TCP/GAM/0065 (NTE: 2002-07-31 00:00:00, LTU: AGAH) - Emergency Eradication of ASF and Enhanc. of Logistical and Technical Capacities-Dept. of Livestock Serv.	$ 13,394
	TCP/GAM/9065 (NTE: 2001-05-31 00:00:00, LTU: AGAH) - Emergency Eradication of ASF and Enhanc. of Logistical and Technical Capacities-Dept. of Livestock Serv. (recoded from TCP/GAM/0065)	$ 200,547
	TCP/GEO/3103 (NTE: 2009-12-31 00:00:00, LTU: AGAH) - Emergency Assistance for the Control of ASF	$ 404,884
	TCP/GEO/3202 (NTE: 2011-12-31 00:00:00, LTU: AGAH) - Emergency assistance for the control of ASF - Phase II of TCP/GEO/3103	$ 89,220
	TCP/GHA/8925 (NTE: 2001-08-01 00:00:00, LTU: AGAH) - Emergency Assistance to Eradicate ASF from Ghana	$ 265,284
	TCP/KEN/6612 (NTE: 1998-05-01 00:00:00, LTU: AGA) - Strengthening the Laboratory Diagnosis of ASF	$ 160,000
	TCP/MAT/8801 (NTE: 1978-12-31 00:00:00, LTU: AGA) - Emergency Assistance to Control ASF	$ 80,000
	TCP/MOZ/3102 (NTE: 2008-10-31 00:00:00, LTU: AGAH) - Assistance to control ASF	$ 256,000
	TCP/MOZ/4553 (NTE: 1997-09-01 00:00:00, LTU: DDFA) - Control of ASF	$ 212,500
	TCP/RAF/3503 (NTE: 2016-01-31 00:00:00, LTU: RAF) - Finalization of the Regional Strategy and development of a Regional Control Program for ASF in Africa	$ 112,000
	TCP/RAF/7822 (NTE: 1999-09-01 00:00:00, LTU: AGA) - Enhancing Prevention Capacities for Emergency Intervention Against ASF in W. Africa	$ 388,690
	TCP/THA/4406 (NTE: 1985-09-01 00:00:00, LTU: AGA) - Training in Laboratory Diagnosis of ASF	$ 29,010
	TCP/UGA/2906 (NTE: 2005-02-28 00:00:00, LTU: AGAH) - Emergency Assistance to Control ASF Outbreak	$ 343,073
	TCP/UKR/3402 (NTE: 2015-10-30 00:00:00, LTU: AGA) - Capacity development in early detection and response to ASF in Ukraine	$ 258,000
TF		
	OSRO/GLO/201/USA (NTE: 2014-03-31 00:00:00, LTU: AGAHD) - Control of Transboundary Animal Diseases in Africa and a Global Alliance to Combat ASF	$ 308,949
	OSRO/GLO/XXX/USA (NTE: -, LTU: AGAHD) - FAO-USDA collaboration in ASF control and prevention ? Phase I: The creation of a global alliance, starting in Eastern Europe	$ 421,000
TF/GCP		
	GCP /GLO/405/EC (NTE: 2015-09-30 00:00:00, LTU: AGAH) - ASFORCE Targeted research effort on ASF	$ 109,522
	GCP /RLA/071/ITA (NTE: 1995-03-01 00:00:00, LTU: AGAH) - Prevention of ASF and Other Diseases	$ 4,752,762
TF/UTF		
	UTF /MAT/006/MAT (NTE: 1996-08-31 00:00:00, LTU: AGAH) - Eradication of ASF and Restocking Pig Farms	$ 772,460

Regional coordination

The ASF Global Platform - Launching

- 5-7 November 2013, Rome
- 51 participants:
  - By Region: Africa (9), America (9), Asia (3), and Europe (29)
  - By type of organization:
    - 7 **Industry:** Pig Multinationals, Pharmaceuticals, Farmer and Vet Associations;
    - 16 **International**: FAO, OIE, AU-IBAR, EC;
    - 11 **National authorities**: Belarus, China, Italy, Japan, Uganda, Cameroun, Russia, US
    - 15 **Research:** OIE/FAO and EU Ref Labs (CISA, FADDL, Pirbright and UCM) , ILRI, VNIIVViM, SVA, IZSUM, IREC, FLI, FAZD, MSU, CIRAD, University of Pretoria
    - 1 **NGO**
- http://www.fao.org/docrep/019/i3739e/i3739e.pdf

GARA - Global ASF Research Alliance

- Launched April 2013
- **Mission:** *To establish and sustain global research partnerships that will generate scientific knowledge and tools to contribute to the successful prevention, control and where feasible, eradication of ASF*
- Technical groups: Virology/Immunology, Vaccines, Diagnosis, Epidemiology
- Open membership
- 3 meetings so far:
  - March 2013, Plum Island, USA
  - November 2014, Pretoria, RSA
  - September 2016, Ploufragan, France
  - April 2018, Cagliari, Italy
- Updates and gap analysis (2018)
- http://www.ars.usda.gov/GARA/

GARA
Global African Swine Fever
Research Alliance

Ad hoc meetings

- 3-4 Feb 2011, EU-FMD & GFTADs, Budapest, Hungary: ***1st Veterinary Forum for South East Europe***
- 21-23 Mar 2011, Kyiv, Ukraine: ***Cross-border cooperation between veterinary services (Russian Federation and Ukraine) for ASF control and prevention***
- 4-5 Dec 2012, Budapest, Hungary: ***Threat of ASF spread in Eastern Europe: Urgent need for international collaboration*** under GF-TADs Europe

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- 5-7 September 2018, Bangkok, Thailand: ***Emergency Regional Consultative Meeting on African Swine Fever risk reduction and preparedness African***
- 22-23 November 2018, Beijing, China: ***Swine Fever Emergency Preparedness Workshop China, Laos, Myanmar and Viet Nam***

Standing Group of Experts on ASF in the Baltic and Eastern Europe Region (SGE ASF)

- http://web.oie.int/RR-Europe/eng/Regprog/en_GF_TADS%20-%20Standing%20Group%20ASF.htm
- Set up under the GF-TADs to build up a closer cooperation
- Comprises decision makers, experts, EC, OIE and FAO
- Main objective is to strengthen mid-term regional cooperation through:
  - Regular exchange of information on ASF situation and control measures
  - Regular review of national control strategies by experts with a view to harmonizing control policies and building a regional control strategy
  - Collaboration on laboratory diagnostics
  - Collaboration on awareness raising campaigns in the affected countries
- Meet every few months (depending on the situation):

GF-TADs

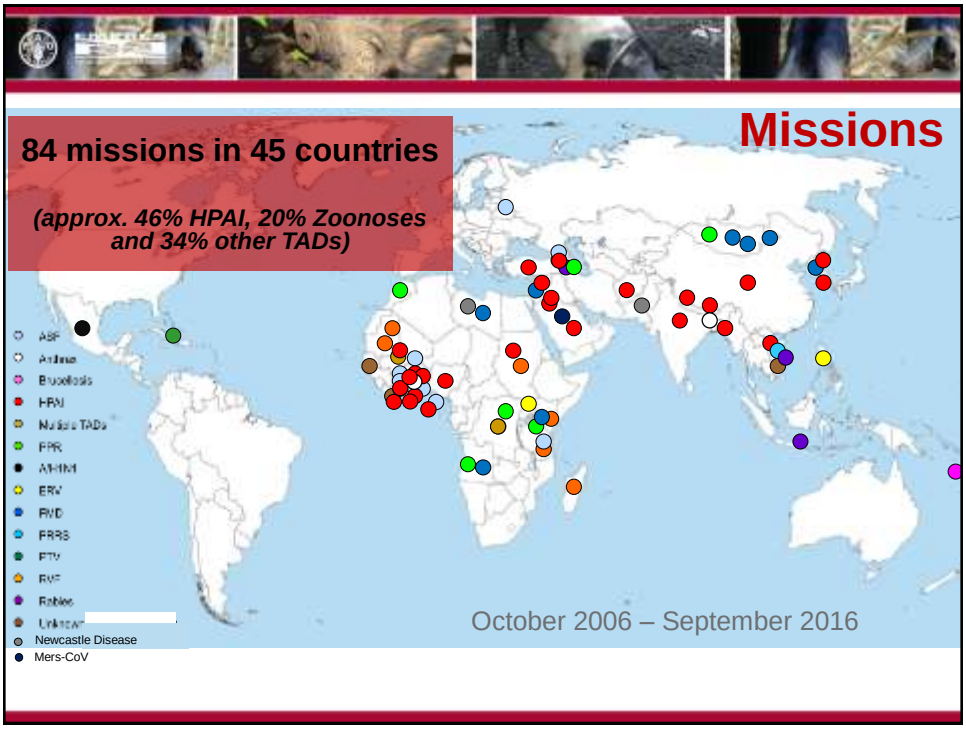
Rapid response missions – Emergency Management Center for Animal Health

Provide **Rapid response** to transboundary animal diseases (TADs) and emerging animal disease (EIDs) threats

When EMC deploys

- Newly infected country
- Country at high risk of infection
- Country affected by significant epidemiologic change

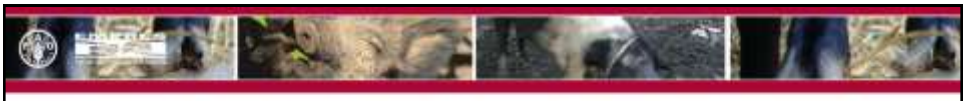
➢ Upon government request



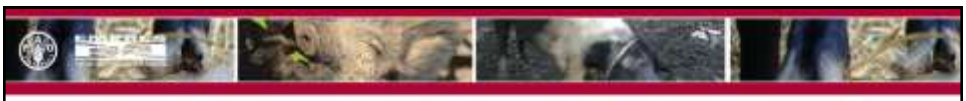
FAO Rapid Assessment missions on ASF

- **EMC rapid missions**
  - Joint FAO/OIE/EC to Georgia (June 2007)
  - Joint FAO/OIE/EC to Armenia (September 2007)
  - FAO/OIE to Belarus (May 2010)
  - FAO/OIE to Tanzania (November 2011)
  - FAO to Côte d'Ivoire (October 2014)
  - FAO to Mongolia (February 2019)
  - FAO to Myanmar (February 2019)

- **Non-EMC assessment missions**
  - EMPRES assessment mission to Ukraine (July 2010)
  - DPRK (January 2019)



Development projects



Current state FAO response

ASF Projects Africa:

- Regional project West Africa (donor- Ireland 300,000 USD)
- TCP Ivory Coast (300,000 USD)

ASF projects Europe:

- Regional TCP project Western Balkans (500,000 USD)
- TCI FAO/EBRD Ukraine (till May 2019)

ASF projects for South East Asia:

- Regional project South East Asia (500,000 USD)

Finalized Projects: TCPs: Georgia, Armenia, China, Ukraine, Belarus, Moldova (TCPf)

EBRD/FAO project *ASF: Risk Awareness Raising and Risk Mitigation in Ukraine – phase 1&2 (2015-2017)*

- Improving (national & sub-national) contingency plans & Simex
- Strengthening lab diagnostic capacity
- Improving knowledge/awareness of local vets
- Raising ASF awareness of farmers
- Training for mass media experts
- Enhancing ASF surveillance capacity locally
- Strengthening private sector resilience to ASF-related risks

Capacity building

Past ad-hoc capacity building efforts

- **Epidemiology Trainings:** Ukraine: (May 2009; > 50 participants); and Belarus (May 2009; > 20 participants)
- **Lab Trainings:** Ukraine (March 2010; 16 diagnosticians from Belarus, Moldova and Ukraine); and Kazakhstan (with CISA-INIA; Sept 2013; 10 participants)
- **Collection & identification of *Ornithodoros* ticks:** Georgia, June 2013 (with CIRAD): 10 participants from Georgia (2), Armenia (1), Kazakhstan (1), Russia (2), Bulgaria (2), and Ukraine (1)
- **Epi & Diagnosis:** Italy, Nov 2013 (with IZS-UM): 9 participants from Georgia (1), Armenia (2), Belarus (2), Russia (1), Moldova (1), Ukraine (2) and Serbia (1)
- **Contribute to EC's BTSF GF-TADS workshops**

Training on ASF management in wild boar

- http://www.fao.org/europe/events/detail-events/en/c/1051367
- Kaunas, Vilnius, 22-23 Nov 2017
- Participants: Belarus, Moldova, Ukraine, Bulgaria, Estonia, Germany, Hungary, Latvia and Lithuania, FAO, OIE, DG SANTE, and FACE
- Day 1 - Technical presentations
- Day 2 - Field day at a hunting ground.

Dissemination, awareness & early warning

Early warnings and assessments:

- 2007 - ASF in Georgia
- 2008 - ASF in the Caucasus
- 2009 - ASF spread in the Russian Federation and the risk for the region
- 2010 - FAO takes a close look at the threat of ASF introduction into Eastern Europe
- 2012 - ASF recent developments - timely updates
- 2013 - ASF in the Russian Federation: risk factors for Europe and beyond
- 2018 - African Swine Fever threatens People's Republic of China

EMPRES-i

FAO's Animal Health Database

Early warnings & awareness raising

1. Weekly updates on the ASF situation in Asia
2. AGAH/EMPRES web-site – ASF Portal
3. Alerts on ASF, e.g. Chinese New Year
4. Email distribution list (ASF & LSD) daniel.beltran.alcrudo@fao.org
5. Other:
    1. ASF Portal - 29th issue of the quarterly Food Chain Crisis Early Warning Bulletin
    2. Early Warning Early Action report on food security and agriculture

Awareness materials

- http://www.fao.org/index.php?id=94206
- Fully editable format (PowerPoint) that allows to quickly adapt, translate, add logos, change pictures, etc. when faced with an animal health emergency.
- Dynamic list of languages
- Additional languages and formats (e.g. posters and videos) will be uploaded as they become available.

What is African Swine Fever (ASF)?

African swine fever (ASF) is a contagious viral disease of pigs and wild boar that causes severe economic losses to the pig sector. Originally restricted to Africa, it was introduced into Georgia in 2007, from where it spread westwards (reaching Eastern and Central Europe) and eastwards within Europe. The disease has now been reported in China, seriously threatening countries in East and Southeast Asia.

Which animals can be affected?

The ASF virus exclusively infects suids, e.g. pigs and wild boar.

Can humans be infected with the virus?

No.

What causes ASF?

The disease is caused by a virus that is very resistant and can survive for long periods, even months, in feces, meat products (frozen, salted and smoked or undercooked), and carcasses of dead animals. The virus, however, can be killed with several disinfectants such as 1% formaldehyde, 2% NaOH or paraphenylphenolic disinfectants.

How is the disease transmitted?

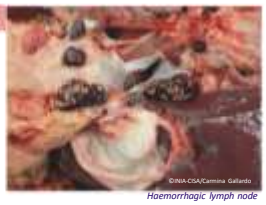
Wild boar and pigs can infect each other by direct contact, particularly when blood is present.
Healthy animals can also get infected when they consume undercooked pork products, either while scavenging or when fed uncooked swill. They can also become infected by feeding on infected pork or carcasses, or through contaminated tools and equipment (clothes, needles, vehicles, etc.).

What are the clinical signs of the disease?

Infection can cause a wide range of clinical signs. Sick pigs usually die.
In the backyard sector, pigs show a lack of appetite followed by sudden death. Rarely other clinical signs are observed.
In commercial farms, you may also see depression, weight loss, hemorrhages in the skin (tips of ears, tail, legs, chest and abdomen), lameness and abortion in pregnant sows.
Clinical signs may be more difficult to see in wild boar because of their long dark hair.

Bloody diarrhoea and distinct hyperaemic (red) areas on skin of neck, chest and extremities

Cyanosis (bluing) at the tips of ears



Haemorrhagic lymph node

Enlarged spleen

Manuals

- **Good practices for biosecurity in the pig sector** (EN, FR, SP, RU)
  http://www.fao.org/docrep/012/i1435e/i1435e00.pdf
- **Preparation of ASF contingency plans** (EN, FR, SP, RU, GEO, ARM)
  ftp://ftp.fao.org/docrep/fao/012/i1196e/i1196e00.pdf
- **Recognizing ASF - A Field manual** (EN, RU, CH, SR, LT) – *Albanian and Macedonian*
  http://www.fao.org/documents/card/en/c/bd35c569-752e-4b57-892e-e3e2e0ee0c9c/

Handbook on African Swine Fever in wild boar and biosecurity during hunting

- Technical, but practical
- Compendium of information about hunting management, biosecurity and wild boar carcass disposal
- Briefly describes range of practical management and biosecurity measures or interventions.
- Living document,
- Link

Research

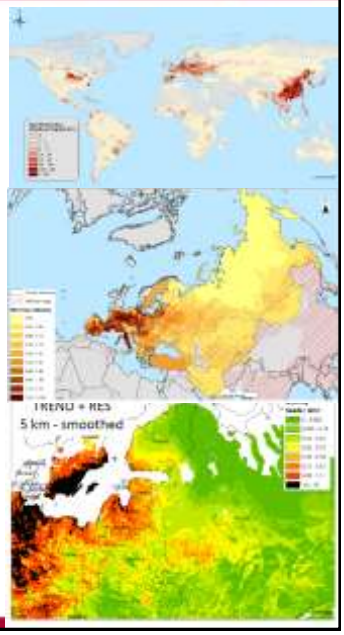
Host population mapping/modelling

Wild boar

- Wild boar distribution range and densities
- Model now available for the whole of Europe and North Eurasia (5 km resolution)

Domestic pigs

- Low and high biosecurity sectors



ASFORCE
TARGETED RESEARCH EFFORT ON AFRICAN SWINE FEVER

- Pittiglio C, Khomenko S, Beltrán-Alcrudo D. 2018. Wild boar mapping using population-density statistics: from polygons to high resolution raster maps. PloS one. 2018 May 16;13(5):e0193295.

- Disaggregate and map wild boar population-density statistics to produce high resolution maps
- From spatially heterogeneous administrative units (polygons) to high resolution raster maps (5 km)

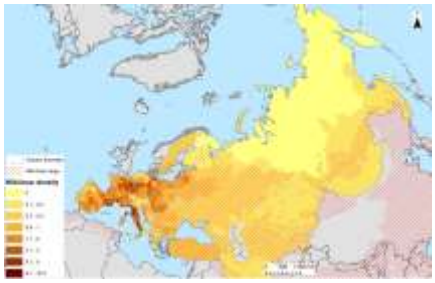
Materials: WB data and predictors

- **WB data**: average density for suitable area by admin unit

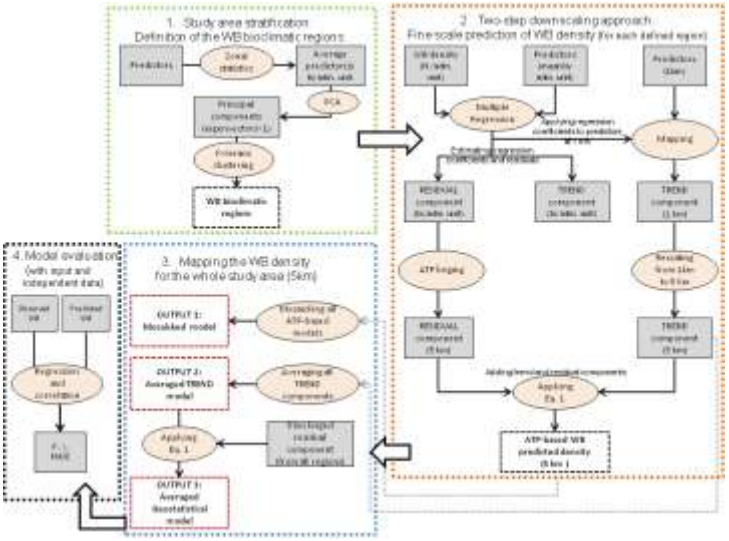
  WB counts/harvest data (n = 504 sub units)
  Timeframe: 2005-2010
  IUCN WB range to mask out unsuitable areas

- **Predictors**: Average bioclimatic and environmental variables for suitable habitat by admin unit

  18 bioclimatic variables (Worldclim)
  3 continuous vegetation cover
  topography (elevation and slope)

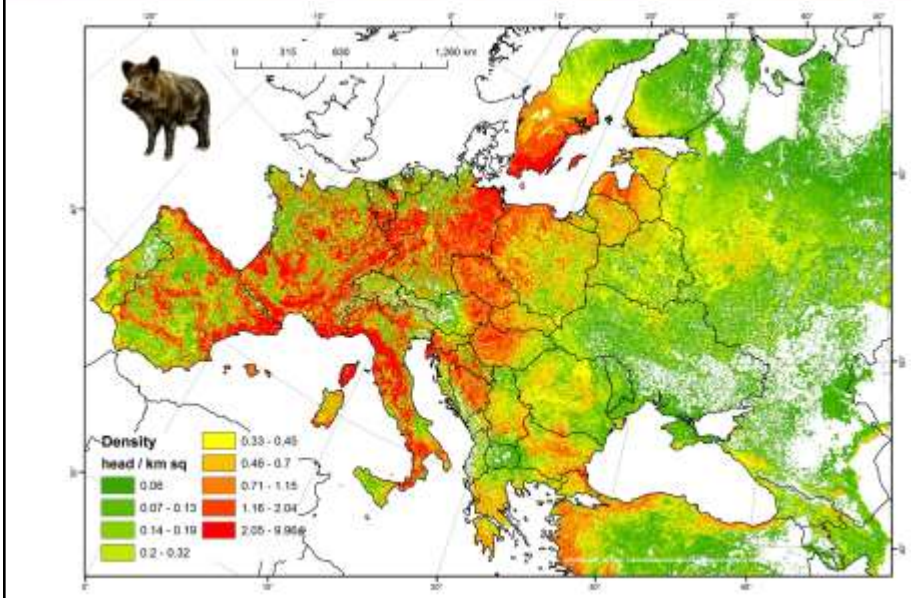


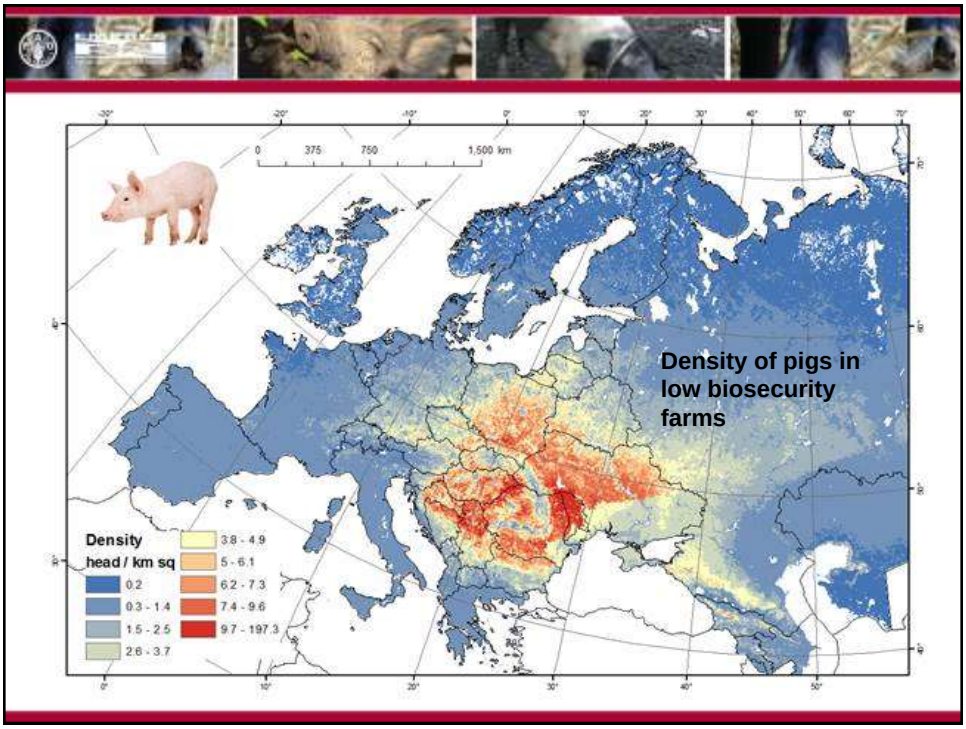
Methods: flowchart of the novel approach

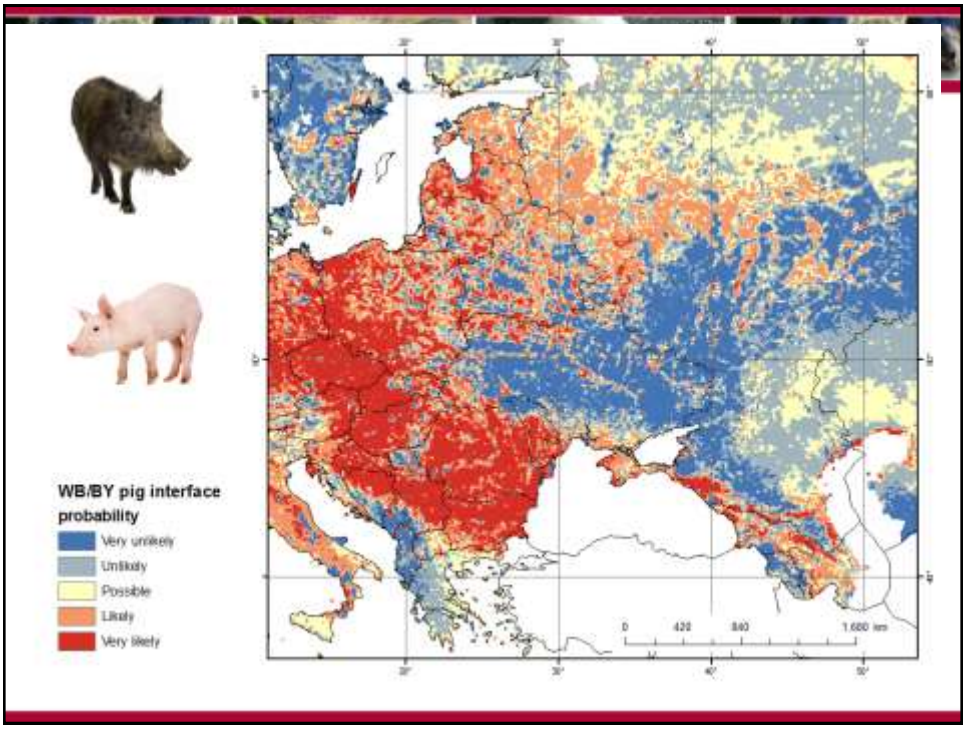


Conclusions

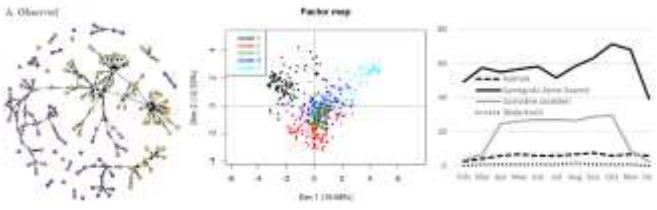
- Highly accurate wild boar predicted densities, both against original input data and independent data (Melis et *al*. 2006)
- The map can be a useful tool for decision makers, dealing with risk assessment, WB management, epi, surveillance, prevention and control

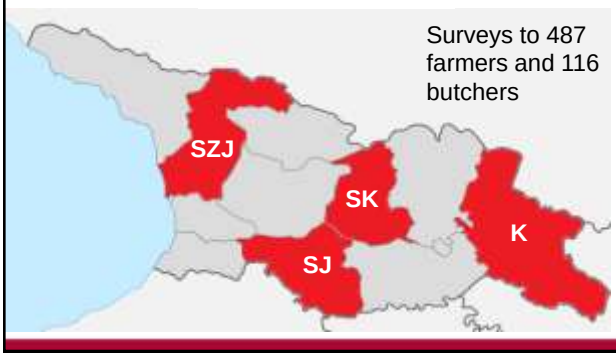



0 375 750 1,500 km
Density of pigs in low biosecurity farms
Density
head / km sq
0.2
0.3 - 1.4
1.5 - 2.5
2.6 - 3.7
3.8 - 4.9
5 - 6.1
6.2 - 7.3
7.4 - 9.6
9.7 - 197.3


WB/BY pig interface probability
Very unlikely
Unlikely
Possible
Likely
Very likely
0 420 840 1,680 km

Pig sector studies





Surveys to 487 farmers and 116 butchers

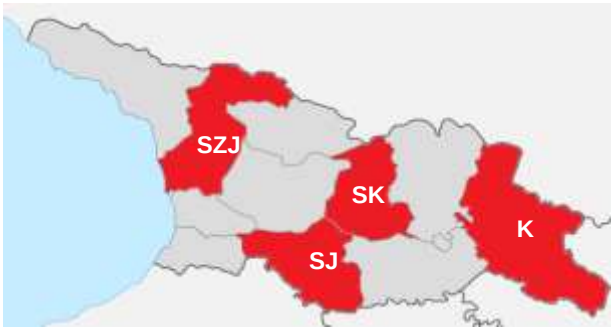
The Pig Sector

- Highly variable
- Highly seasonal
- Almost 100% backyard (non-professional)
- Predominant home-slaughtering
- Many unknowns

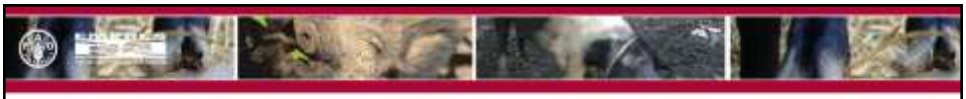
- Beltrán-Alcrudo D *et al.* 2018. Descriptive and multivariate analysis of the pig sector in Georgia and its implications for disease transmission. PLoS ONE 13(8): e0202800.
- Kukielka EA, Martínez-López B, Beltrán-Alcrudo D. 2017. Modeling the live-pig trade network in Georgia: Implications for disease prevention and control. PLoS One 12(6): e0178904

- Questionnaires for both farmers and butchers
- Contents: biosecurity, husbandry, market chains, awareness, socioeconomic aspects, wild boar

Region	Villages	Farmers	Butchers
Kakheti	42	120	30
Samegrelo Zemo-Svaneti	47	122	31
Samtskhe Javakheti	37	125	25
Shida Kartli	43	120	30
Grand Total	**168**	**487**	**116**

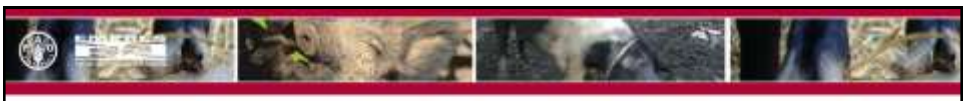


Response rate:
- pig keepers - 30/41 questions had a response rate over 95%
- butchers - 22/24 questions had a response rate over 95%



Data analysis

- **Descriptive statistics**
- **Two factorial analyses of mixed data (FAMD)** - to study the relationship among collected variables
- **Hierarchical clustering on principal components (HCPC)** - to identify clusters of individuals
- **Social network analysis** and **exponential random graph models** - to understand structure, contact patterns and main drivers for pig trade in the country



Main findings

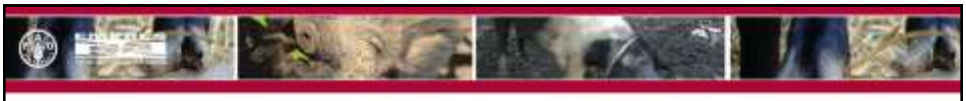
- Five major production/husbandry strategies (which match the four study regions)
- Main characteristics:
  - Secondary income
  - High within-country variability and seasonality
  - Not professional
- Main biosecurity gaps at farm level:
  - Scavenging, i.e. Highest scavenging → Highest # of outbreaks
  - Swill feeding
  - Reproductive management
  - No apparent major connection to wild boar
- Key social network knots identified: Live animal markets and middlemen

Conclusions - Recommendations

- Need to better educate and raise awareness of disease transmission and outbreak management policy
- Main biosecurity gaps can be targeted through training, awareness and sector development programs
- Live animal markets and middlemen can be targeted for disease interventions, e.g. surveillance, awareness, training and financial compensation)
- However, these systems are difficult to change, since they go deep into the traditions and roots of the communities and allow the production of pigs with minimum investments

IAEA Coordinated Research Project (CRP) for Early and Rapid Diagnosis and Control of ASF

- 2014-2019 (1st Meeting on 7-11 July 2014, Vienna, Austria)
- Participating countries:
  - Burkina Faso, Cameroon, China, Côte d'Ivoire, Germany, Nigeria, Russian Federation, Senegal, Uganda, Zambia
- Topics covered:
  - Serology
  - Molecular diagnostics
  - Epidemiology and sequencing
  - Immunization and Immunology



FAO, EU and OIE Reference laboratories/ centres in ASF

- **ARC-OVI** (Agricultural Research Council, Onderstepoort Veterinary Institute), South Africa
  - **FAO** and **OIE**
- **CISA-INIA** (Centro de Investigación en Sanidad Animal - Istituto national de investigación y tecnologia agraria y alimentaria), Spain
  - **FAO** and **EU**
- **Pirbright Institute**, UK
  - **OIE**
- **UCM** (Universidad Complutense de Madrid), Spain
  - **OIE**

Thanks for your attention