UPDATE OF FOOT AND MOUTH DISEASE (FMD) IN THE MAGHREB REGION: VACCINATION ISSUES

OS18 29/31 OCT 2018 BORGO EGNAZIA, Puglia, Italy

INTRODUCTION

Foot-and-mouth disease is:

- A highly contagious and transboundary viral disease
- Cloven-hoofed animals disease
- Caused by a single-stranded RNA virus
- There are seven distinct serotypes, namely O, A, C, ASIA1, SAT1, SAT2, SAT3
- No cross-protection between serotypes

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Lately, the Maghreb region has suffered from several epidemics of foot and mouth disease (FMD) caused by new viral lineages, more precisely serotypes O and A.

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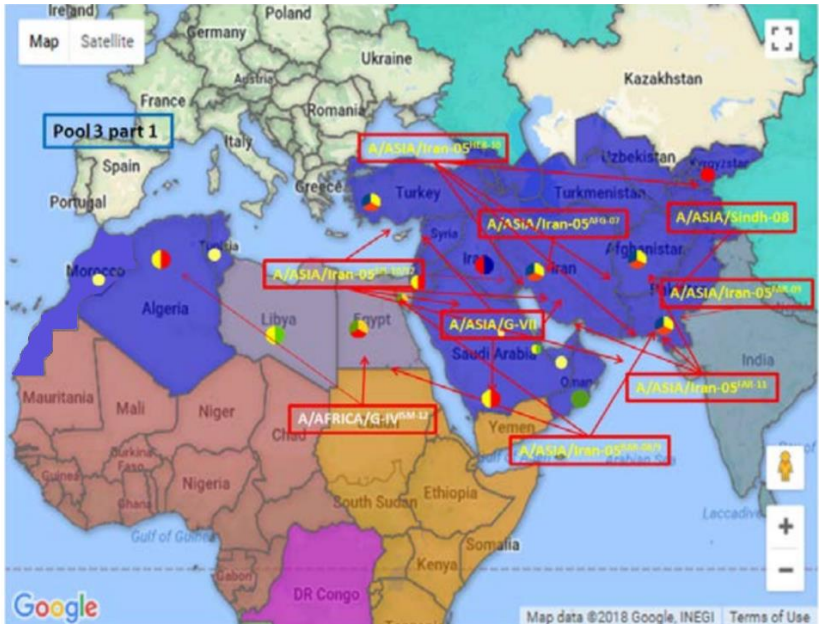
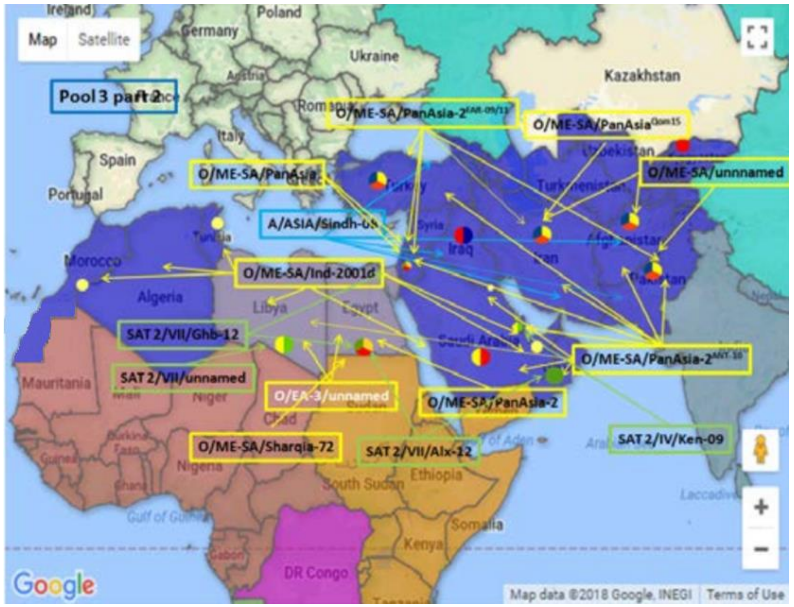
The Maghreb region includes, Morocco, Algeria, Tunisia, Mauritania, and Libya. Its geographical location with permeable borders with sub-Saharan Africa and the northern countries of the region, in close communication with Middle East, increases the risk of introduction of transboundary diseases, notably FMD





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In Morocco, Tunisia and Algeria, vaccination is the most used approach for controlling the spread of FMD

Morocco, in its prophylaxis strategy, has imported antigens, stored in suitable premises at Biopharma. In case of emergency , Antigen is reconstituted as a vaccine rapidly.

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PROBLEM

- Diversification of serotypes and topotypes circulating in the region
- Few of the vaccine strains tested match with topotypes that circulate (example A Algeria 2017)
- matching value r1 at the limit

OBJECTIVE

The present study aims to explore the main FMD strains in the Maghreb and to present the problematic of the choice of vaccine strains in North Africa.

THE MAIN ISOLATED STRAINS IN THE MAGHREB BETWEEN 2013 AND 2018

Country	Year	Serotype	Topotype
LYBIA	201 3	O	O/ME-SA/Ind-2001
TUNESIA	2014	O	O/ME-SA/Ind-2001
ALGERIA	2014	O	O/ME-SA/Ind-2001
MORROCO	2015	O	O/ME-SA/Ind-2001
ALGERIA	2017	A	A/AFRICA/G -IV
TUNESIA	2017	A	A/AFRICA/G -IV
ALGERIEA	2018	O	O/EA-3

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- Serotype O isolated in Libya (2013) , then in Tunisia (2014) Algeria (2014) and Morocco (2015) is closely related to FDM virus present in the Indian subcontinent.
- the serotype A responsible for outbreaks in Algeria then in Tunisia in 2017, belongs to the topotypeA / AFRICA / G -IV highlighting connections with countries in sub-Saharan Africa
- The serotype identified in 2018 in Algeria is serotype O, topotype East Africa 3. This is a new introduction in Algeria.

Different studies were fully and deeply examined to figure out the emergent strains in North Africa and the related risk factors.

But it remains very important to study the precise pathways of introduction of its lines into the region, and the causes of spread of the virus between neighboring countries

THE MAIN VACCINAL STRAINS USED IN THE MAGHREB

Country	vaccinal strain
MORROCO	O (manisa, O3039) A
ALGERIA	O A (Eritria98).
TUNISIA	O sat 2 A (A22 Iraq)

the details of the vaccine strains used in the vaccination campaigns are not always communicated

PROBLEMATIC OF THE CHOICE OF THE VACCINE STRAIN

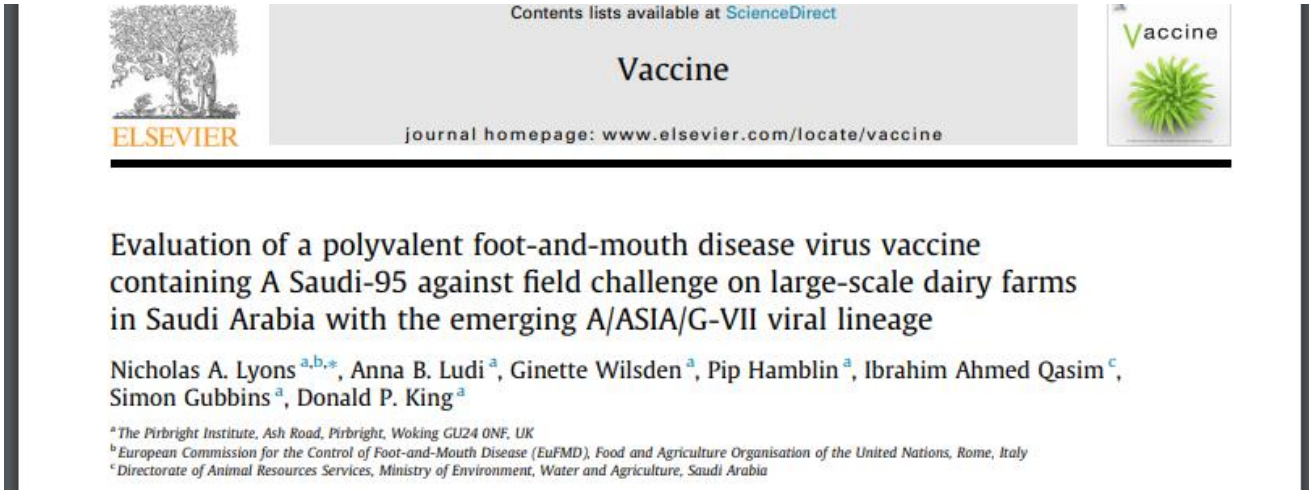
The choice of vaccines is based on the results published by the reference laboratories, using in vitro matching vaccine, which is the most used method for the selection of the vaccine strain.

To make the results of its vaccines matching accessible to the public , at the earliest possible time, can have an important added value, in particular to provide the appropriate vaccine, not only for the notifying country, but also the countries at risk

However, with the genotypic variation that increases with time, this method may not provide the best vaccine strain :
Examples

Lyons and al 2017

The middle east experienced in 2015 a quick spread of a linage of serotype A because a bad in vitro adaptation of field isolates with vaccine strains



Contents lists available at ScienceDirect

Vaccine

journal homepage: www.elsevier.com/locate/vaccine

Evaluation of a polyvalent foot-and-mouth disease virus vaccine containing A Saudi-95 against field challenge on large-scale dairy farms in Saudi Arabia with the emerging A/ASIA/G-VII viral lineage

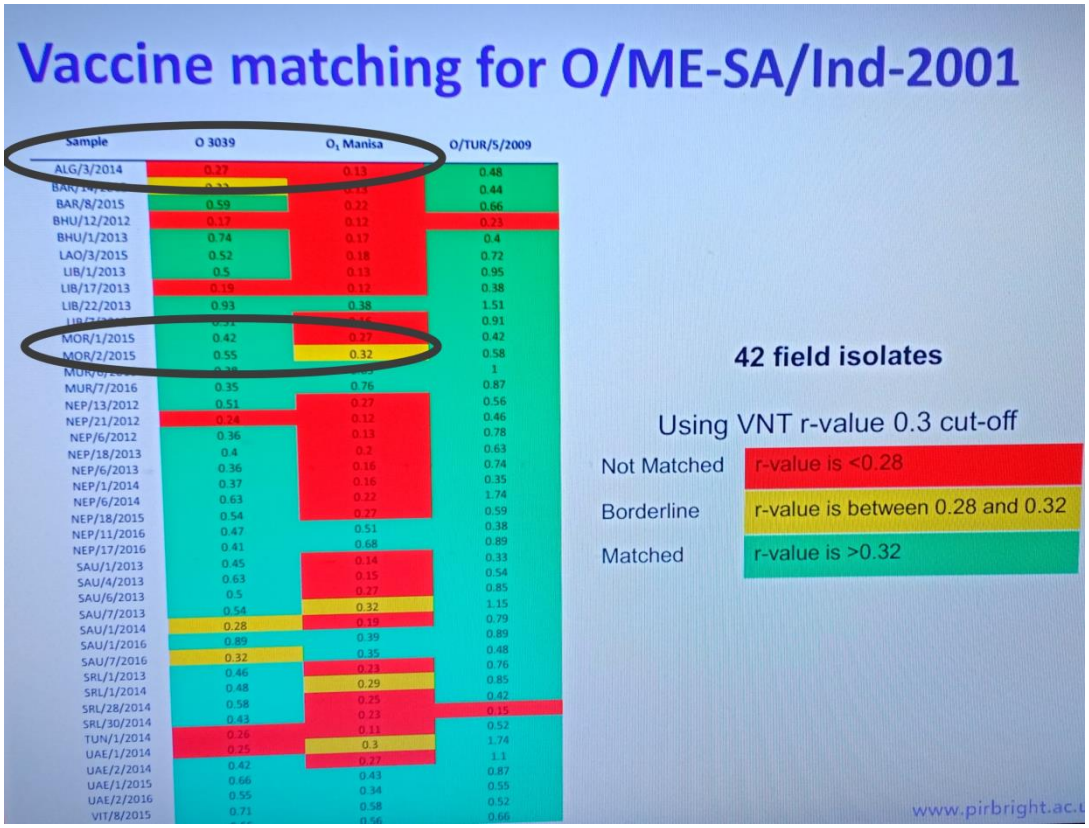
Nicholas A. Lyons [a,b,*], Anna B. Ludi [a], Ginette Wilsden [a], Pip Hamblin [a], Ibrahim Ahmed Qasim [c], Simon Gubbins [a], Donald P. King [a]

[a] The Pirbright Institute, Ash Road, Pirbright, Woking GU24 0NF, UK
[b] European Commission for the Control of Foot-and-Mouth Disease (EuFMD), Food and Agriculture Organisation of the United Nations, Rome, Italy
[c] Directorate of Animal Resources Services, Ministry of Environment, Water and Agriculture, Saudi Arabia

However, with the genotypic variation that increases with time this method may not provide the best vaccine strain :

Vaccine mathing for O/ME-SA/Ind-2001
PIRBRIGHT

The virus ALG/3/2014 did not match with the vaccine strain O1 Manisa, neither with the strain O3039, however, the virus prevailing in Morocco matched with O3039 but less with O1 Manisa. even if both viruses belong to the same virus lineage O / ME-SA / Ind-2001



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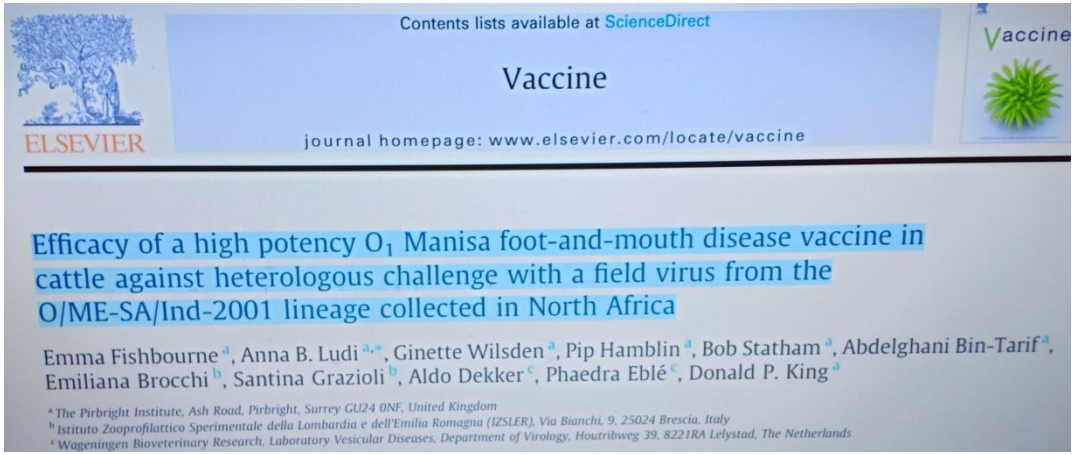
Examples

Donald P. king and al 2017

A study using the in-vivo potency cross protection technique confirmed that the viruses belonging to O / ME-SA / Ind-2001 can be handled using the vaccine strain O1 Manisa to control FMD in endemic areas



Contents lists available at ScienceDirect

Vaccine

journal homepage: www.elsevier.com/locate/vaccine

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Efficacy of a high potency O_1 Manisa foot-and-mouth disease vaccine in cattle against heterologous challenge with a field virus from the O/ME-SA/Ind-2001 lineage collected in North Africa

Emma Fishbourne [a], Anna B. Ludi [a,*], Ginette Wilsden [a], Pip Hamblin [a], Bob Statham [a], Abdelghani Bin-Tarif [a], Emiliana Brocchi [b], Santina Grazioli [b], Aldo Dekker [c], Phaedra Eblé [c], Donald P. King [a]

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- These studies indicate some discordances were found between vaccine strain results based on matching vaccine and potency cross protection techniques.

- A vaccine strain that does not match is not necessarily ineffective strain, it is important to take into account other analyzes to decide

- Compare the results of the matching vaccines of the same strains made by different laboratories can be important

- As the most reliable method is in vivo cross protection, and which unfortunately can not be implemented at every statement, the invitro method must be extended to a wider range of strains.

CONCLUSION AND RECOMMENDATION

The emergence and reemergence of the virus is a serious problem in the region

Due to the close geographical location and connections across the Mediterranean Basin , circulation of new FMDV lineages in North Africa may increase the risk of an FMD introduction into Europe

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Investigation for the development of new vaccines and new methods and measures for the vaccine choice process should be performed, in addition, building a regional vaccine bank will have an important added value

THANK YOU