

## Achievements and challenges of PPR control programs: The experience of Morocco



Regional training workshop on the OIE procedures for the endorsement of national official control programmes with regard to foot-and-mouth diseases (FMD) and peste des petits ruminants (PPR)

*Kigali (Rwanda) - 18-20 July 2017*

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**Animal Health Division**  
**ONSSA**

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**PPR IN MOROCCO :**  
WHAT REVIEW ON  
EPIDEMIOLOGICAL SITUATION ?

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## PPR in Morocco



- ◆ The disease was first suspected in Morocco in July 2008: sheeps with clinical signs and unusual deaths;
- ◆ Laboratory diagnosis was made for the first time in a national laboratory Biopharma;
- ◆ Confirmation and genetic study was conducted at CIRAD (France): virus belonging to the IV lineage (Middle East and South Asia).

# Official notification to the OIE

**Immediate notification  
23/07/2008**



**11 follow up reports,  
23/7 to 28/11/2008**

 **Peste des petits ruminants,  
Maroc**

*Information reçue le 23/07/2008 de Dr Hamid Benazzou, Directeur de  
l'Elevage, Direction de l'Elevage, Ministère de l'agriculture et de la pêche  
maritime, RABAT, Maroc*

## Résumé

Type de rapport	Notification immédiate
Date de début	12/06/2008
Date de première confirmation de l'événement	18/07/2008
Date du rapport	23/07/2008
Date d'envoi à l'OIE	23/07/2008
Date de clôture de l'événement	27/01/2009
Raison de notification	Apparition pour la première fois d'une maladie appartenant à la liste de l'OIE
Manifestation de la maladie	Maladie clinique
Agent causal	Virus de la peste des petits ruminants
Nature du diagnostic	Suspicion, Clinique, Tests élémentaires en laboratoire (i.e. parasitologie, bactériologie, mycologie, histopathologie), Necropsie
Cet événement se rapporte à	tout le pays

## Rapports s'y rattachant

Notification immédiate (23/07/2008)

Rapport de suivi N° 1 (29/07/2008)

Rapport de suivi N° 2 (07/08/2008)

Rapport de suivi N° 3 (12/08/2008)

Rapport de suivi N° 4 (25/08/2008)

Rapport de suivi N° 5 (12/09/2008)

Rapport de suivi N° 6 (13/09/2008)

Rapport de suivi N° 7 (19/09/2008)

Rapport de suivi N° 8 (30/09/2008)

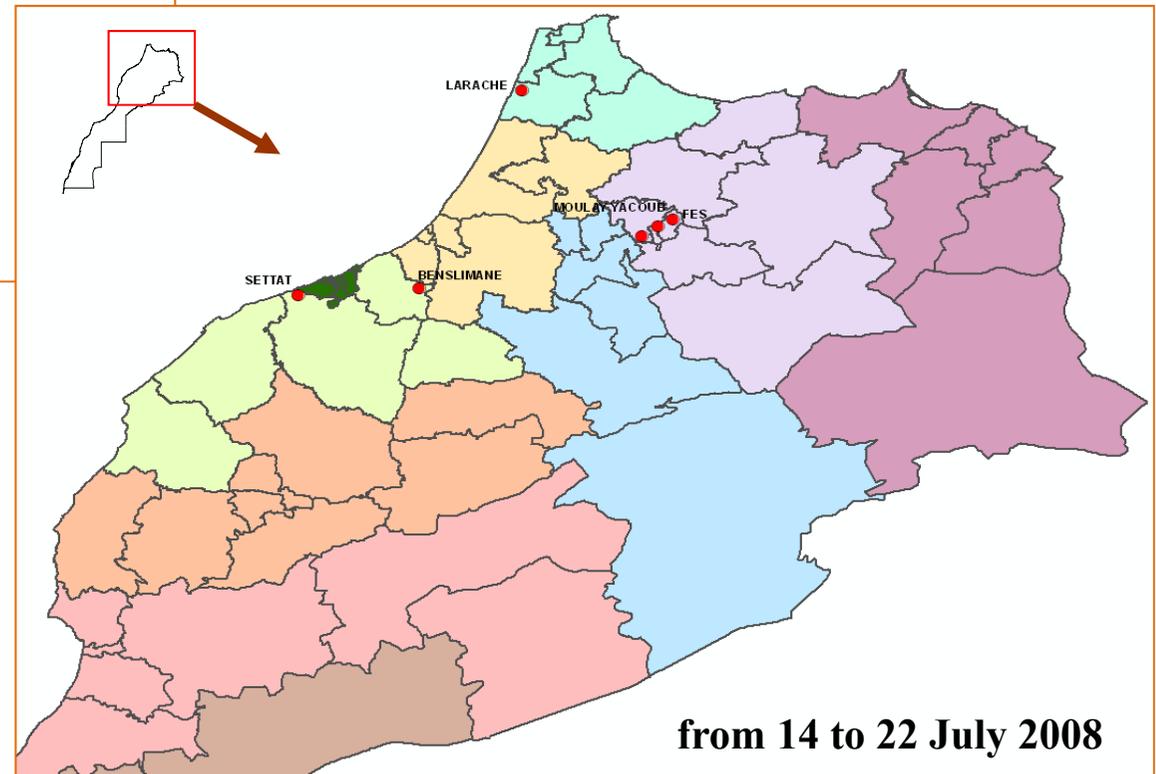
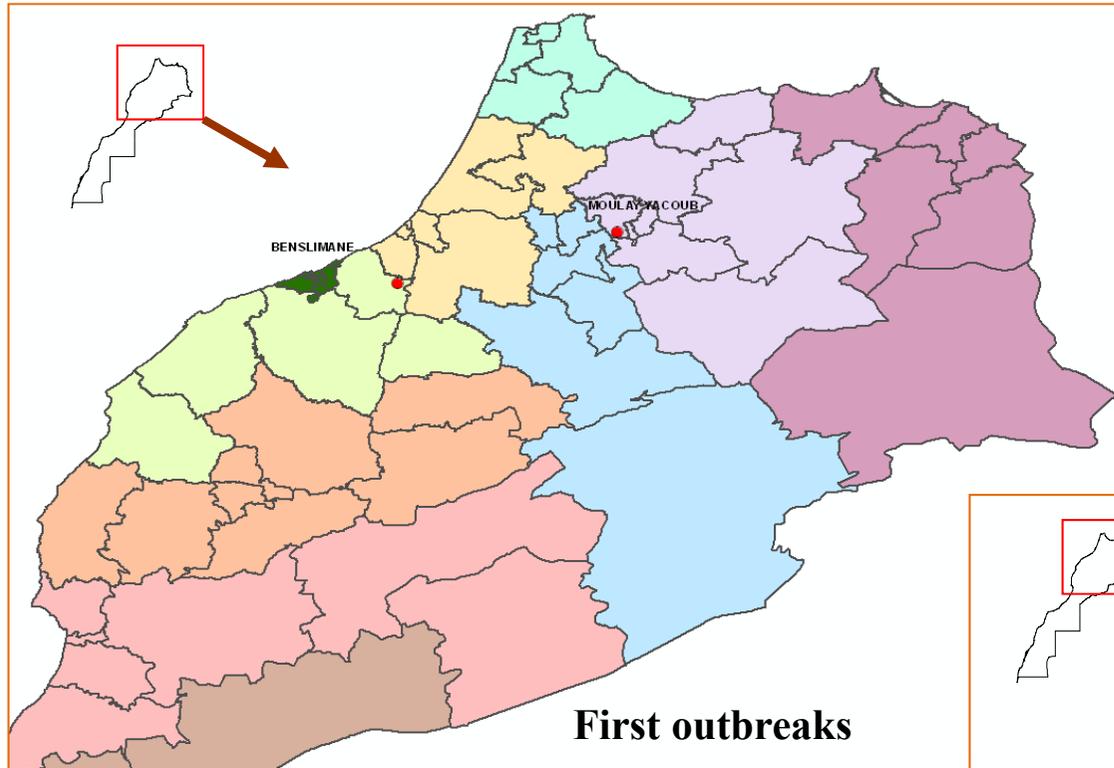
Rapport de suivi N° 9 (14/10/2008)

Rapport de suivi N° 10 (03/11/2008)

Rapport de suivi N° 11 (28/11/2008)

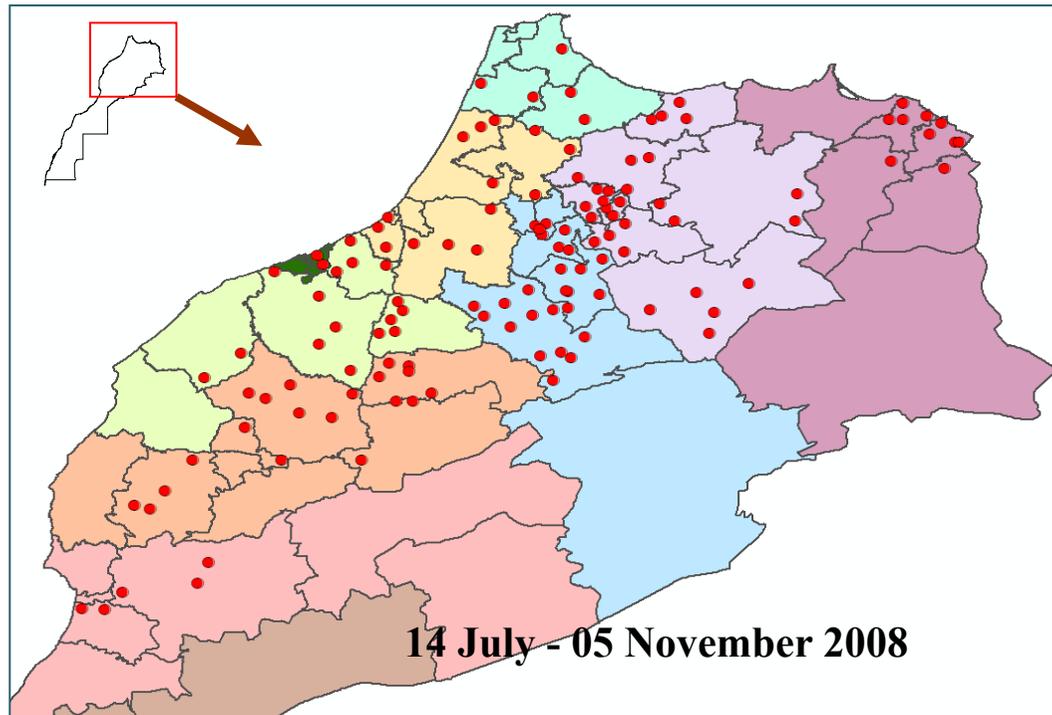
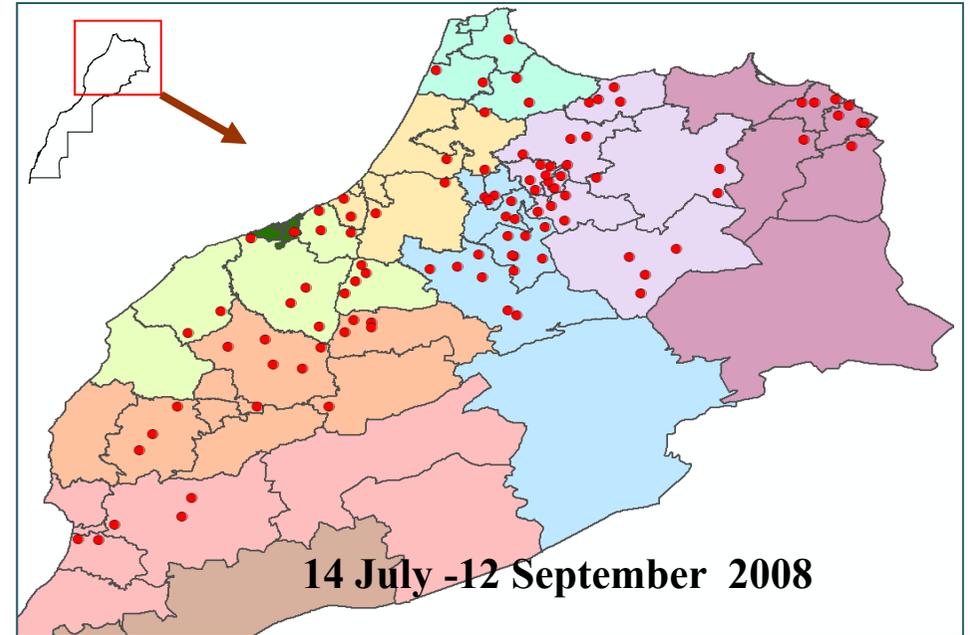
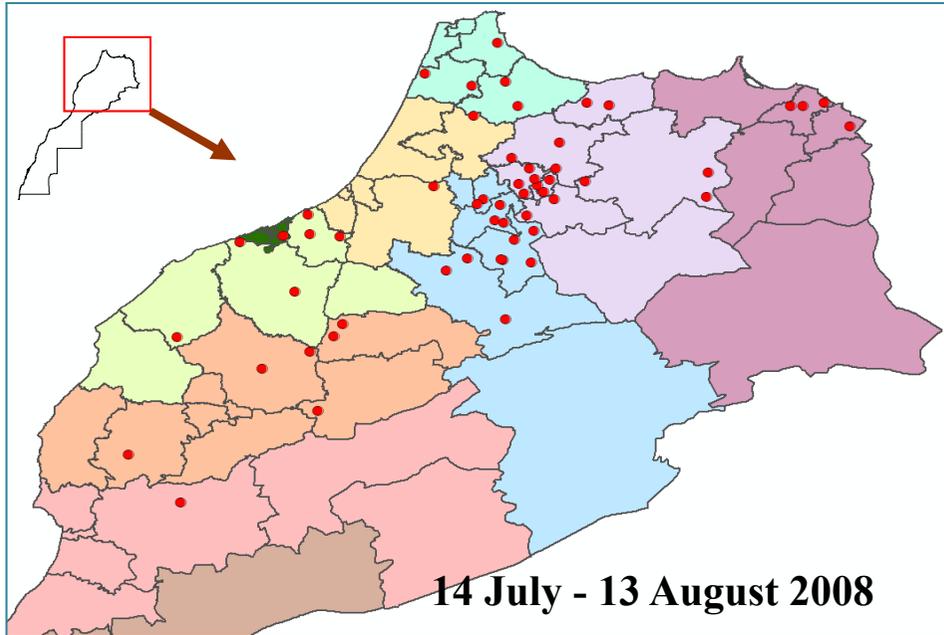


# Evolution of the epidemiological situation (1)



- Chaouia -Ouardigha et Doukkala-Abda
- Grand Casablanca
- Laayoune-Boujdour--Sakia El Hamra-Guelmim-EsSmara
- Marrakech-Tensift-Al Haouz et Tadla-Azilal
- Meknes-Tafilalet
- Oriental
- Rabat-Salé-Zemmour-Zaer et Gharb-Chrarda-Bni Hssen
- Sous Massa-Draa
- Tanger-Tétouan
- Taza-Al Hoceima-Taounate et Fès- Boulemane

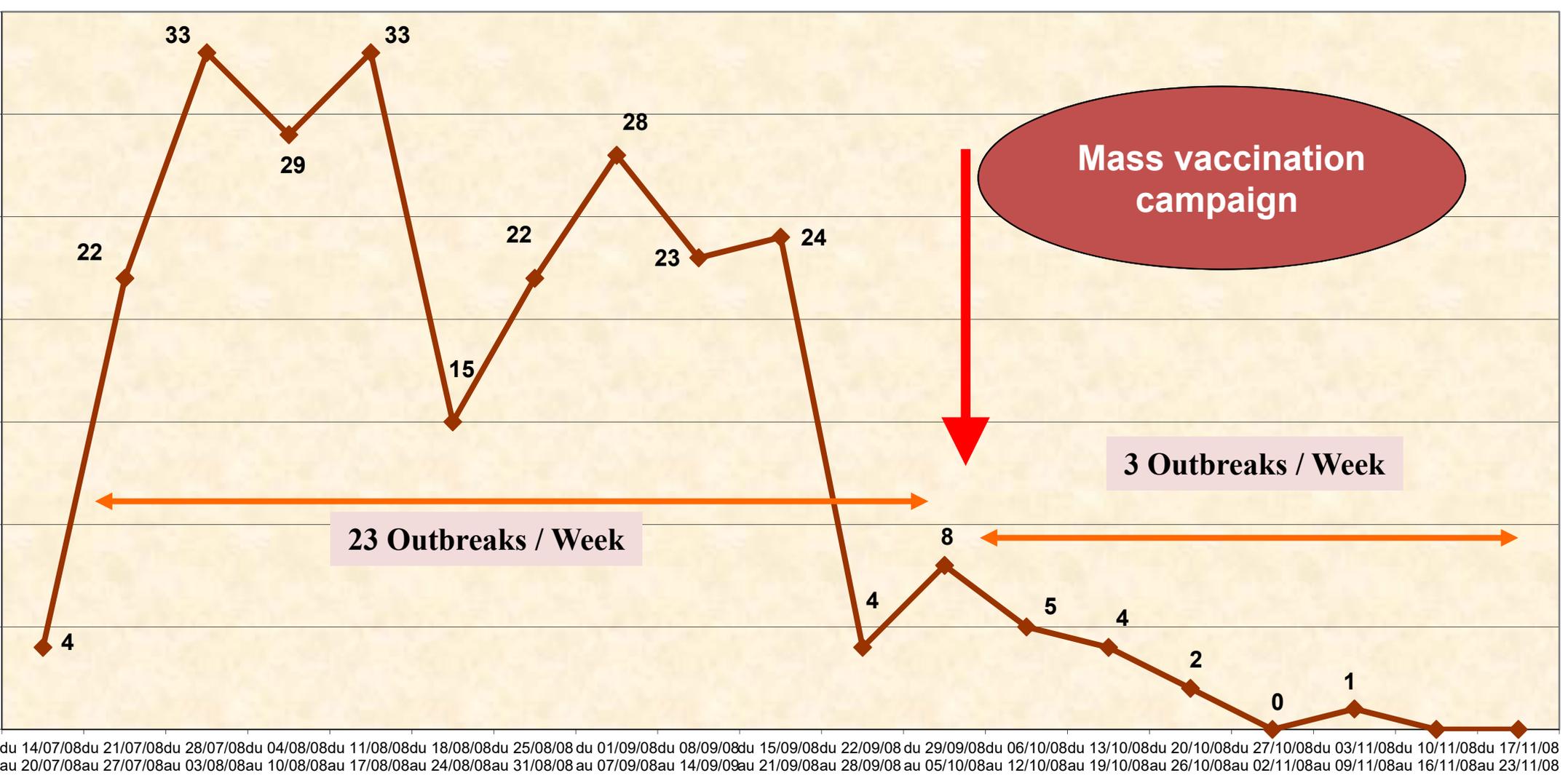
# Evolution The epidemiological situation (2)



- Chaouia -Ouardigha et Doukkala-Abda
- Grand Casablanca
- Laayoune-Boujdour--Sakia El Hamra-Guelmim-EsSmara
- Marrakech-Tensift-Al Haouz et Tadla-Azilal
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- Oriental
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- Sous Massa-Draa
- Tanger-Tétouan
- Taza-Al Hoceima-Taounate et Fès- Boulemane

# Weekly Evolution of epidemiological situation (3)

Nb. foyers



Mass vaccination campaign

3 Outbreaks / Week

23 Outbreaks / Week

## Results of the epidemiological situation

A total of 257 outbreaks spread at 36 provinces  
(131 locations )

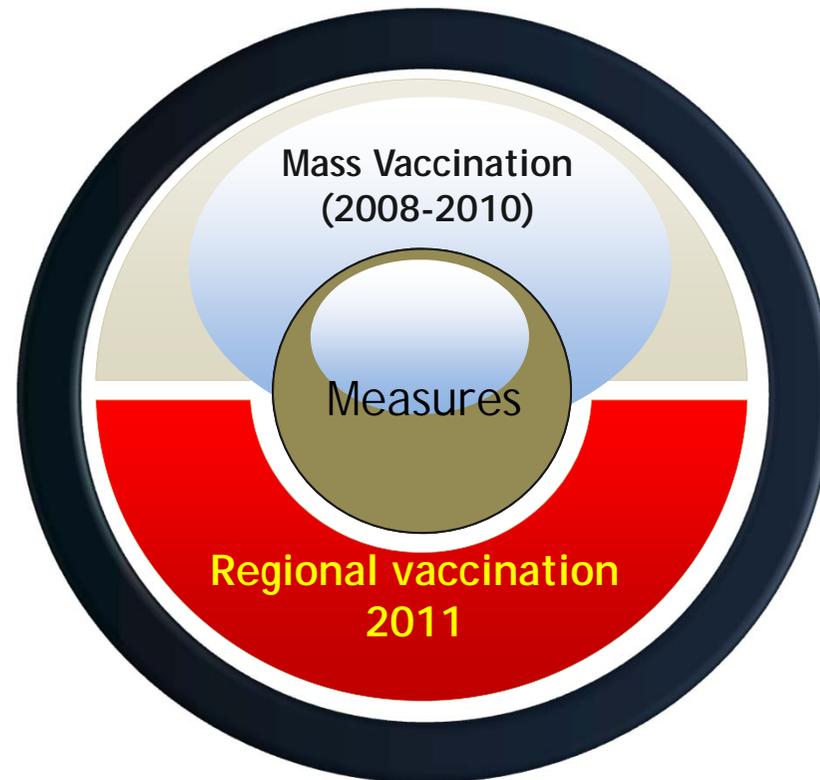
Number of cases		Number of deaths	
Sheeps	Goats	Sheeps	Goats
4939	694	2386	223
5633		2609	
Morbidity Rate= 11,9%		Mortality Rate= 5,5 %	

- Over 80% males;
- Mainly young animals (94%);
- 90% of animals purchased;
- 48% in feedlots.

The last outbreak was reported Nov. 5th, 2008

Control strategy based on:

- Import from Botswana of 900,000 doses PPR vaccine
- Production of a vaccine locally (BIOPHARMA)
- Mass vaccination campaign for national livestock of small ruminants from September 2008 to 2010
- A regional vaccination campaign in 2011 (Eastern and southeast border areas)
- Control measures
- Awareness ,communication.



2008	2009	2010	2011
20.857.117	22.795.721	22.978.158	716 699



# Epidemiological –Surveys of PPR in Morocco

A retrospective survey (serotheque 2006): 991 serum (689 sheep and 302 goats): Negative

Survey: August 2008: To elucidate the epidemiology of PPR :  
20 sera of sheep and goats,  
sampled from 106 municipalities

Sero-surveillance  
March 2009: Monitor the degree of protection of vaccinated animals vis-à-vis the PPR :  
58 sera of sheep and goats,  
49 municipalities (48 provinces)

Serological -Survey 2012  
Assessment of vaccine protection level in small ruminants vaccinated adults;  
Detect a possible virus circulation among vaccinated young animals

1-This confirms the absence of virus circulation of the disease before the onset of the disease in 2008

2-A number of 74 small ruminants are sera positive : 8.25% (sheep) and 6.21% (goats)

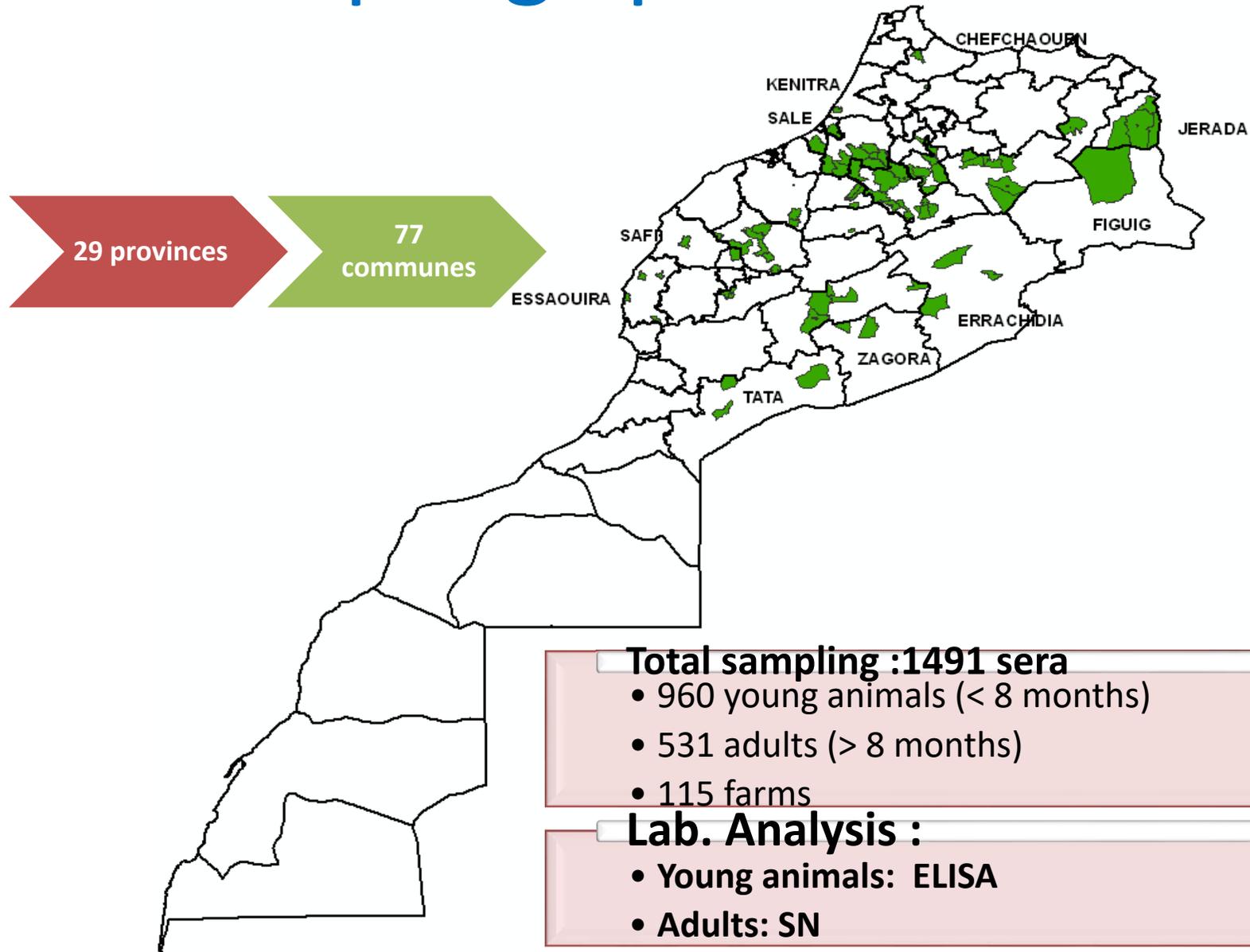
3- Vaccine protection level: 66.8% (sheep); 74.31% (goats)

4-Vaccine protection : 51.2% of farms sampled, the rate of animal protection is between 80% and 100%.

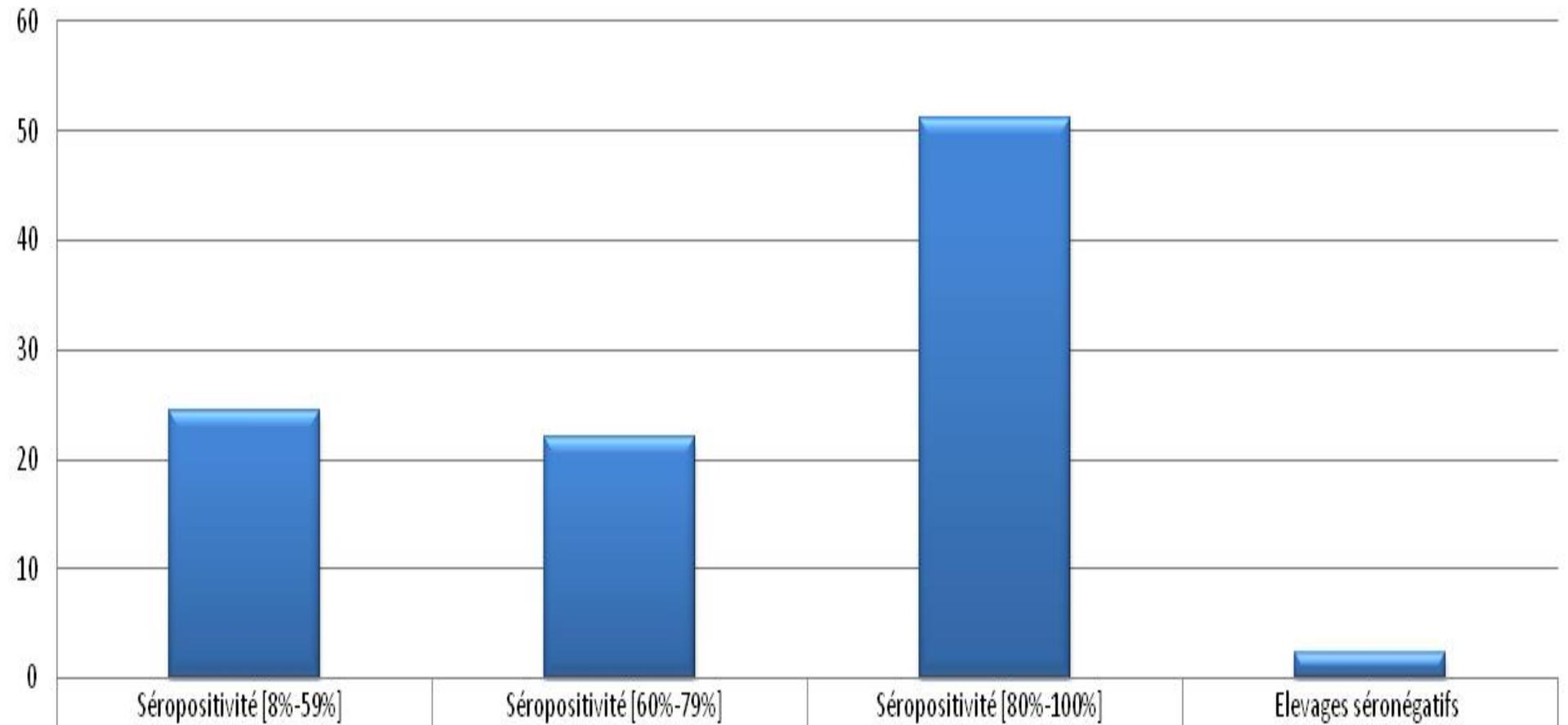


# Survey study 2012

## Sampling Spatial distribution



## sérop. Elevage



■ sérop. Elevage

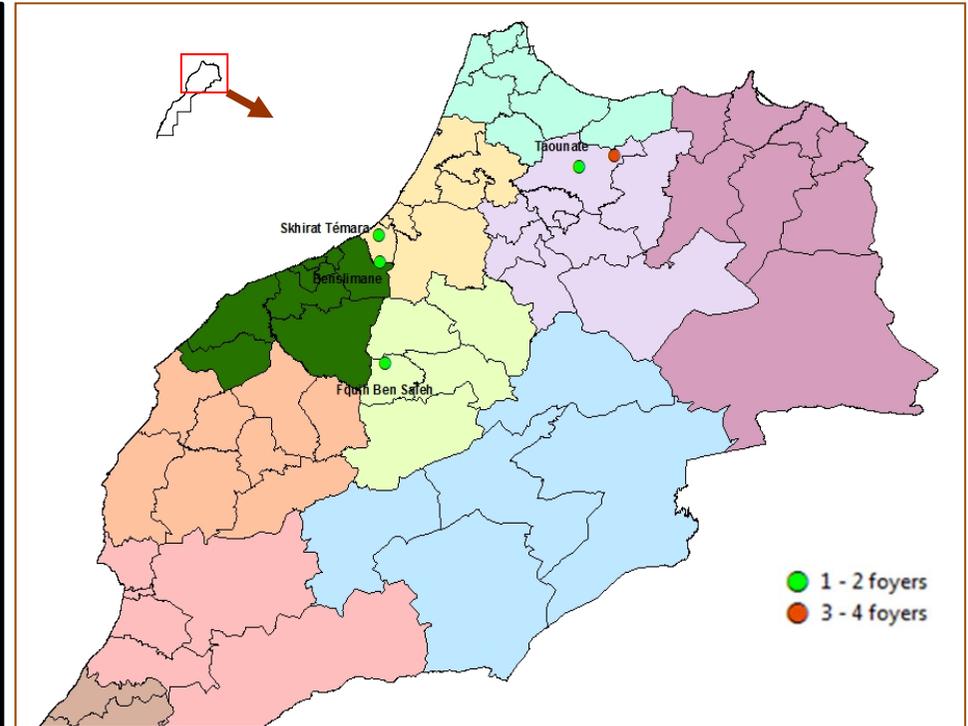
24,4

22

51,2

2,4

- Reemergence: end of June 2015.
- Location: Province of Skhirate-Témara
- Le diagnostic a été réalisé par ONSSA labs (ELISA, PCR).
- Immediate notification sent to the OIE on 03 July 2015.
- Closing follow up report: **03/09/2015**



Province	foyer	Effectif dans l'exploitation		Nombre de cas		Nombre d'animaux morts		Taux de morbidité	Taux de mortalité	Date de déclaration
		Ovin	Caprin	Ovin	Caprin	Ovin	Caprin			
Skhirate-Témara	2	11800	0	70	0	0	0	0,6	0,0	16/06/2015 04/07/2015
Benslimane	2	1900	0	10	0	0	0	0,5	0,0	13/07/2015
Fquih Ben Salah	1	160	0	3	0	1	0	1,9	0,6	28/07/2015
Taounate	5	0	190	0	14	0	11	7,4	5,8	26/08/2015 01/09/2015 03/09/2015
<b>Total</b>	<b>10</b>	<b>13860</b>	<b>190</b>	<b>83</b>	<b>14</b>	<b>1</b>	<b>11</b>	<b>0,69</b>	<b>0,09</b>	



- Vaccination around outbreaks
- Control measures
- Mass vaccination campaign :
  - vaccin combiné clavelée-PPR
  - partir d'octobre 2015
  - +16.2M sheeps, 86% vac covering rate

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**PPR IN MOROCCO :**

WHAT WE LEARNED?

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## **National level:**

PPR well controlled

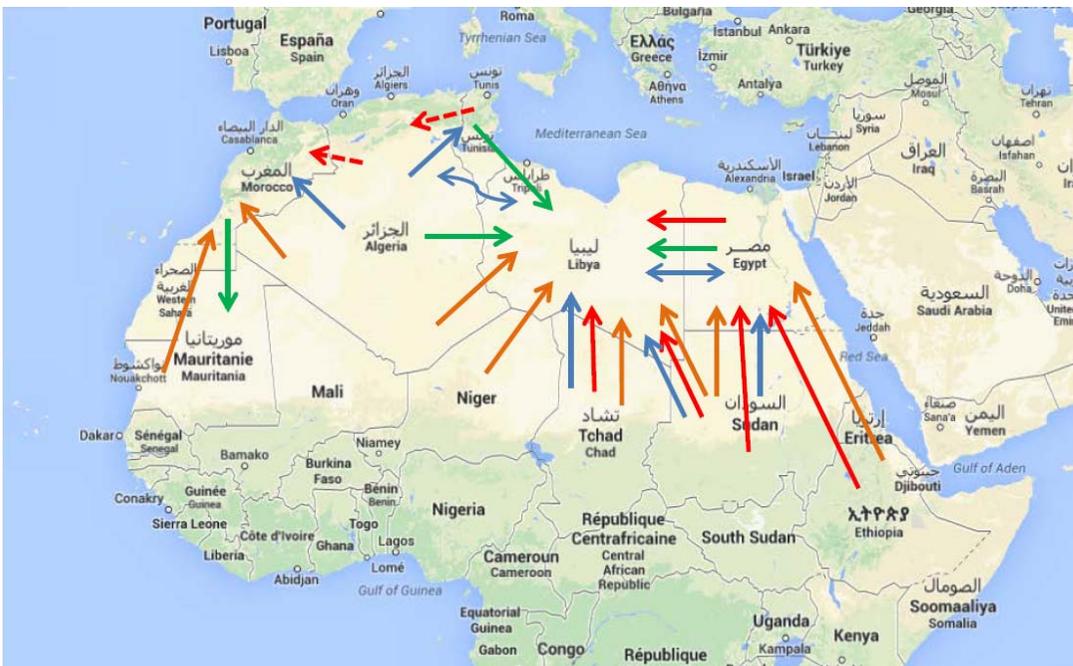
- No viral circulation in young animals
- Good immune protection for adults vaccinated

Needs to adapt surveillance for a rapid detection and control of any new outbreaks of PPR

## **Regional level:**

Risk of recurrence of the disease is present given cross-border animal movement

# Animal movements in the Maghreb



- > Imported bovine
- Domestic bovine
- Small ruminants
- Camelidae
- Dairy products

## 10 | L'Algérie pr

### BRÈVES de l'Est

#### CONTREBANDE À TEBESSA

#### Saisie d'un troupeau de chèvres

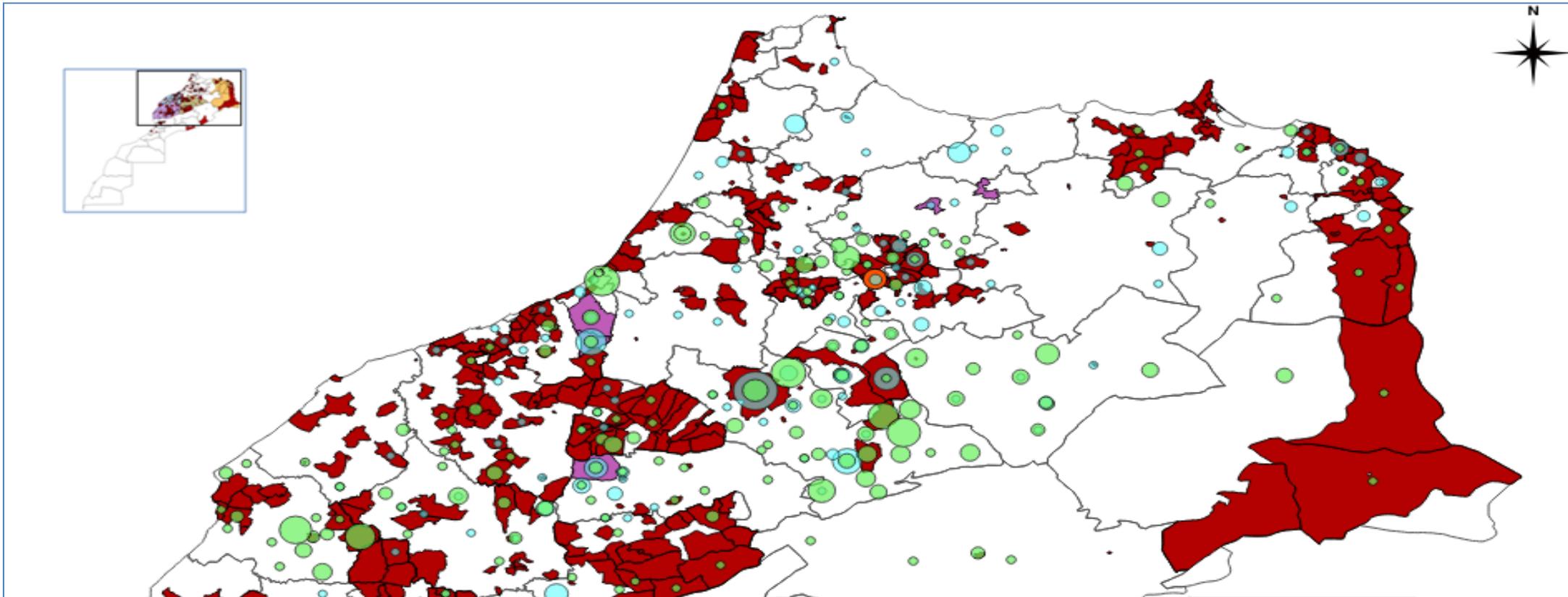
■ La brigade mobile de la gendarmerie de Tébessa a réussi, en début de semaine, à faire avorter une tentative d'introduction illégale sur le territoire tunisien, de 115 têtes de chèvres.

L'opération a eu lieu sur la bretelle frontalière sud de la wilaya de Tébessa.

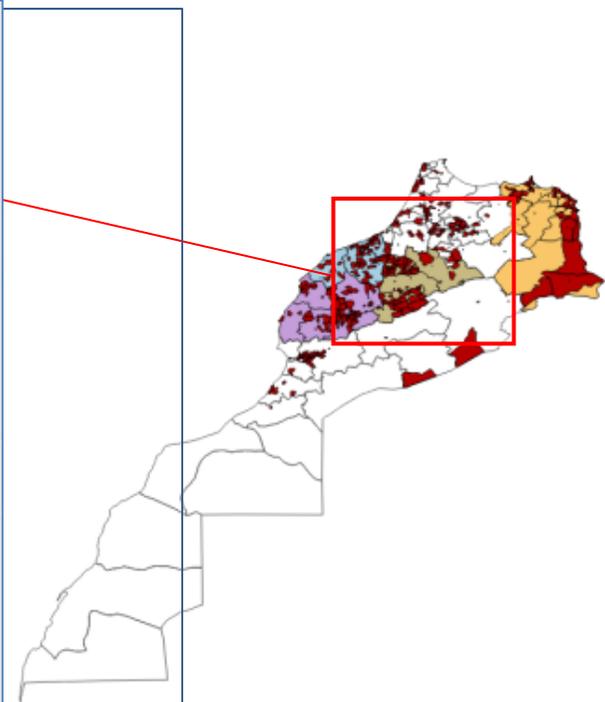
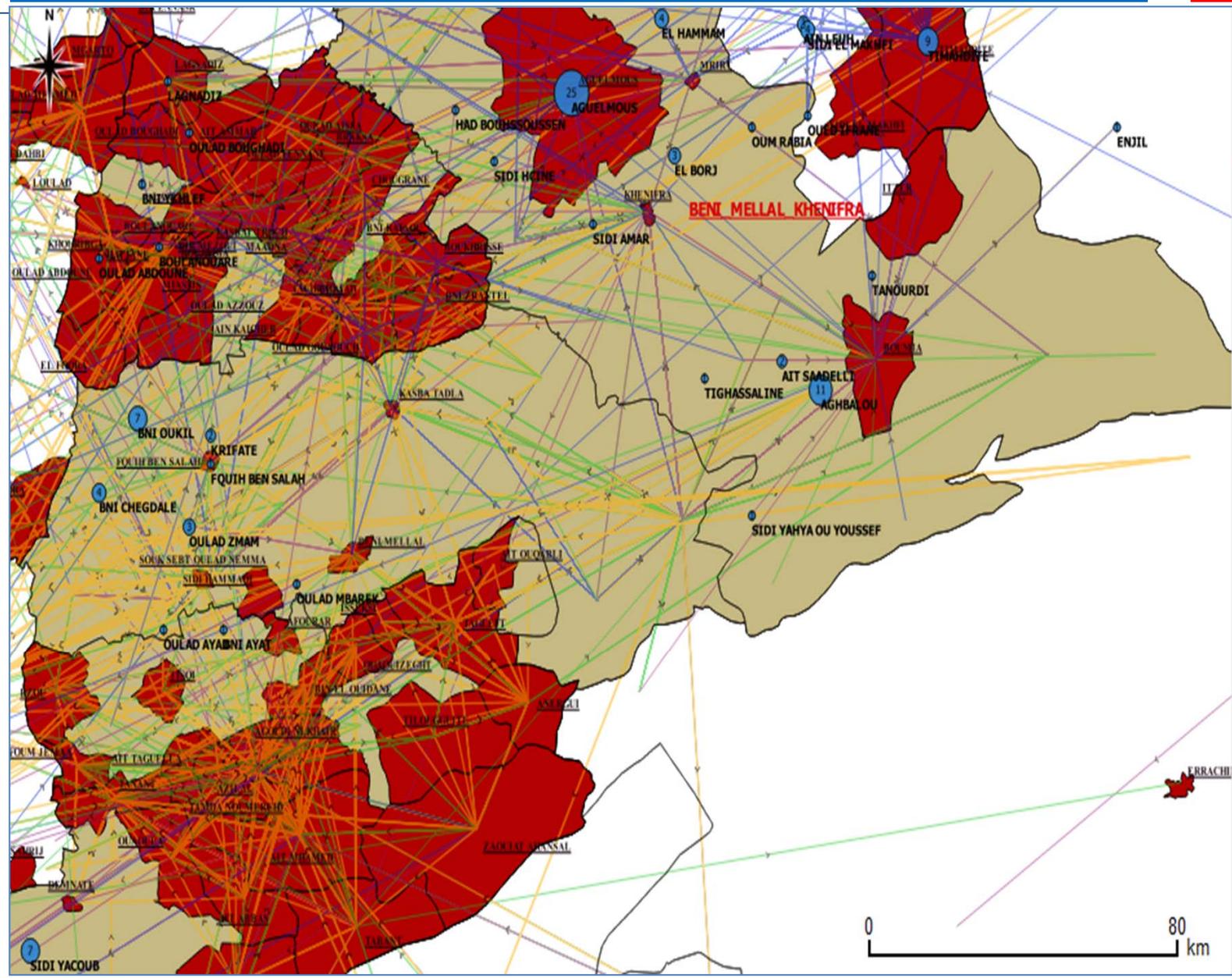
-Some locations are more vulnerable to repeated affections by PPR than others

-Would be in favor of contamination following a commercial relationship or a collective use of water points or grazing lands.

### PPR outbreaks (2008, 2015)

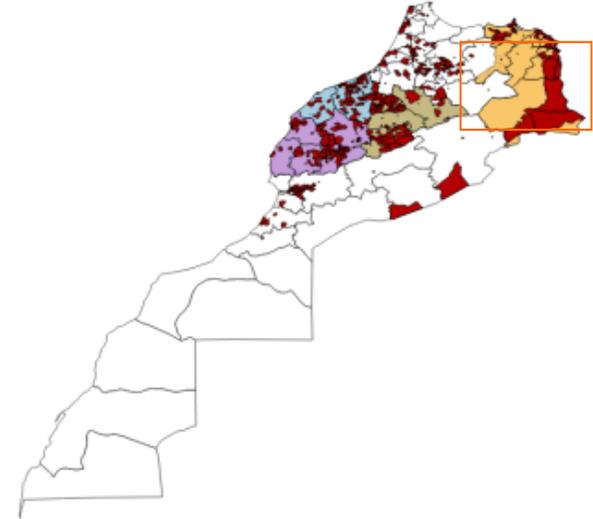
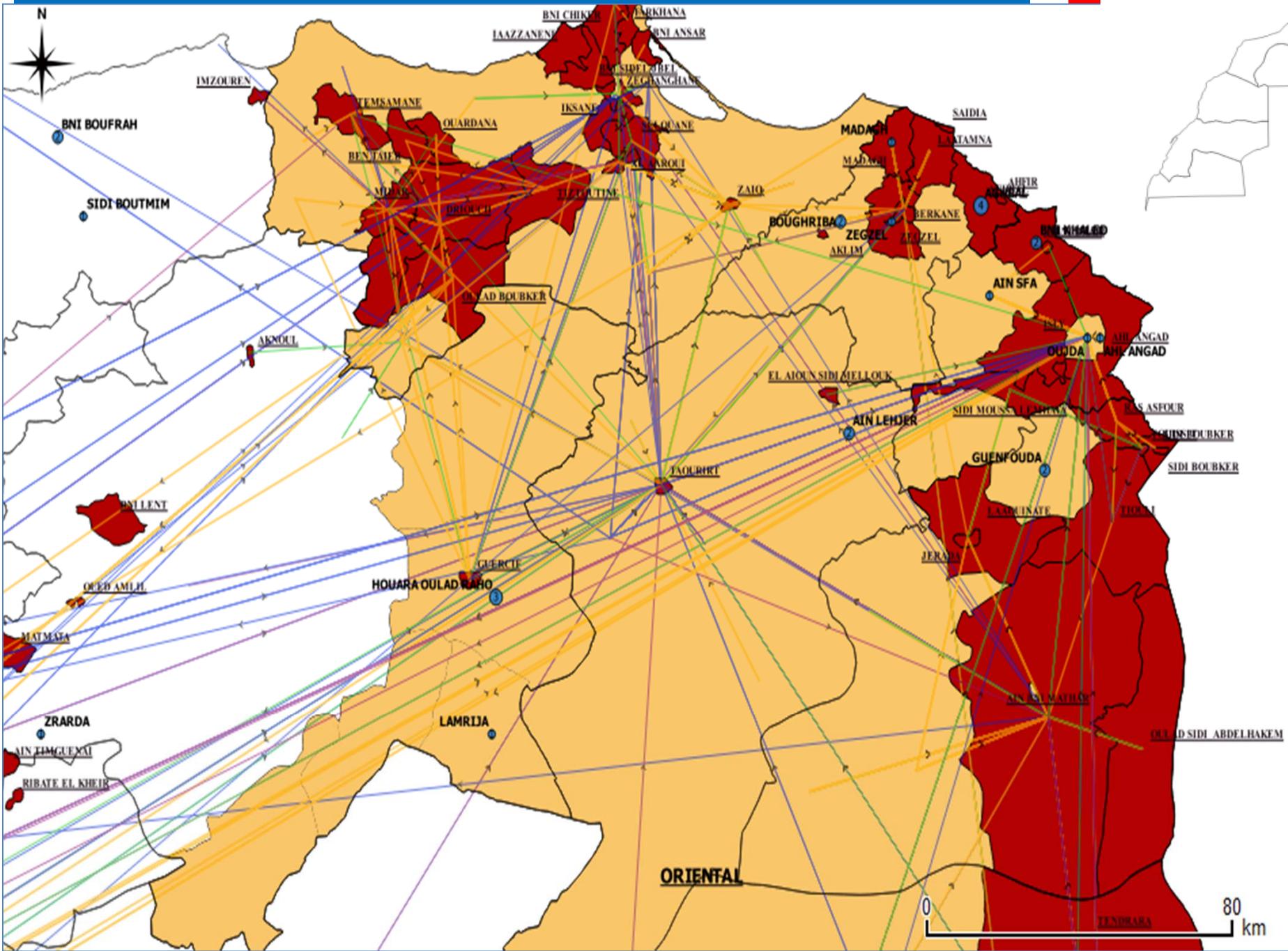


# Beni Mellal-Khènifra





# Oriental



## Conclusions



- In Morocco PPR is one of the priority national animal diseases
- Considerable efforts and resources have been deployed for the control and control of the disease
- Implementation of a harmonized regional / global strategy for the control of PPR is necessary for its control and eradication.

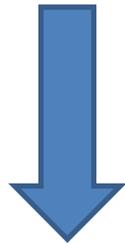


## FMD Situation in Morocco



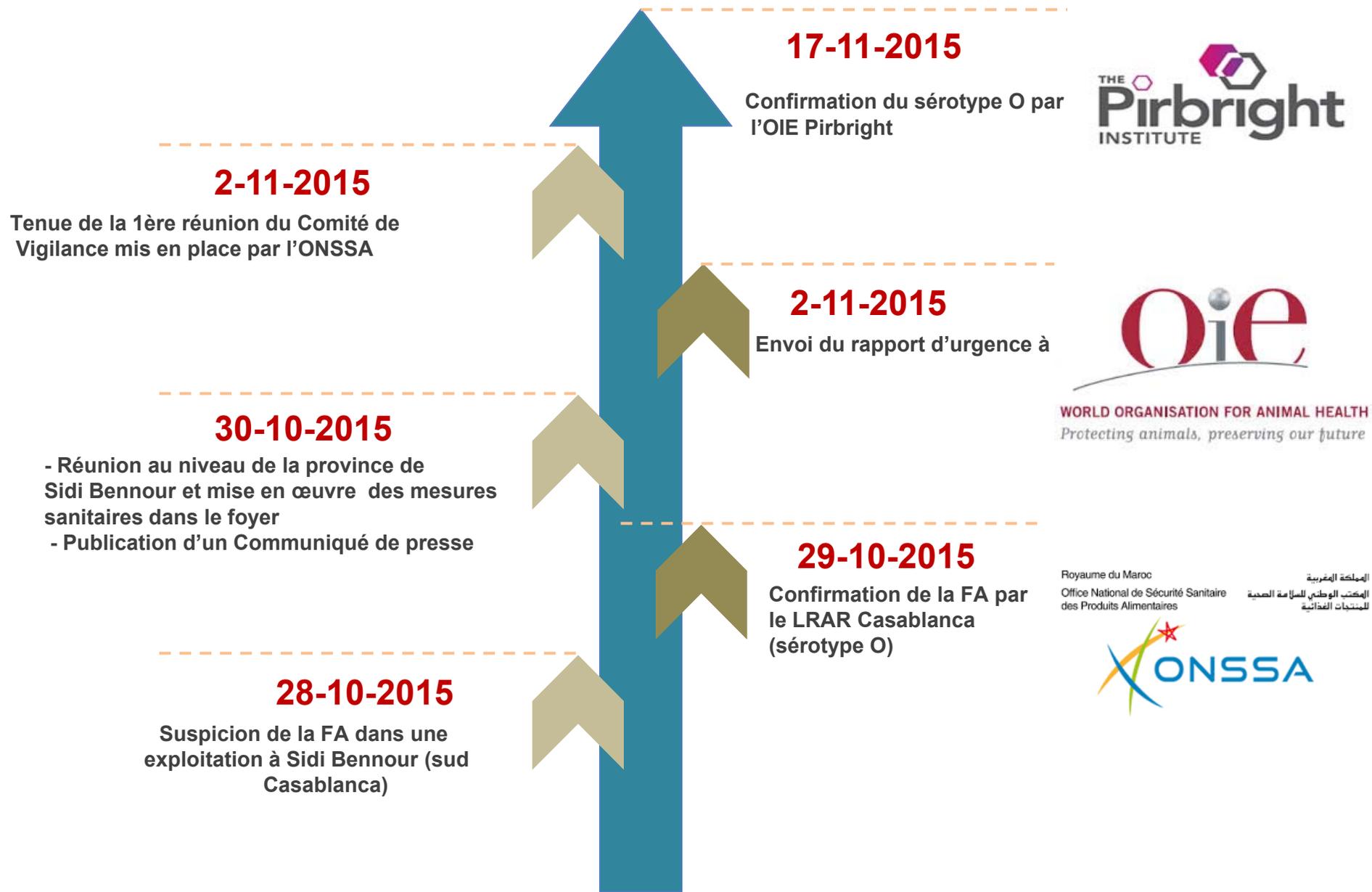
# FMD in North Africa...

*After 15 years of absence, FMD reoccurred in Tunisia (April 2014), Algeria (July 2014 and March 2015) and Morocco (October 2015)*



*Serotype O  
O/ME-SA/Ind-2001*

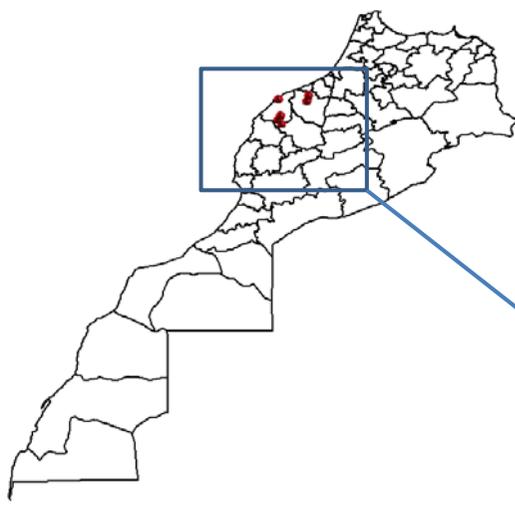




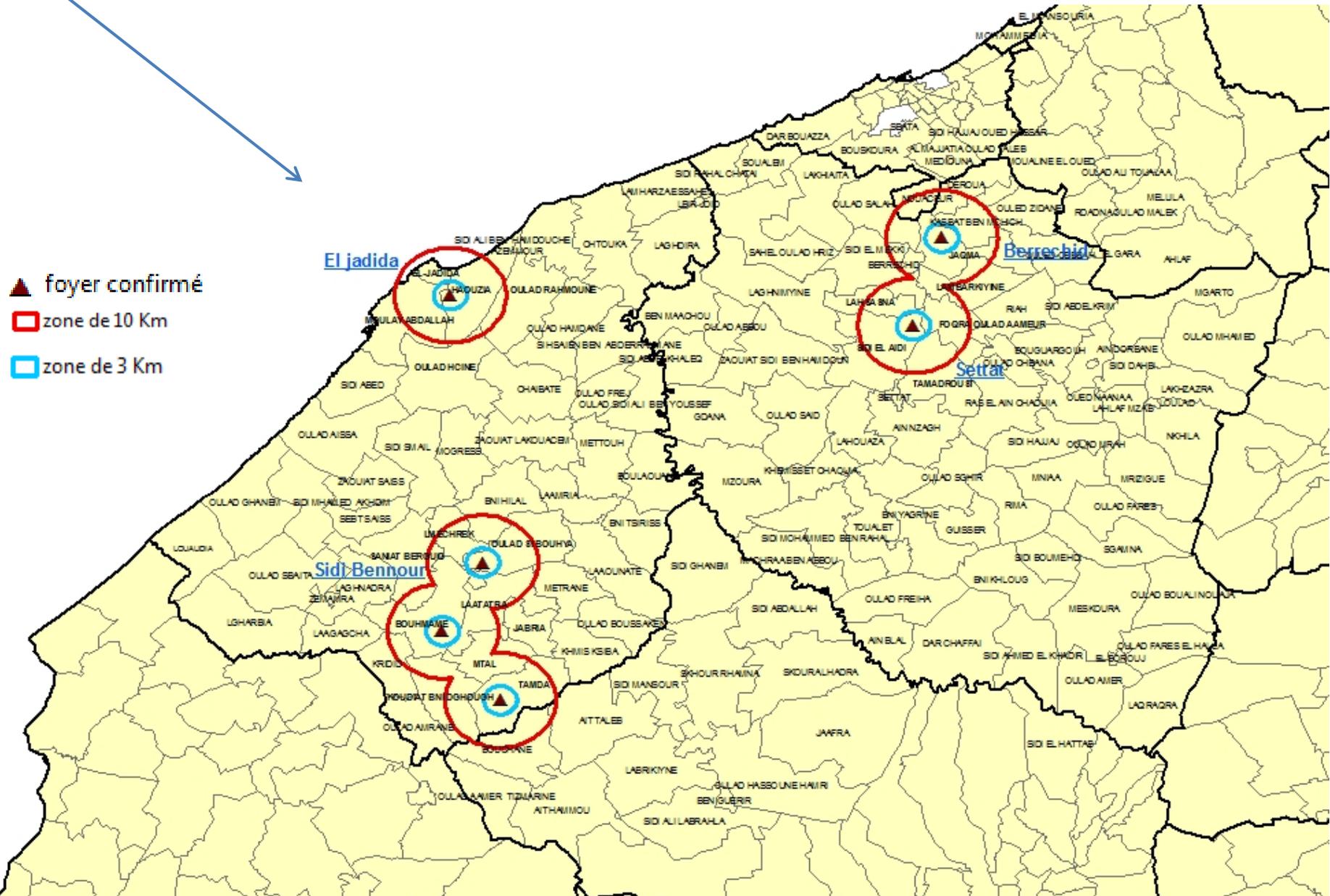
# FMD in Morocco

## 1. Epidemiological situation

Date de déclaration	Province	Commune	Foyers	Nombre de <b>Bovins</b>				Nombre <b>d'Ovins</b>	
				Cas	Morts	Détruit	A. Sensibles	Détruits	A. Sensibles
<b>28/10/2015</b>	Sidi Bennour	BOUHMAME	1	10	0	17	17	14	14
<b>28/10/2015</b>	Sidi Bennour	TAMDA	1	1	0	4	4	0	0
<b>03/11/2015</b>	Sidi Bennour	LMECHREK	1	1	0	2	2	22	22
<b>06/11/2015</b>	Settat	SIDI EL AIDI	1	3	0	17	17	38	38
<b>07/11/2015</b>	El Jadida	HAOUZIA	1	1	0	12	12	0	0
<b>13/11/2015</b>	Berrechid	JAQMA	1	11	0	30	30	41	41
<b>Total</b>			<b>6</b>	<b>27</b>	<b>0</b>	<b>82</b>	<b>82</b>	<b>115</b>	<b>115</b>



# Geographical distribution of FMD outbreaks





Foyer de fièvre aphteuse

Zone de protection (3km)

Zone de surveillance (3-10km)

Limite commune

Légende

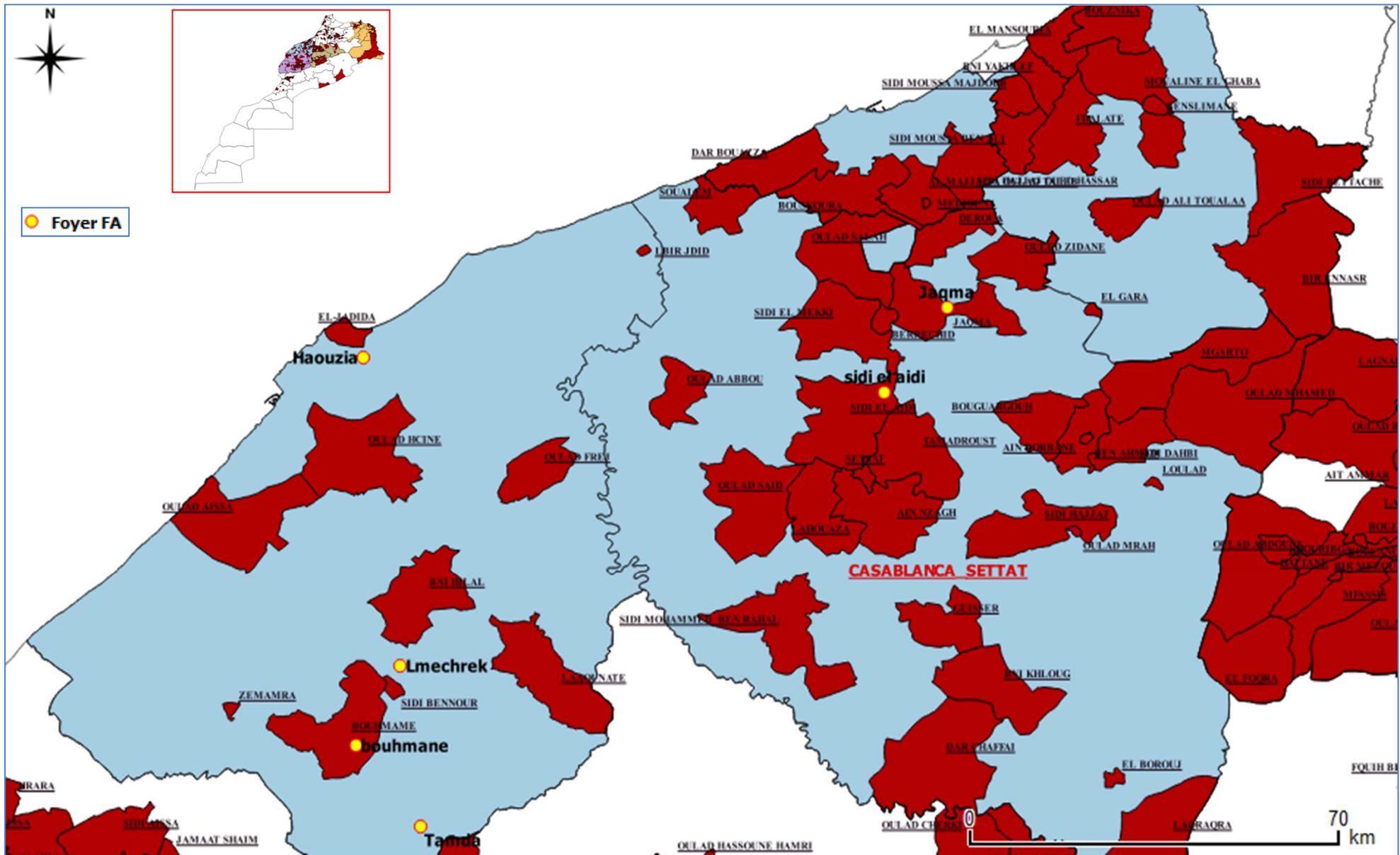
Dr A BAKKOURI 16-11-2015

Data SIO, NOAA, U.S. Navy, NGA, GEBCO

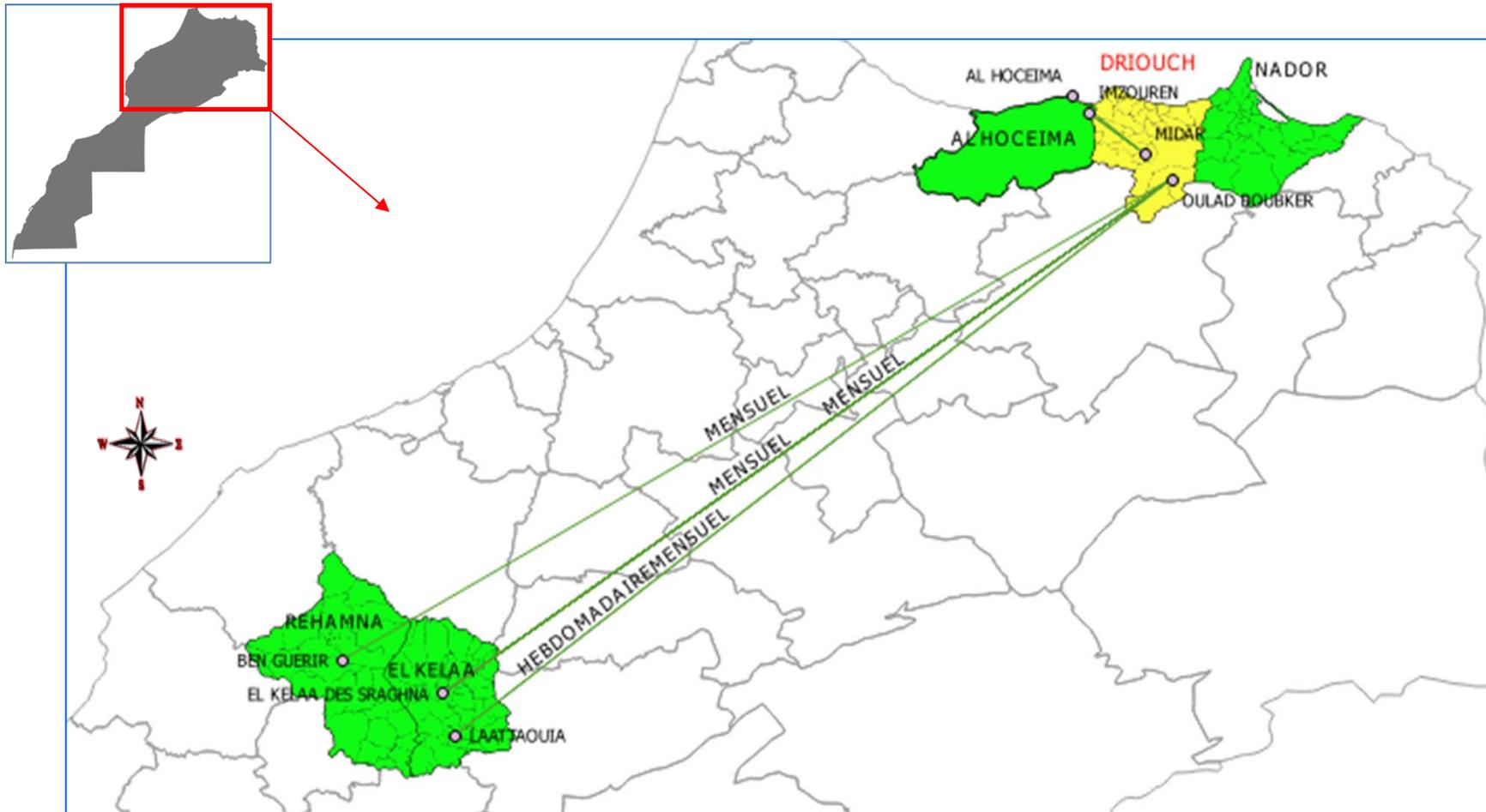
© 2015 Google  
Image Landsat

Date des images satellite : 10/4/2013 33°29'37.36"

# Risk of foot-and-mouth disease through movement of sheep :



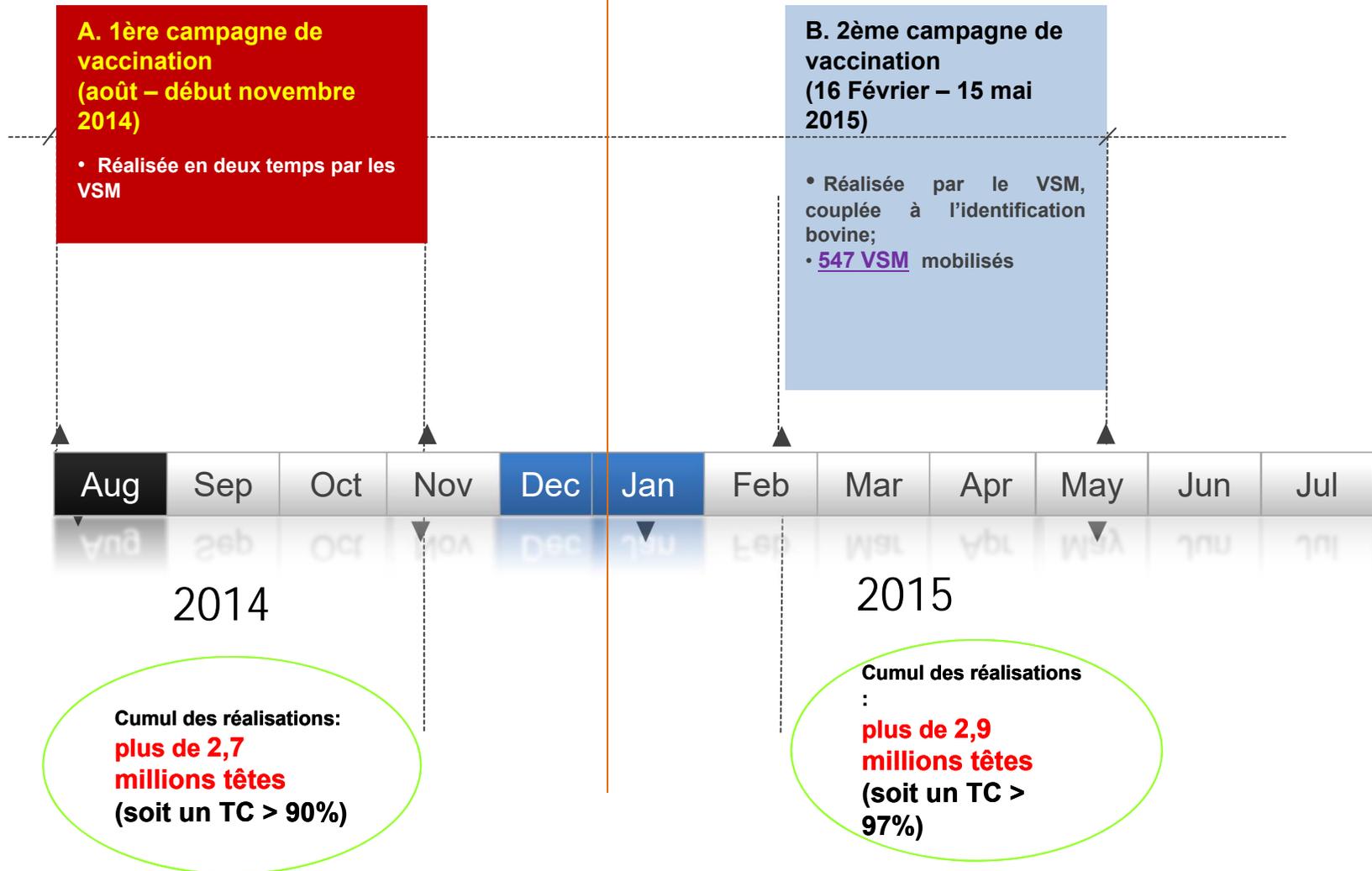
## Existing Sheep Trade Routes and Possible Relationships with 2015 FMD outbreaks



# FMD outbreaks 2015



# Preventive vaccination campaigns (Prior to onset of FMD).



# Vaccination

## A. Campagne de vaccination (12 novembre 2015 – 8 janvier 2016)

- Réalisée par les VSM (558 mobilisés),
- **> 3,2 millions** bovins vaccinés

## B. Campagne de vaccination (20 octobre – 20 décembre 2016)

Lancement de campagne nationale de vaccination de rappel FA



A highly concentrated vaccine strain covering the O Manisa and O 3039 serotype  
The vaccine dose used contains 3PD50, that is to say 3 times the protective dose.



## National serological survey:

Effectiveness of vaccination in cattle:

Results on Day 0: Average seropositivity rate of 78.1% (70.4 to 100%).

Results at Day 30: Mean seropositivity rate 99.2% (97.65% to 100%)

Study on the efficacy of the vaccine used in cattle,  
02 groups:  
-10 unvaccinated young.  
-10 adults vaccinated.

Results

Nov. 2015

Nov. 2015

End 2016-2017

April 2017

## National serological survey:

Elucidate the degree of viral circulation in small ruminants.

RESULTS: Average seropositivity rate of 2.40% (209 sera positive by NSP ELISA).

## Risk-Based surveillance:

Viral circulation in small ruminants (Collaboration: EuFMD)

- 723 samples
- Results in progress.

Risk-based serological survey in small ruminants 2017 for detection of viral circulation (Eufmd collaboration).

01

**Place of study:** areas considered to be at high risk:  
Communes: results of the 2015 serological survey;  
Communes: outbreaks of FMD in 2015 in cattle.

02

**Sampling unit:** Random draw at two levels: breeding and then drawing of all young animals of the breeding (age between 5 and 12 months).

03

**Sampling frame:** Census of small ruminant farms carried out at the level of the communes concerned.

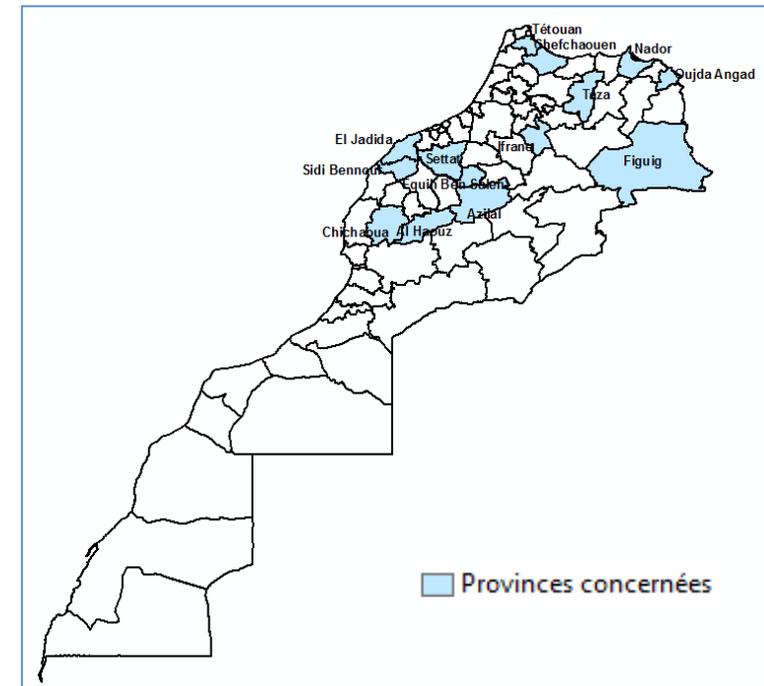
04

**Random:** 76 breeding farms; 723 sera.

05

**Lab technique:** ELISA NSP

**Results:** in progress

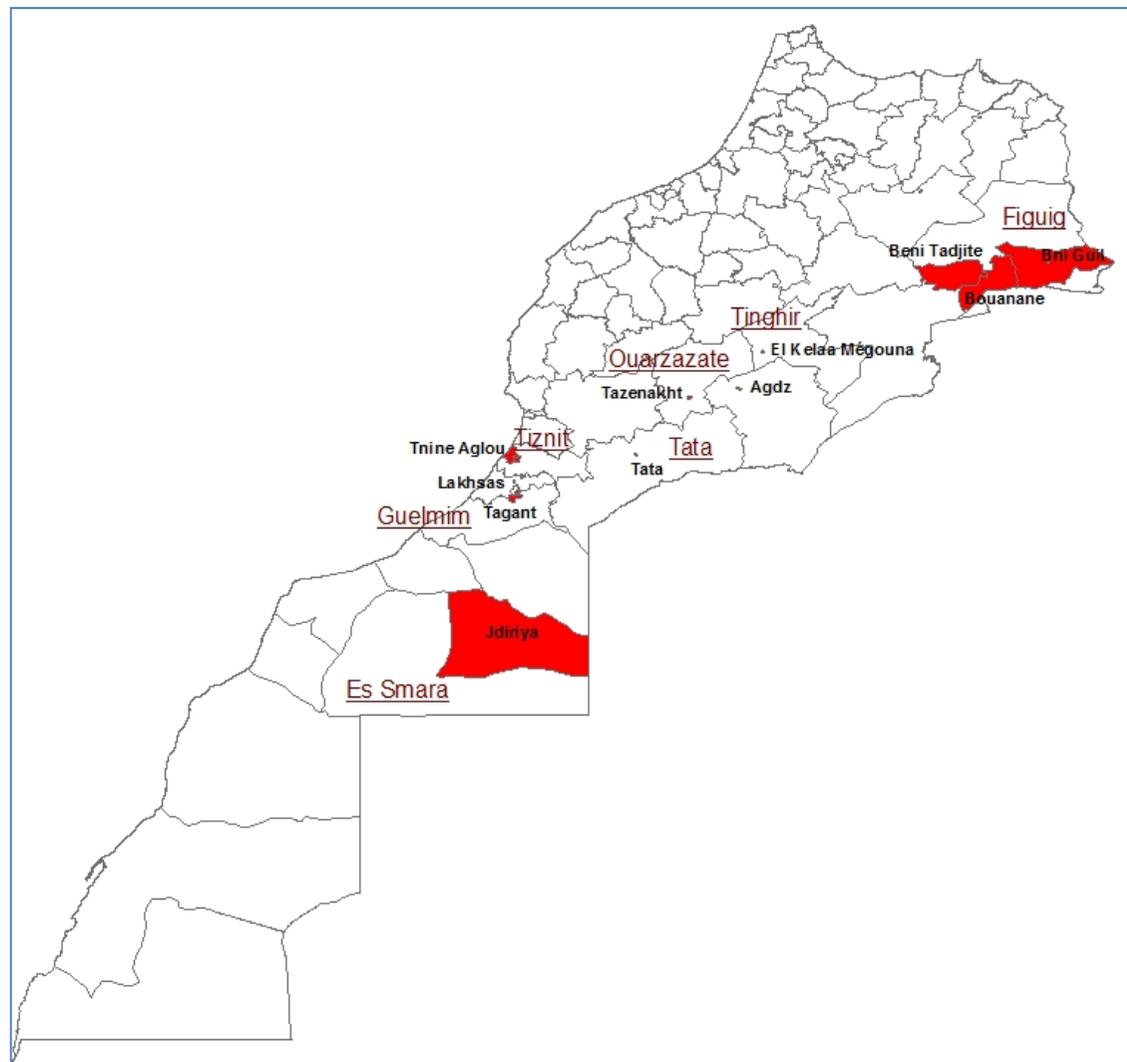


# Implementation and monitoring of sentinel herds



Following the occurrence of serotype A in Algeria in March 2017 and in Tunisia in April 2017: active surveillance in zones considered at risk of introduction of FMD.

- **Location of the study:** areas deemed to be at high risk
- **Sentinel farms:** 20 farms with different species of ruminants.
- **Number of animals to be monitored per animal:** 02 cattle and 03 small ruminants.
- **Type of sample:** sera , blood.
- **Frequency of blood sampling:** 2 times / month since May 2017.
- **Techniques of analysis:** ELISA / PCR if seroreactors
  - A total of 230 samples were collected.
  - Up to date no seroreaction has been detected.



**Merci pour votre  
attention**

