

Genetic analysis of dystocia in French draft horses

M.SABBAGH(1), A.RICARD(2) and
S.DANVY(1)

(1) IFCE, (2) INRA, SAGA

Draft horses are usually bred outside. One of the most important problems for the breeders is problems which appear during the foaling: mares need help, foal or/and the mare could die ... All the problems make lose money .

The aim of the study is to find the heritability of two traits:

-the facility of foaling

-and the facility of birth.

With the heritability, we will try to make easy tools which could be used by the breeders to think about their mating plans.

Field Data

DÉCLARE SUR L'HONNEUR être NAISSEUR du (ou des) produit(s) désigné(s) ci-dessous.

La jument : est restée vide a avorté le a mis bas le

CONDITIONS DU POULINAGE : sans aide facile difficile intervention vétérinaire

Sexe : _____ Robe* : _____ Produit mort le Nom : 21 caractères maximum espaces compris

Sexe : _____ Robe* : _____ Jumeau mort le Nom : 21 caractères maximum espaces compris

* robe obligatoire pour les poulinières

Code 1

Code 2

Code 3

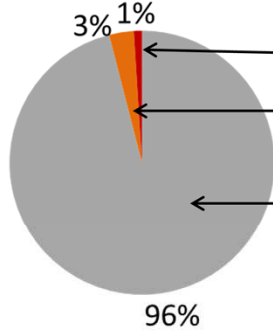
Data result from notifications of birth filled by breeders. They have to check a box concerning the conditions of foaling.

4 choices could be made: "with out help", "easy", "difficult" or "need the vet".

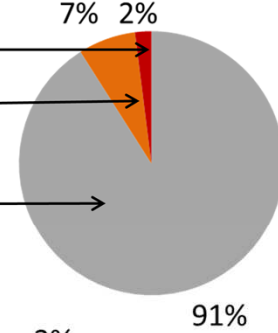
A first analysis show us than the difference between the two firth choices: "with out help" and "easy", is not easy to understand. When we look at the proportion of "with out help" and "easy", we could see that it depends of the place of breeding. Consequently, those two choice are grouped for the study.

Field Data

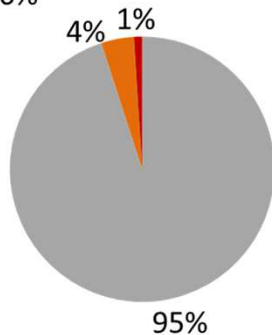
Bretons



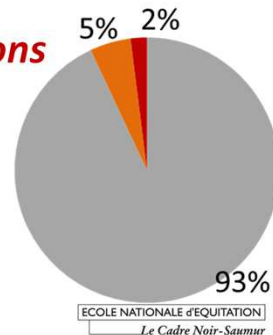
Ardennais, Auxois and Trait du Nord



Comtois



Percherons



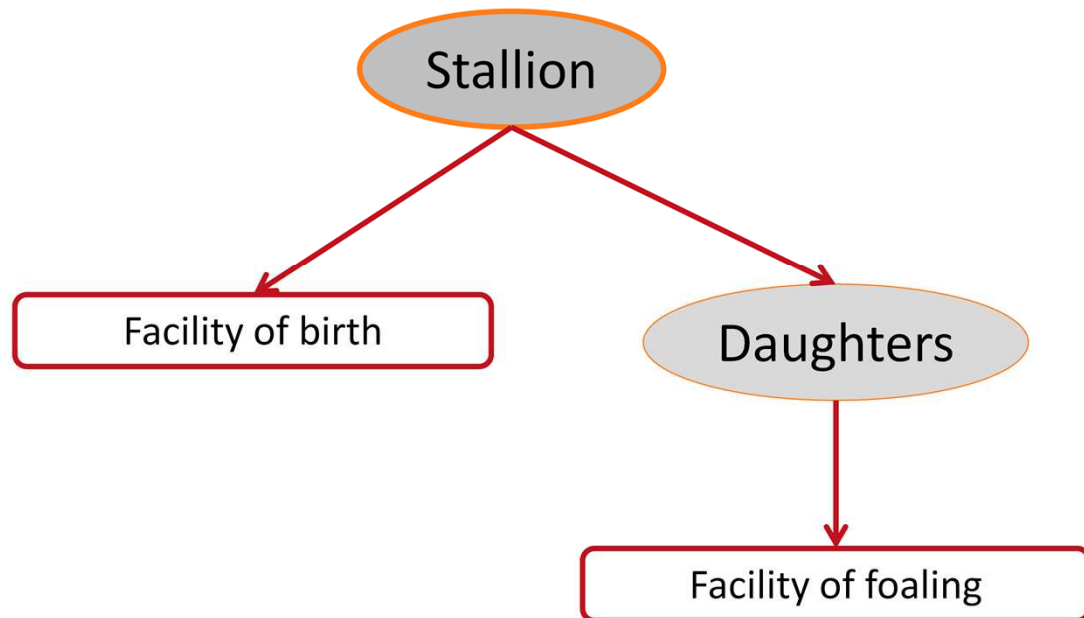
ECOLE NATIONALE d'EQUITATION
Le Cadre Noir-Saumur  les Haras nationaux
Institut français du cheval et de l'équitation

Data are collecting if there are the result of a pure breed birth. There is 9 French Draft horses breeds in France, but only 4 groups of draft French breeds have enough data to be included in the analysis:

- Bretons: 38 877 births concerning 12 873 mares and 1 483 stallions
- Ardennais, Auxois and Traits du Nord: 11 229 births concerning 4 039 mares and 680 stallions. The 3 breeds are grouped because a mare or a stallion of one studbook could product in another studbook. The links between the 3 breeds has been proved (Leroy et al. , 2009)
- Comtois: 35 764 births concerning 12 876 mares and 1 784 stallions
- Percherons: 13 274 births concerning 4 927 mares and 446 stallions

The other breeds: Boulonnais, Cobs Normand and Trait Poitevins are small breeds. Even if we are collected data since 1998, there were not enough data to includes those breeds in the study.

2 different traits for one performance

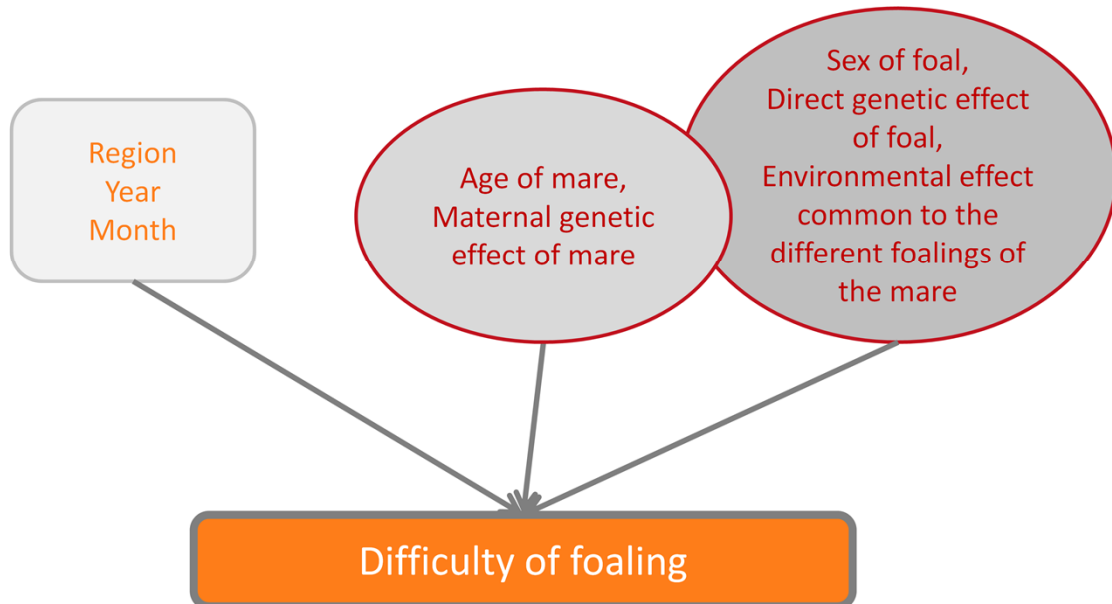


Data are collecting with one cross. However, 2 different traits could be study and 2 EBV could be calculated for a single stallion:

-the facility of birth: the information comes from the birth of all the product of the stallion,

-the facility of foaling: the information comes from the daughters of the stallion. The characteristics of the birth of those mares could give information about the study stallion.

Threshold model (3 categories)



Data are analyzed with a Threshold model (100 000 iterations).

The various effects include in the analysis are :

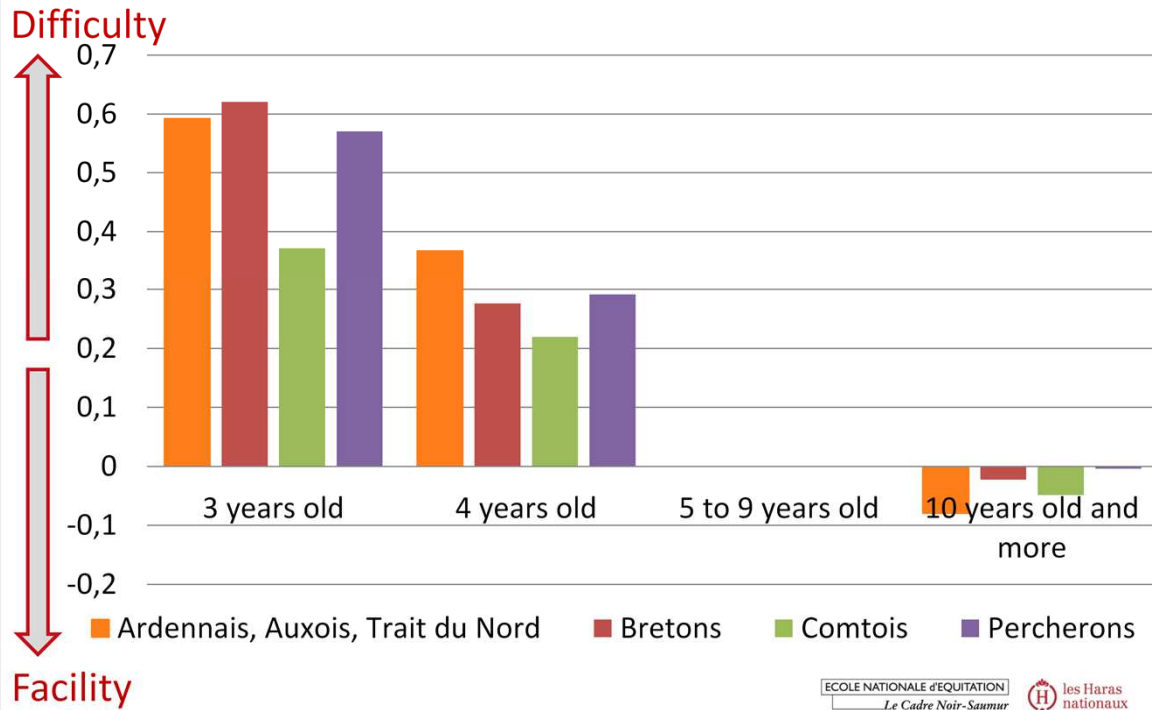
- the region,
- the month and the year of foaling,
- the sex of the foal,
- the age of the mare
- and an environmental effect common to the different foal of a single mare.

A breeder effect could not be include because there is too much different breeders. Moreover, it usual to find two different name for a single breeder: one year, the breeder could by Mr X and the next year, his wife → the foals of a single mare will have the same environment but on paper they have 2 breeders, that why we include an environmental effet for a mare and not a breeder effect.

Genetic parameters

	Ardennais Auxois Trait du Nord	Bretons	Comtois	Percherons	Cattle: breed for meat
h ² direct effect	0,31	0,12	0,20	0,21	0,03 to 0,20
h ² Maternal effect	0,22	0,21	0,11	0,17	0,03 to 0,40
Repeatability	0,33	0,30	0,28	0,26	0,32
Genetic Correlation	-0,27	-0,38	-0,02	-0,42	-0,06 to -0,1

Age of the mare



The importance of the fix effect could be analyzed.
For the impact of the age of the mare, the reference population is the mare of 5 to 9 years old.

Available information for the breeders

➤ For the stallions:

- EBV for direct effect ➔ information on the facility of birth products
- EBV for maternal effect ➔ information on the facility of daughters' foaling

➤ Examples :

	Age	Facility of Birth		Facility of Foaling	
		EBV	Reliability	EBV	Reliability
QUAINE DES BOIS	7	0,33	0,45	Not calculated	
QUEL SUCCES	7	-0,17	0,51	Not calculated	
INOUK	14	0,06	0,72	-0,45	0,50
CIMBALI	20	0,71	0,40	0,66	0,39




 Le Cadre Noir-Saumur

Institut français du cheval et de l'équitation

4 Comtois stallions could be take as example.

-Facility of birth:

- CIMBALI and QUAINE DES BOIS have a positive EBV, they tend to produce foals who are smaller than the average.
- WHICH SUCCESS has a negative EBV, he tends to produce foals bigger than the average.
- INOUK has an EBV close to 0, he tends to produce medium-sized foals.

-Facility of foaling:

- QUAINE DES BOIS and QUEL SUCCES are two young stallions. Information about the foaling of their daughters are not yet available. Their EBV are not yet calculated
- INOUK has a negative EBV, consequently, his daughter will probably have more difficulties in foaling than the average of the population.
- CIMABLI has a positive EBV, his daughter will probability foal more easily than the average of the population

Published Indexes and Perspectives

- EBV are published for stallions if the reliability $CD \geq 0,20$
- Or presented as an advice as for the cattle:
 - « to avoid on primiparous »
 - « easy foaling »
- A new analysis including the rank of foaling is being made

Take home message

- Heritabilities and repeatability are not insignificant
- Fixed effects are important
- EBVs could be used easily by the breeders
- This study could be made in other stud-book if data are available.

Thanks



I would like to thank the associations of draft horses which allowed the use of their data and more particularly the Comtois to whom the study was led for the first time

Le Cheval Breton



ÉCOLE NATIONALE D'ÉQUITATION
Le Cadre Noir-Saumur
national

Institut français du cheval et de l'équitation