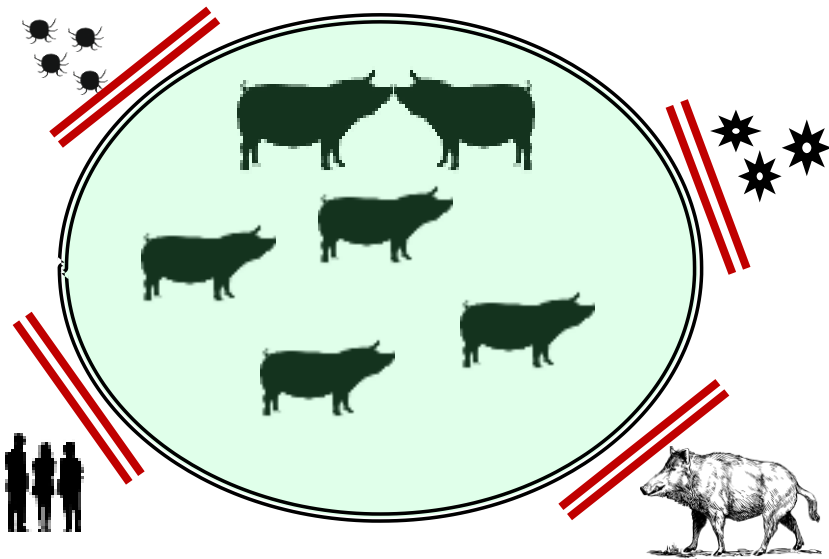


Biosecurity:

A great tool to enhance farm health status



Measures to reduce the risk of disease agents being introduced

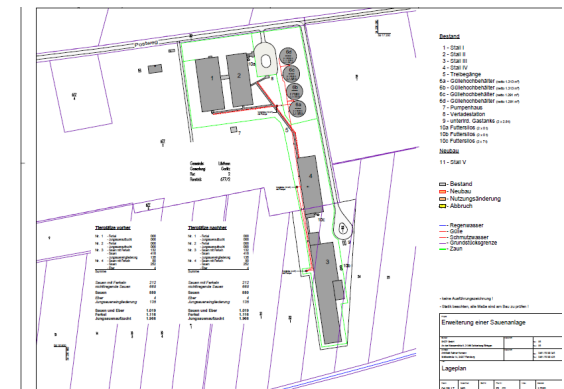
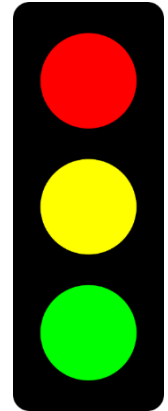


- **Segregation** = barriers that prevent entry of pathogens
- **Cleaning** = reduction of contaminations
- **Disinfection** (will be covered in a separate talk)

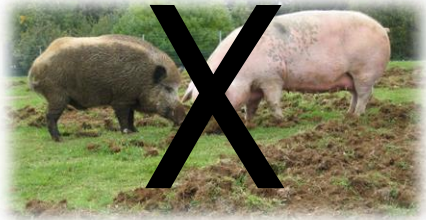
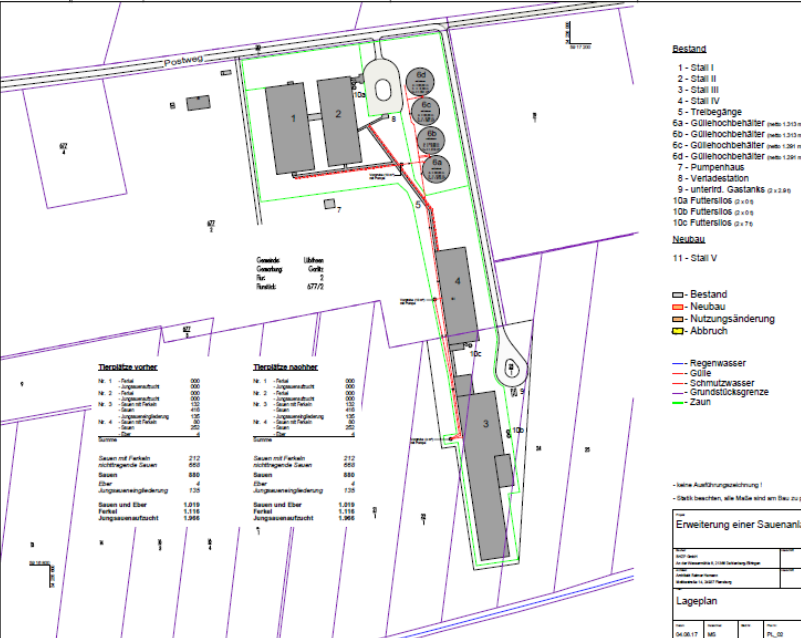
Segregation

- controlling the entry of pigs
- quarantine
- limiting sources of stocks
- proper fencing of the holding and, if possible, critical units
- controlling access for people and vehicles
- provide footwear and clothing
- shower into the herd
- black and white principle: avoid crossing ways
- pest control
- management of pig production: distance between holdings
- all-in-all-out
- workers are not allowed to keep pigs at home
- no food enters the premise (canteen provided)

→ investment capacity
→ cultural acceptability...



First line of defence: Fencing



Biosecurity is not only on paper... only living it makes the difference!

Movement of personnel and visitors:

- strict limitation of access rights
- no contact with pig farms, slaughterhouses and wild boars (applies to personnel, craftsmen etc.)
- the quarantine period is 48 hours
- a visitor's book must be kept as proof of this

Name	Adresse	Besuchstermin u. Uhr	Unterschrift
10.11.14	Herrn	10.11.14 10:00 Uhr	[Signature]
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Black-and-white principle for personnel and tools

- compulsory showering (in well-kept facilities!!!)
- complete change of clothes (provision of farm-owned footwear, overalls, and towels)
- no food, cigarettes, mobiles etc to be brought into the stables
- disinfection of tools that enter the stable (construction, repair)



Movement of animals



- Transport only from the plant!
- Remounting only from the same herd
- Delivery of semen for AI exclusively from strictly monitored boar stations
- Transport of animals from the farm (breeding and slaughter animals) only if truck can show appropriate fallow period and CD (logbook)
- separate loading ramps for breeding and slaughter animals

Controlled, high-tech vehicles

FRIEDRICH-LOEFFLER-INSTITUT

FLI

Bundesforschungsinstitut für Tiergesundheit
Federal Research Institute for Animal Health



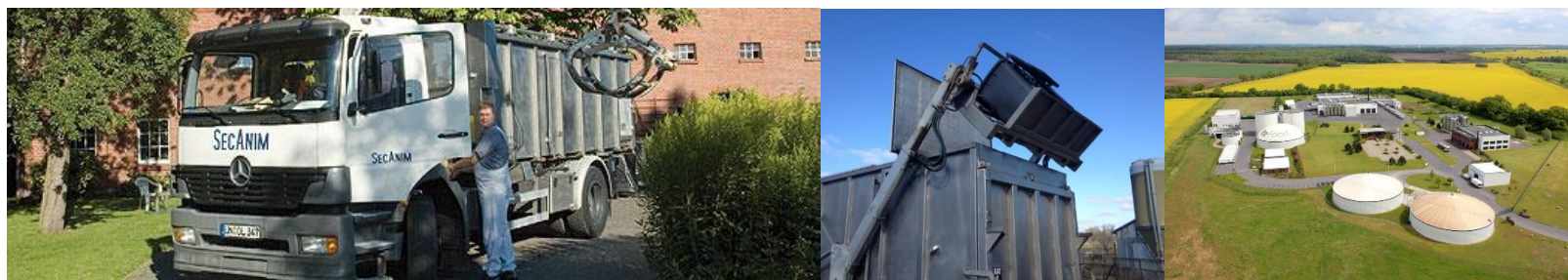
Supply of feed



- Only high quality commercial pig feed
- Only on Mondays or if the lorry had a suitable fallow period
- Position of the connections for feed supply far outside the system
- In this case: no use of straw in the plant

Management of slurry and carcasses

- own vehicles for spreading slurry
- only slurry from the respective farms is spread on the land around the farms
- slurry storage capacities for 9 months
- *optimal: slurry pipeline directly to a biogas plant so that foreign vehicles can stay as far away from the plant as possible*
- carcasses are stored in a designated, lockable room outside the fence
- carcasses are taken there shortly before the end of the working day
- pick-up point far away from the plant, so that the vehicle from the rendering plant does not get into the vicinity of the stable
- the renderer collects and processes these materials in accordance with legal requirements and produces flours and fats that serve e.g. as alternative fuels for power plants or the cement industry



- control of flies, rats, mice and other harmful rodents is in place
- windows and doors are kept closed or fitted with narrow meshed wire mesh (mosquito nets)
- some stables have filtered influx of air

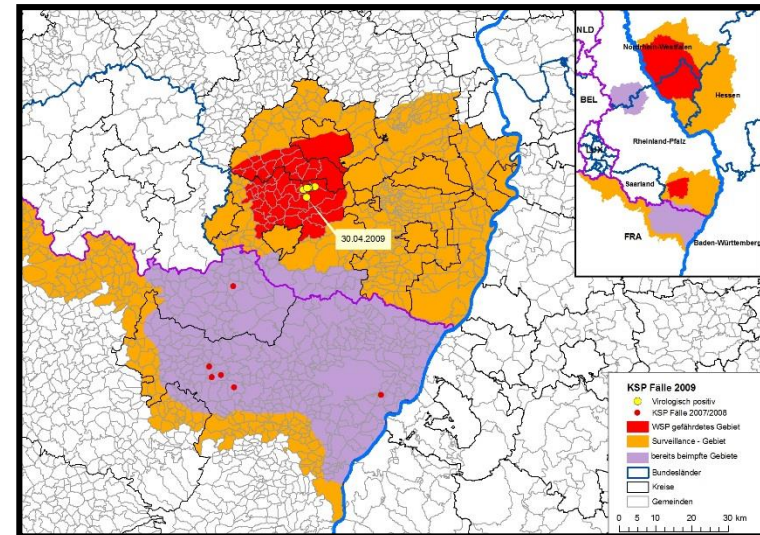
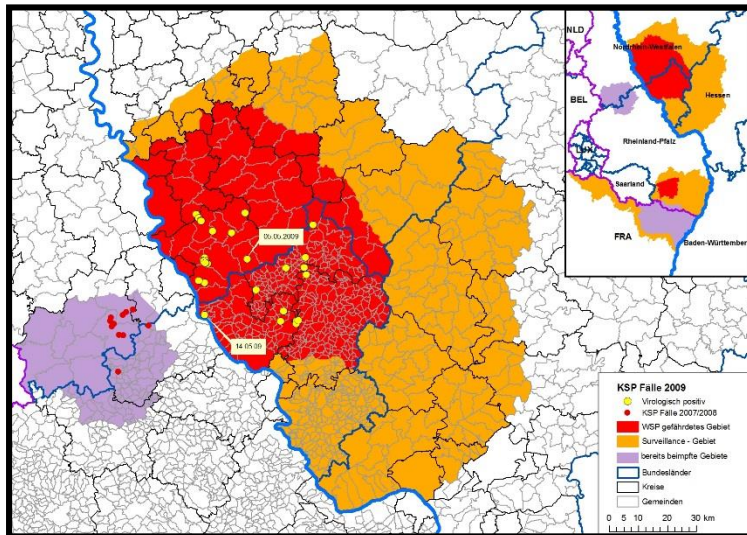


It works!

Fritzemeyer et al., 2000:

The observation that **most of the primary outbreaks in domestic pigs were due to virus transmission from wild boar** shows that these are a permanent threat to domestic pigs.

→ Biosecurity was reinforced based on the German swine husbandry hygiene ordinance



2009: Classical swine fever was detected in wild boar populations of two Federal States (two areas)

Not a single outbreak occurred in domestic pigs!

Production systems



Scavenging pigs



Backyard/small scale confined pig production



Commercial farm/large scale confined production



Commercial outdoor production



Scavenging pigs

Possibilities for scavenging pigs are limited but existing:

- quarantine for new animals at least in a fenced enclosure (epidemiological unit can be the village or area)
- “traveling” boars can be dangerous: their health status is of paramount importance
- marketing of sick pigs is a very high risk and must be discouraged under all circumstances
- untreated swill is one of the highest risks and therefore proper treatment has to be put in place where prohibition is not feasible
- be careful with protein sources such as spray-dried plasma and any blood products
- reporting of disease events should be encouraged
- cleaning of night shelters
- disposal of dead pigs has to be controlled (no dumps)



Backyard/small scale
confined pig production

Options for small scale and backyard farms (on top of what was said for scavenging pigs):

- fence farm units to avoid wildlife contacts
- use nets to avoid contact to birds
- implement access control
- visitor log book
- specific clothing, especially footwear
- clean and disinfect vehicles
- safe pig loading bays
- keep equipment to one unit (or at least clean and disinfect properly)
- control of pests
- age segregation
- regular cleaning and disinfection





Commercial farm/large scale confined production

Large-scale production:

- as described..
- limit access, “clean” personnel (change clothing and footwear)
- farm deliveries are designed to minimize traffic
- feed and equipment deliveries should be managed to start with high-hygiene farms
- contact to pig/wild boar meat and products **MUST** be avoided
- be most careful with blood-based protein sources
- risk assessment for bedding and enrichment materials
- decontamination of vehicles
- no crossing ways, no access of wildlife to any tools or storage
- hygiene routine including quarantine testing



Commercial outdoor production

- Proper fencing
- Avoid contact to wildlife
- Birds should not have access to feed supply
- ... risk assessment

Disinfection in pens and stables

Check for commercial products that are tested for enveloped DNA viruses (e.g. for Herpesvirus, comply with national guidelines)!

When using NaOH or formalin, check national regulations (biocides)

Be aware of problems: protein error, temperature error,...

Cleaning and disinfection have to go hand in hand!

Ensure proper wetting and incubation time!

Special circumstances may need flexibility...





Avoid contact of susceptible wildlife with pig carcasses (no dumps!), pig products (e.g. sausages) and fomites!



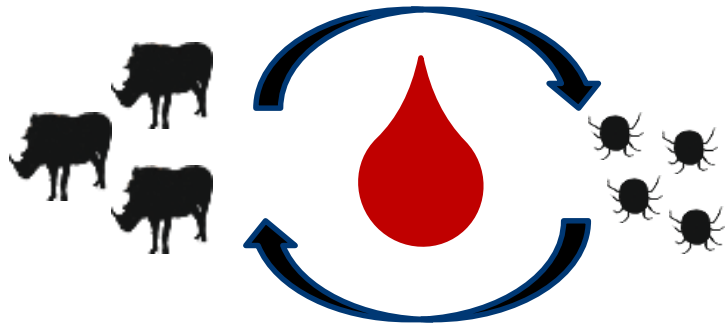
Raise awareness of hunters



Pictures: Edvīns Oļševskis, LV

General ways of transmission	Relevance for African swine fever
Direct pig-to-pig contact	High
Airborne transmission	Works over short distances (studies NL)
Semen (AI)	ASFV was shown in semen
Vehicles and fomites	Depending on contamination, high (exp. blood contamination)
Pig feed	Depending on material, moderate; can be high for blood products
Manure and bedding	Moderate (see stability)
Drinking water	Cannot be excluded (example Romania)
Birds, bats, rodents, stray and domestic animals	No competent vectors but mechanical transmission possible
Arthropods (competent)	Only Ornithodoros ticks
Arthropods (mechanical)	Possible especially within farms, but so far no significant evidence for far distance spread





The virus is „optimized“ for vector transmission, i.e. one drop of blood is sufficient!

Means: any blood product that originates from an infected pig and is not completely inactivated through heat treatment can be the death of an entire population!!!



Direct pig-to-pig contact is a major cause of infection: an infected pig is brought into close physical contact



Humans are THE vectors for long-distance spreads

Contact to manure, contaminated bedding or water may work



Airborne transmission only over very short distances

Mechanical arthropod vectors are discussed...



Swill feeding and feeding of contaminated meat products is rather inefficient but important in its repetition (it only has to work ones!)



Main cause in several regions!

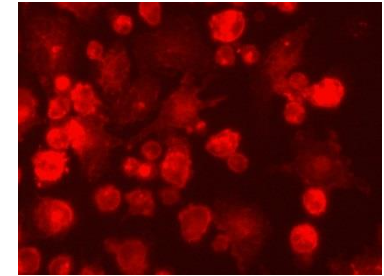
High stability

„Survival“:

- 3 h at 50°C
- up to 10 days in feces
- up to 70 days in blood at room temperature
- up to 15 weeks in cooled meat
- up to 6 months in conserved ham
- up to 18 months in cooled blood
- several years in frozen carcasses

pH stability:

Reliable inactivation at pH <3,9 and >11.5
Proteins, especially in serum are stabilizing:
21 h at pH 13,4



BUT: the virus is enveloped and proper disinfection is not so difficult!

Disinfection:

NaOH, formalin, phenolic agents, citric acid
Commercial products containing e.g. formic acid

Quelle: OIE, FAO, DEFRA, USDA

„Group dynamics“ of ASF



Remember!



- Oral infection is rather inefficient (remember that the virus is optimized for tick transmission)
- In the majority of cases, rather high virus doses are needed for oral infection and not all inoculations result in infection (~10.000 HAU)
- An infected animal dies with high probability, but not all animals in a stable/pen have to be infected
- The virus is found in high amounts in blood of diseased animals, much less in feces and saliva
- Contagiosity can be moderate or even low if no blood shedding occurs!
- Even with close contact, some animals may go uninfected (see pictures above)
- In units with separate pens, the disease may stop after one or some pens
- Transmission after an isolated introduction can be sluggish
- Fulminant courses are seen in breeding farms where abortions and thus blood contact is frequent





What to do with difficult matrices... ??

- We know that heat will do the trick... 30 min at 70°C under all tested conditions...
- What about citric acid? We know it works 2% on wooden surface (see Krug et al., 2012)



Global African Swine Fever
Research Alliance

Thanks for your attention!



<https://youtu.be/eyQ4t1wHl2M>