

SWINE INFLUENZA IN SUB SAHARAN AFRICA – CURRENT KNOWLEDGE AND EMERGING INSIGHTS

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Background

- Swine influenza virus (SIV) is an ‘emerging disease’ in Africa unlike African Swine Fever (ASF)
- Though pigs are widely kept in the region, they often receive less attention in contrast with poultry and ruminants
- Pigs contribute substantially to livestock development, trade and livelihood in the region
- Diseases like SIV- classical or pandemic can jeopardize swine health/production and endanger public health.

Pig husbandry in Africa

- Global pig population is estimated at around 923 million
- 552 million (60%) are found in Asia, 194 million in Europe, 81 million in South and Central America, 72 million in North America
- About 18 million (2%) pigs are ascribed to Africa?
- Nigeria with over 6 million swine accounts for over 30% total pig production in Africa (FAOSTAT, 2002)

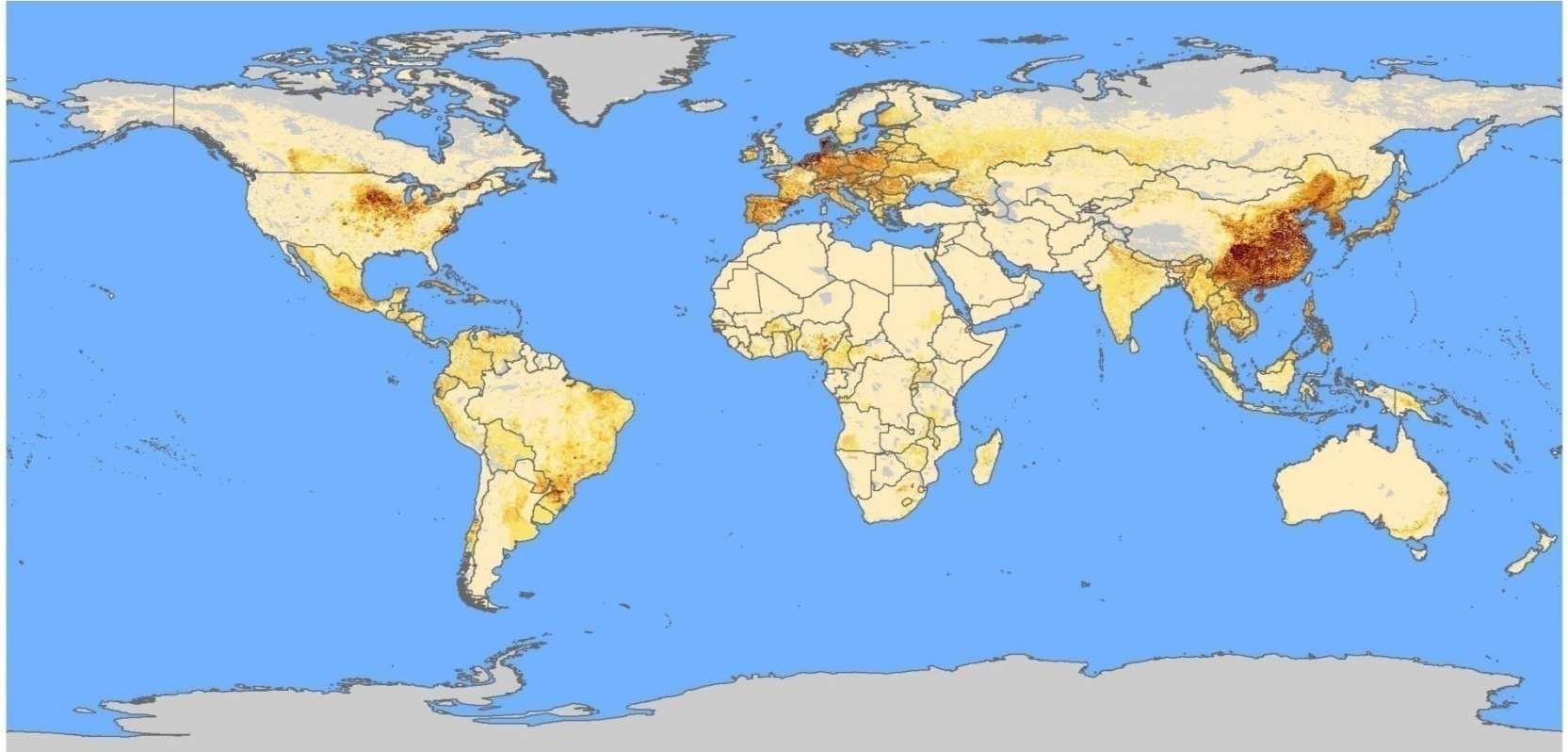
Pig husbandry in Africa

- Gambia and Senegal for instance have just about 25,000 and 325,747 heads of pigs respectively (FAO, 2009)
- In Ghana, 1998 estimate puts the pig population at about 400,000 (FAO, 1998)
- Lower concentration of pigs in some countries in the sub region is attributable to social and religious bias (Permin et al., 1999)

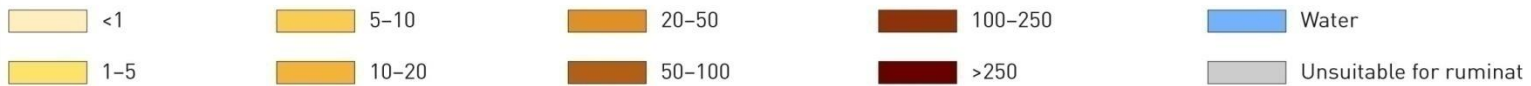


Pigs density map matching FAOSTAT 2005 (modelled)

AGRICULTURE AND CONSUMER PROTECTION DEPARTMENT
Animal Production and Health Division



Number per square km



Source: Gridded Livestock of the World

Pig husbandry in Africa

- Pigs are reared virtually in all countries in Africa including Egypt where over 300,000 pigs were slaughtered at the beginning of the 2009 swine flu pandemic (Kerr, 2010)
- Two major husbandry practices in Africa are:
 - ✓ free range/backyard farming in rural areas
 - ✓ intensive, commercial piggery in peri-urban and urban centres

Free range pig in Northern Nigeria



Hog hole Gashaka forest



Backyard piggery in Taraba



Human



Avian



Swine



Movement



Pig husbandry in Africa

- The intensification of pig farming operations in urban and peri-urban areas favours circulation of pathogens at the human-animal interface (Vibound *et al.*, 2006)
- This is often aggravated by poor sanitation, waste management and disease control practices
- According to a study by ILRI, the Institute of Zoology (UK) and the Hanoi School of Public Health in Vietnam - Ethiopia, Tanzania, Nigeria all in sub Saharan Africa and India are the top 4 geographical hotspots of zoonotic diseases
- Infections like swine influenza virus pose both economic and public health risks (Shrestha *et al.*, 2002; Verhulst 1993).

Africa and swine influenza

- Data on swine influenza virus in sub Saharan Africa is scanty
- This may not be due to the absence of virus activity in wide scale free range or commercial pig production in the region
- But poor surveillance and the absence of coordinated reporting and documentation systems (Schelling, 2005)

Africa and swine influenza

- African Swine Fever (ASF) is by far the most important cause of morbidity and mortality in pigs in the region (El Hicheri et al., 1996; Nana-Nukechap and Gibbs, 1985)
- Few studies on SIV are limited to serology in either pig or human from Nigeria, Ghana, Mali, Zambia, Egypt and South Africa (Shalaby, 1981; Olaleye et al., 1990; Stafford et al., 1992;)

Africa and swine influenza

- Could it be that SIV was not known to Africa as was reported for Australia prior to 2009 pandemic?
- (influenza virus infection has not been previously confirmed in Australian pigs until pandemic H1N1 was first identified in 2009 (Holyoake et al., 2011))
- As at April 2013, there are only two deposits of SIV sequences in the Genbank from Africa
 - Cameroun (free range) and Nigeria (intensive farm)
- Retrospective and prospective examination of data in Africa is important to define SIV subtypes in the region

GAPS IN KNOWLEDGE

- SIV surveillance and research in Africa is hitherto neglected compared to other infectious diseases like ASF
- No known SIV lineage has been described in literature with respect to Africa!
- According to ILRI report- generally, zoonoses and animal diseases in underdeveloped countries are "massively" underreported and 99.9% of all livestock losses in sub-Saharan Africa are never registered in official disease reports

GAPS IN KNOWLEDGE

- SIV is not a listed (reportable) disease by OIE
- Could that have affected the status of investigation and reporting of swine influenza in pigs regardless of production and productivity losses?
- A recent study in West Africa suggested influenza may not be a problem among pigs because samples tested in three countries all returned negative (Couacy-Hymann et al., 2012)

Challenges ahead

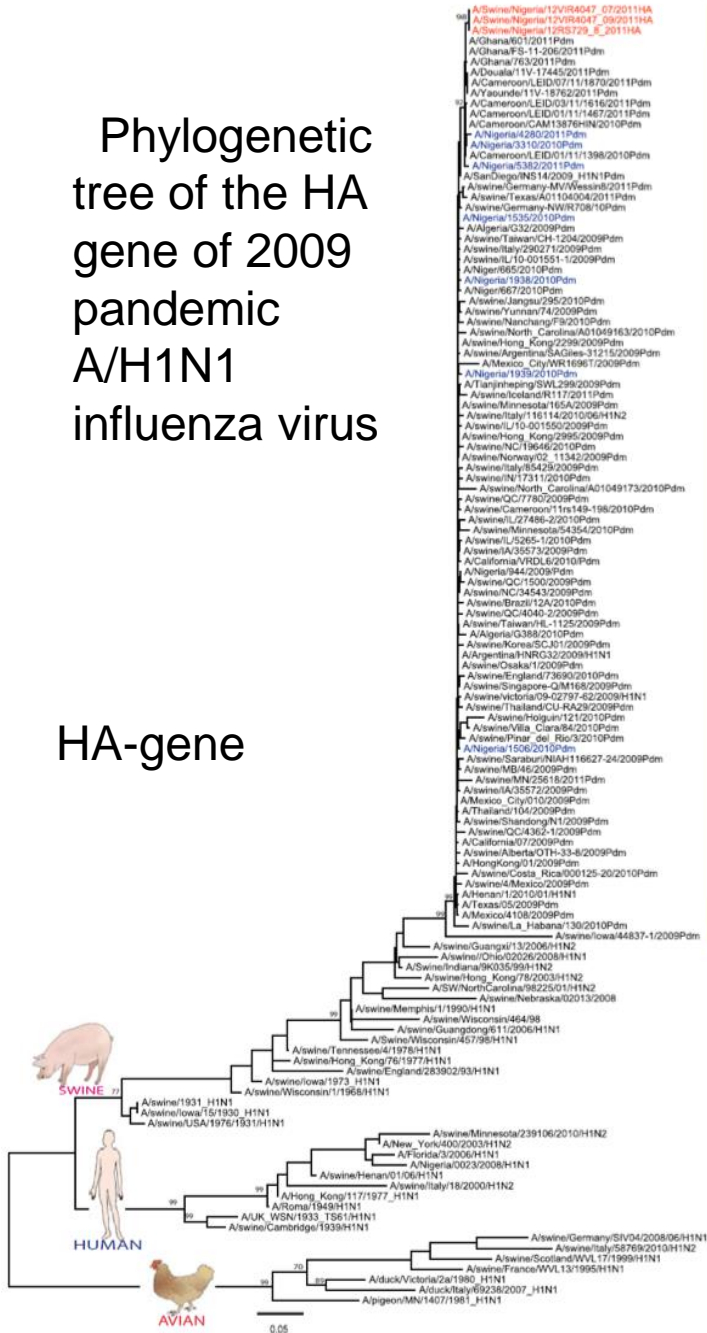
- In view of serological evidence of classical swine influenza reported in times past ((Shalaby,1981 ; Olaleye et al., 1990; Stafford et al., 1992;)
- Surveillance to detect classical SIV need to be intensified in order to better describe African lineage of SIV for research and diagnosis

Challenges ahead

- Though isolation of the virus in Cameroon was a one time report in free range pigs
- There were several confirmed cases in Nigeria over two years (2010-2012)
- As at February 2013, pandemic H1N1 was still positively identified in pigs in the same epidemiological zone in Nigeria
- 89 (29.4) of 302 sera analyzed by ELISA was also positive for influenza A
- HI test showed 97.7% (pdm H1/H1), 2.3% (H3)

Phylogenetic tree of the HA gene of 2009 pandemic A/H1N1 influenza virus

HA-gene



PANDEMIC 2009

- A/Swine/Nigeria/12VIR4047_07/2011HA
- A/Swine/Nigeria/12VIR4047_09/2011HA
- A/Swine/Nigeria/12RS729_8_2011HA
- A/Ghana/601/2011Pdm
- A/Ghana/FS-11-206/2011Pdm
- A/Ghana/763/2011Pdm
- A/Douala/11V-17445/2011Pdm
- A/Cameroon/LEID/07/11/1870/2011Pdm
- A/Yaounde/11V-18762/2011Pdm
- A/Cameroon/LEID/03/11/1616/2011Pdm
- A/Cameroon/LEID/01/11/1467/2011Pdm
- A/Cameroon/CAM13876HIN/2010Pdm
- A/Nigeria/4280/2011Pdm
- A/Nigeria/3310/2010Pdm
- A/Cameroon/LEID/01/11/1398/2010Pdm
- A/Nigeria/5382/2011Pdm
- A/San Diego/INS14/2009_H1N1Pdm
- A/swine/Germany-MV/Wessin8/2011Pdm
- A/swine/Texas/A0110A001/2011Pdm

Challenges ahead

- SIV (pdm) may become endemic in Nigeria like it was when Spanish flu (1918) was introduced and entrenched in pigs globally
- The virus may spread around the country and across borders
- Mutations have been observed-Q240R(H1-numbering) in the antigenic site of the HA gene compared to related virus
- S31N mutation on the M2 protein conferring resistance to adamantane antivirals like other pandemic SIV
- Reassortments among classical, seasonal and pandemic strains of SIV is another possibility! (CDC, 2012)
- Human contacts may get infected or re-infected !
- Novel and pandemic strain may emerge !(lessons from H7N9 in China)

Recommendations

- Surveillance, monitoring and research on circulating swine influenza in Africa is important as currently in place for ASF to define circulating lineage in this region for diagnostics, research and vaccine production purposes focusing on:
 - commercial piggery
 - Human-animal interface
 - Free roaming/backyard pigs
 - Live pig markets
- Accumulation and sharing of virological and epidemiological data from the region
- Implementing control measures including enlightenment and biosecurity

Affiliation & Collaborators

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Thank you