Use of two French equine databases for better knowledge of mortality and other demographic issues

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EAAP Annual meeting 2018 - Dubrovnik - Croatia - August 29th

Introduction

Imperfect knowledge of the equine population at regional, national and international level

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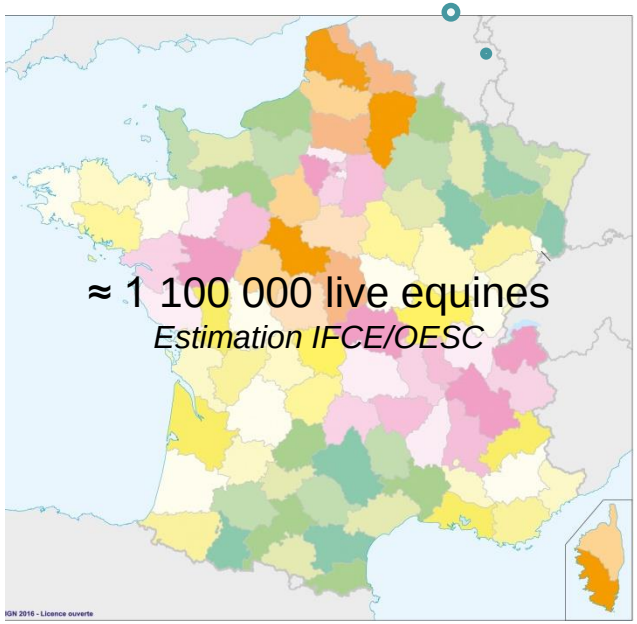
Limiting factor for accurate socio-economic, animal health and welfare studies

How many exactly ?



Where am I ?

Introduction

In France

2 complementary and centralized databases

For the whole national equine population

SIRE Individual data

- All equines born in or imported into France must be identified
- Data are centralized in the French equine census database (**SIRE**) managed by the French Horse and Riding Institute
- Since 2010, 95% of equines are identified ***(Dornier, 2010)***

FSDI Mortality data

- All equine cadavers have to be collected by a fallen stock company
- Data from rendering plants are centralized in the Fallen Stock Data Interchange (**FSDI**) database managed by the French Ministry of Agriculture
- Since 2011, equine data are comprehensive

Objective

Evaluate whether
the combined use of the FSDI and SIRE databases
can

- Provide relevant estimates on equine mortality for the whole French equine population
- Provide a better knowledge of equine demography

FSDI dataset

From January 1st 2011 to 31th december 2017 – **246, 093 dead equines**

Date of removal request /or removal (100% - good proxy for the date of death)

Age/breed category (100% - incomplete information)

Age category	Breed category
Adult (> 2 years)	**Saddle horse**
	Draft horse
	Donkey
	Pony
Yearling (> 1 year et ≤ 2 years)	**Young animal**
Stillbirth and Foal (≤ 1 year)	

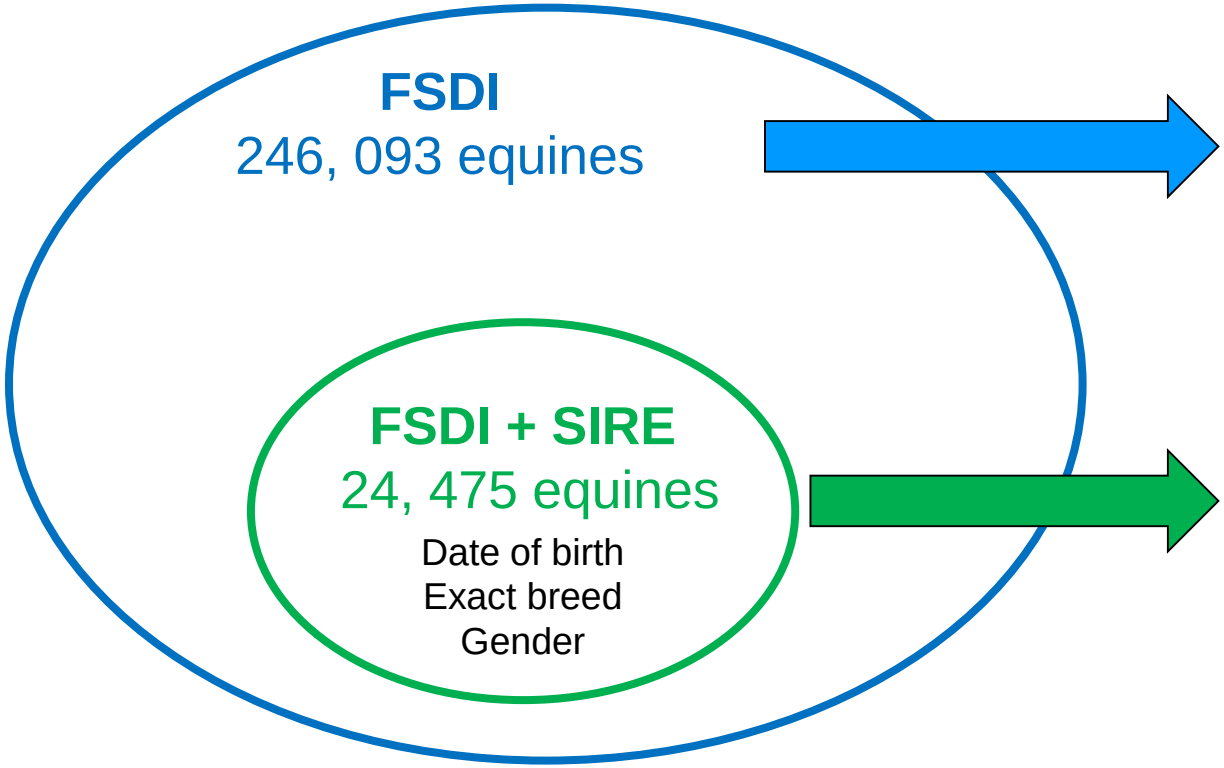
Number of animals collected (100% - quantification)

Zip code of removal location (100% - spatial data)

Identification number (**9.5%** - **24, 475 equines**)

Subset with additional SIRE data

identification number registered in the FSDI database
AND traceable in the SIRE database



Annual mortality ratios

Spatial and temporal variations of mortality

Survival analyses

Method

Data management and analyses: R software

Estimation of global mortality ratios

Number of dead animals collected per year/ estimated number of live equines

Spatial distribution of deaths

Via zip code of the removal location

Modelling temporal variations in mortality

Generalized Additive Mixed Models (GAMMS)

Survival curves

Kaplan-Meier estimates

Results and discussion – Mortality ratio

Annual overall mortality ratios for the French equine population

within the [2.81% - 3.55%] interval

Estimates of equine mortality ratio vary markedly with

- the definition of mortality rates
- the type of samples involved
- the diversity of situations

France - insured horses: **2.47%** *(Leblond 2000)*
USA - animals over 30 days : **1.8%** *(NAHMS 2005)*
Germany - racehorses: **2.2%** *(Lindner 1992)*

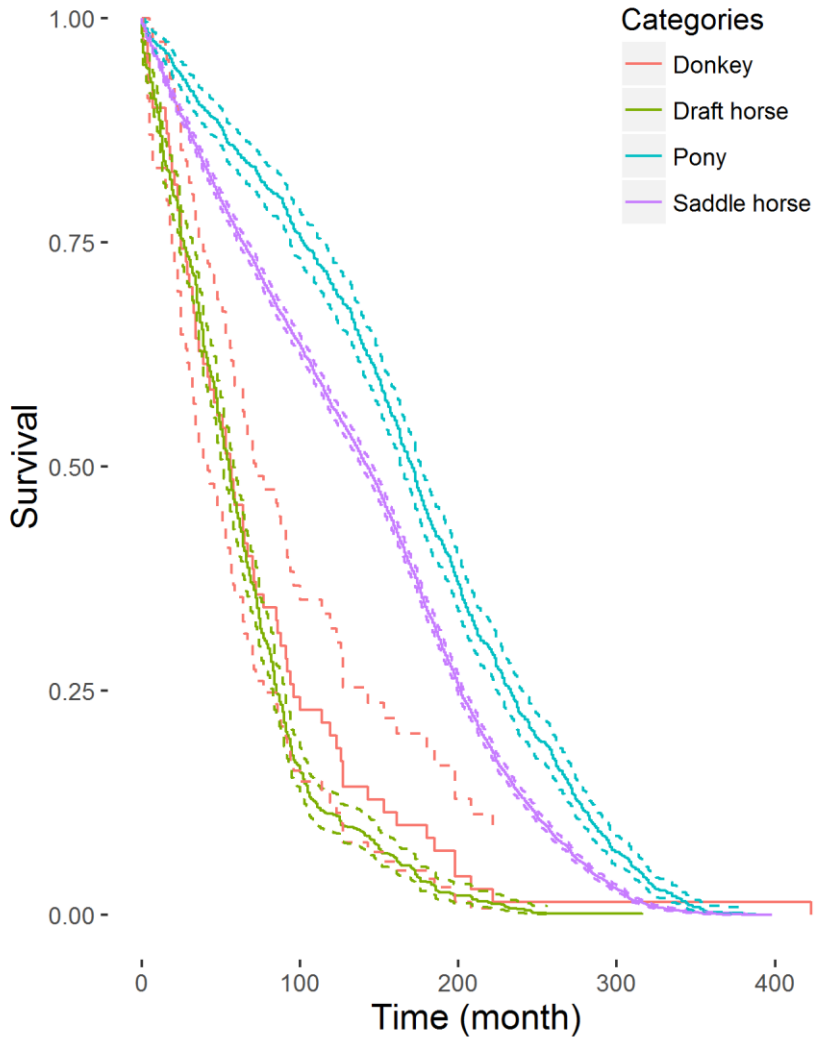
Higher mortality ratio ⇔ general population - young animals included

Potential bias

- uncertainty of the estimated size of the live equine population
- possible illegal burial of small cadavers

Results and discussion – Survival analyzes

Survival analyses
Equines ≥ 2 years



Significant differences between breed categories

Breed category	Median age at death
Pony	**16.9 years**
Saddle horse	14.3 years
Draft horse	8.3 years
Donkey	8.4 years

Pony: highest survival rate

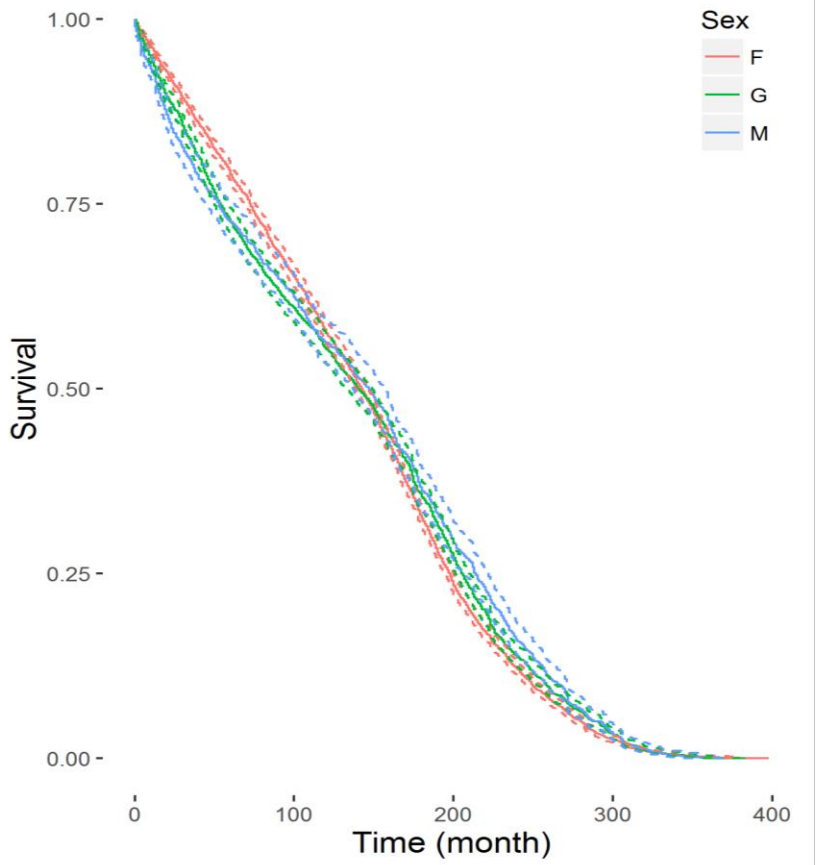
Similar longevity
USA *Brosnahan 2003* - Sweden *Egenval 2009*
Hyp: greater hardiness of ponies, less intense workload

Draft horse: shorter lifespan
France *Leblond 2000*
Hyp: rough life style, increased risk during foaling

Donkey: small sample ➔difficult to conclude

Results and discussion – Survival analyzes

Survival analyses
Saddle horse ≥ 4 years



Lack of sex related survival differences

Global french equine population

=/=

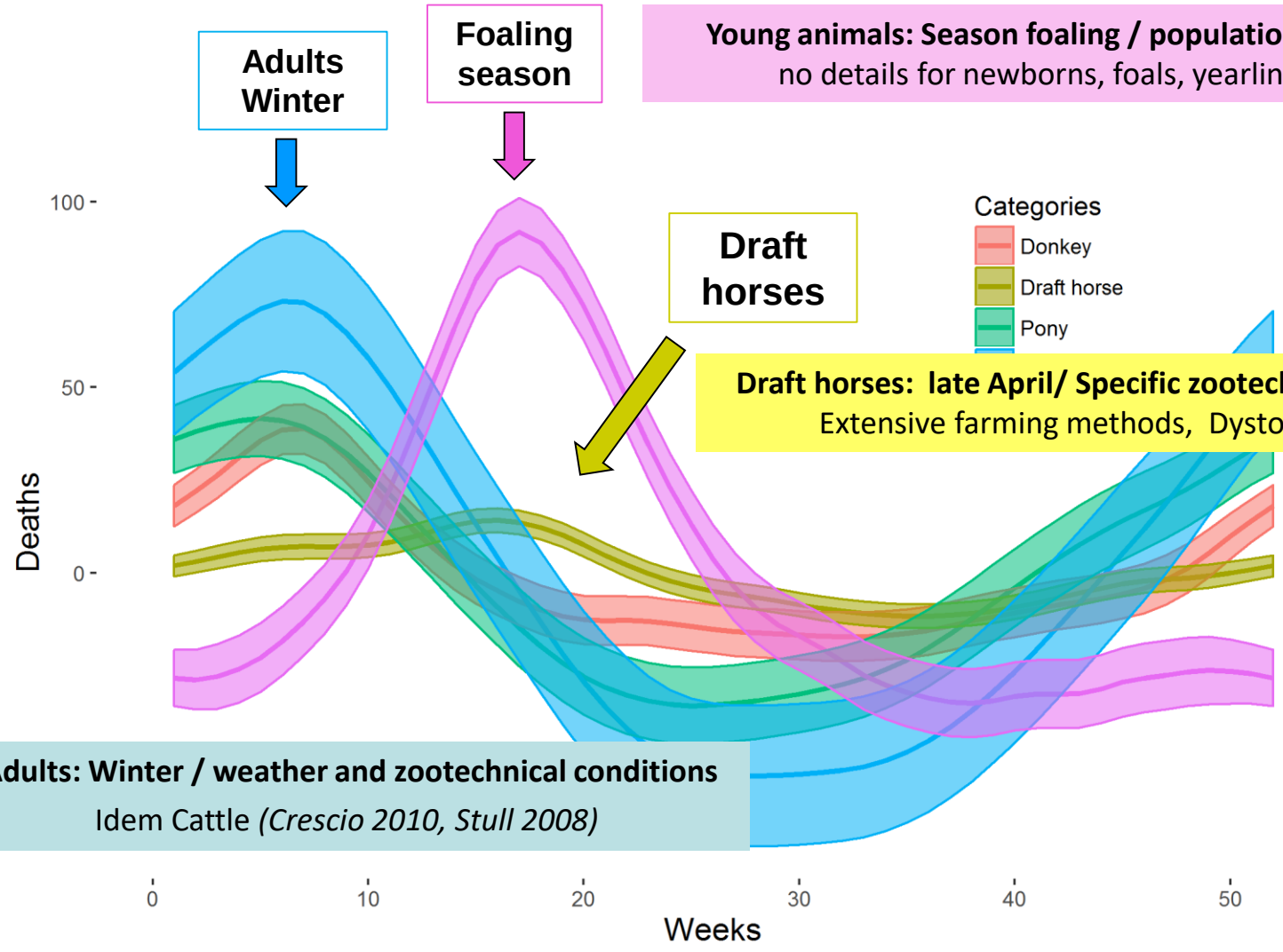
Litterature
focus on specific group of horses

- Geldings between 4 and 15 years: more at risk of death than mares and stallions *(Egenval 2006)*

- Thoroughbreds: Longer lifespan for mares than for stallions *(Langlois 1976)*

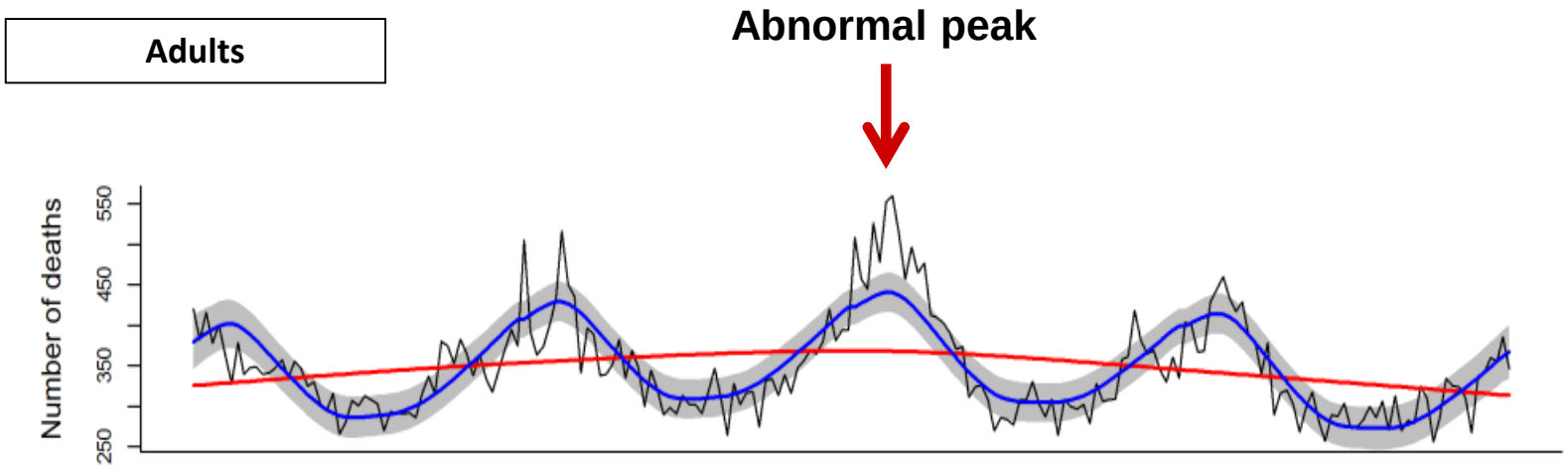
Results and discussion – Temporal variations

Temporal description of equine mortality ⇔ Marked seasonality



Results and discussion – Temporal variations

Temporal variations in equine mortality over several years



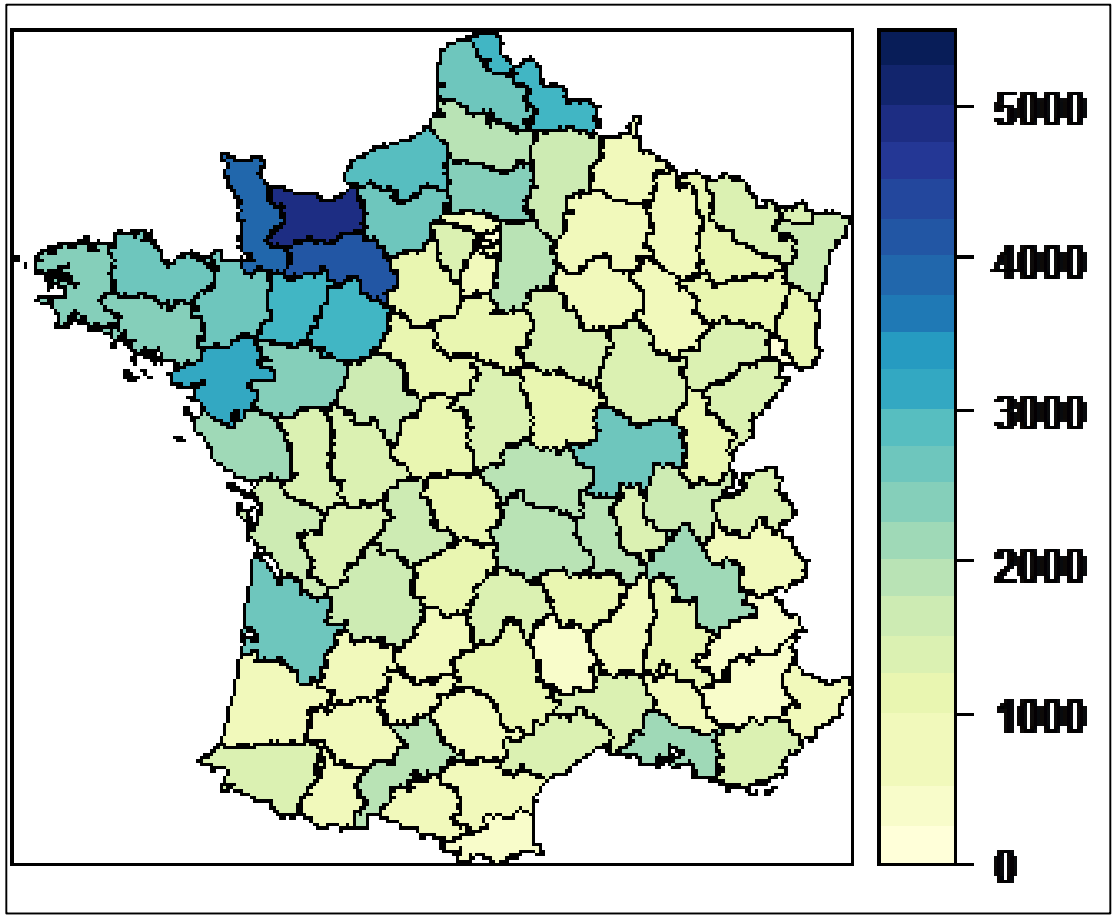
Apparent excess mortality

unknown cause but potential for syndromic surveillance

if there was continuous monitoring of quantitative mortality
➔ *possibility of alerting +/- investigating the cause(s) of abnormal peaks*

Results and Discussion - Spatial distribution of mortality

Number Dead Equines (FSDI) – **All age/breed categories**

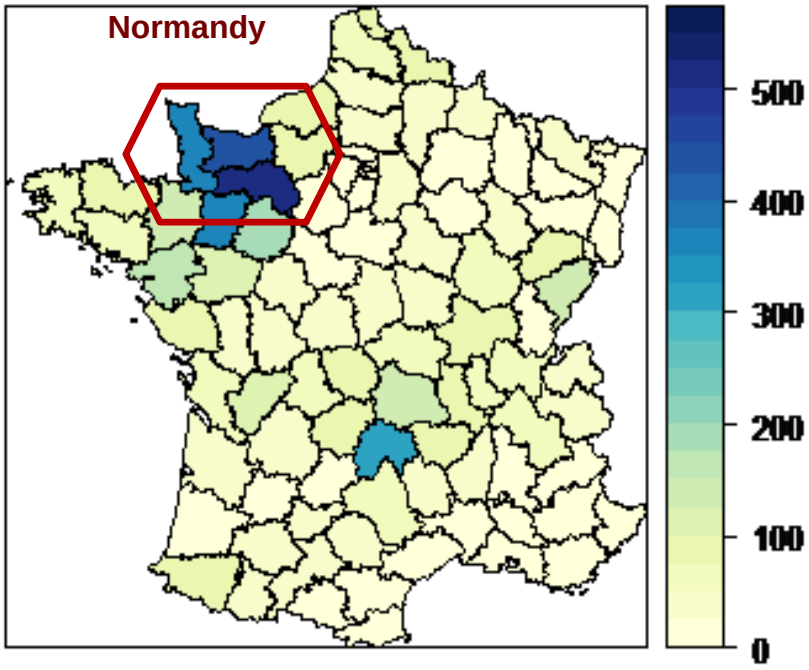


Significant variations of the number of deaths according to the location/*départements*

Results and Discussion - Spatial distribution of mortality

Distribution of deaths according to age and breed

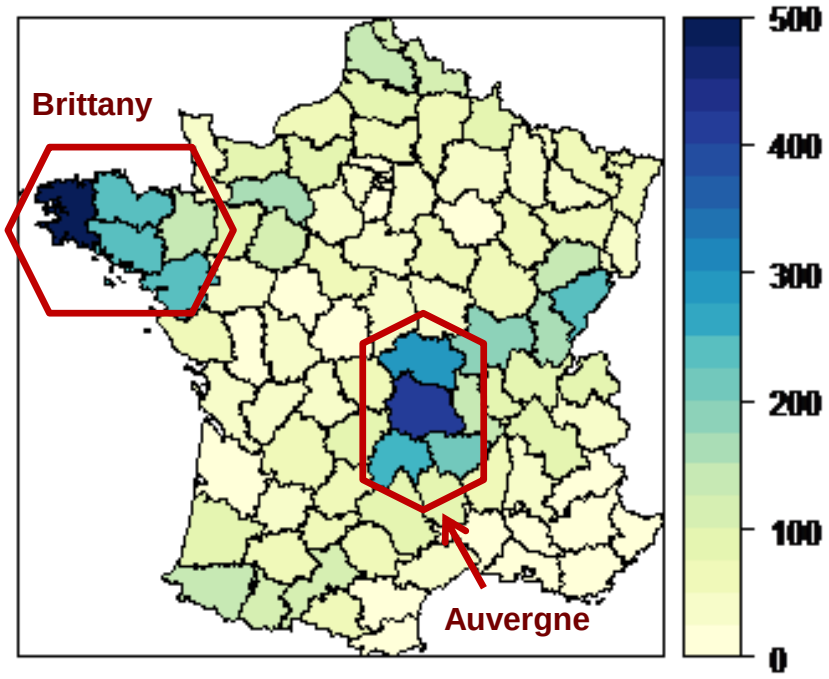
Young animals (FSDI)



Normandy region

France's leading breeding region
All breed taken together

Draft horses (FSDI)



Brittany and Auvergne regions

Leading regions for breeding and use of draft horses

The spatial distribution of deaths seems to reflect the spatial distribution of live equines
➔ Could be used to estimate location of the equine population

Conclusion

Joint analyses of the two databases

✓ *Very promising to study mortality in the French equine population*

✓ *Interest for equine health surveillance through*

the identification of excess mortality

✓ *Can regularly improve the knowledge of the living equine population number and location*

Updating of the dead population in SIRE

Use of the spatial distribution of the deaths
to estimate the spatial distribution of live equines

Future

Better traceability between the two databases
to enable comprehensive interoperability and synergistic use

Thank you for your attention