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Genetic parameters for resistance to infectious diseases in two french paternal meat rabbit lines

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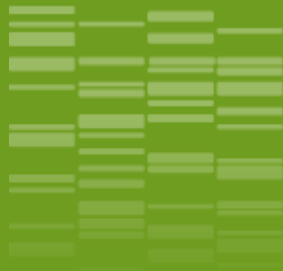
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Genetic parameters for resistance to infectious diseases

in two French paternal meat rabbit lines



World Rabbit Congress
18/06/2016

Gunia M, David I, Hurtaud J , Maupin M , Gilbert H , Garreau H

Introduction



Antimicrobial
resistance

Genetic
selection



Diseases in rabbit
farms

Improve health
AND
reduce antibiotic use

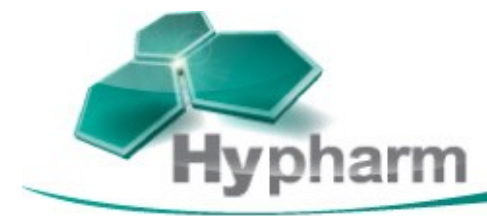


Aim of the study

Heritability of resistance to infectious diseases

Genetic correlation between disease and
production traits

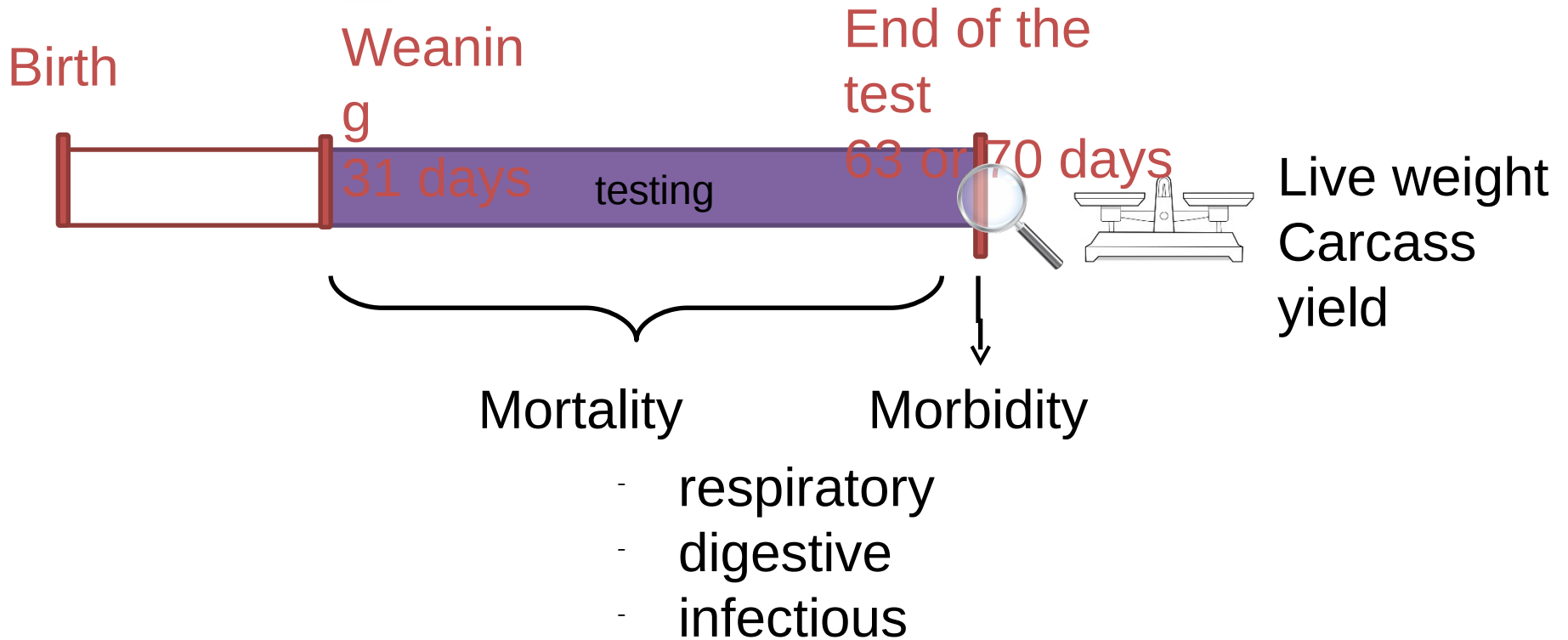
Data



- Nucleus farm of the French breeding company Hypharm
- 2 purebred paternal lines selected for meat production traits
 - AGP39 and AGP59
- 150 000 rabbits
- 1998 - 2014



Recording



Disease traits

Trait	Description	Prevalence
Digestive syndromes	Diarrhea, bloated abdomen...	7.1 %
Respiratory syndromes	Nasal discharge, lung lesion, wry neck...	4.0 %
Infectious syndromes	Digestive + respiratory syndromes	12.1 %
Infectious mortality		4.7 %

Production traits

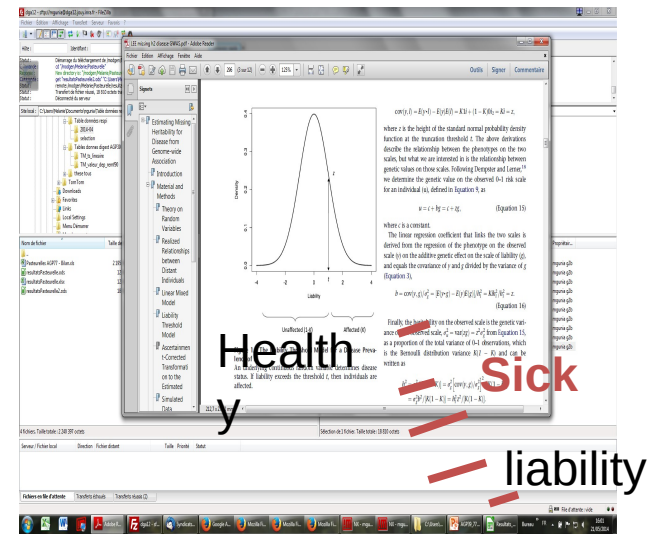


Trait	Mean	Standard deviation
Carcass yield (%)	57.69	1.92
Live weight (kg)	2.88	0.39

Data from 1998 to 2014

Statistical analysis

- ❖ Threshold model creates an underlying continuous unobservable trait, the liability
- ⇒ theoretically better for binary trait

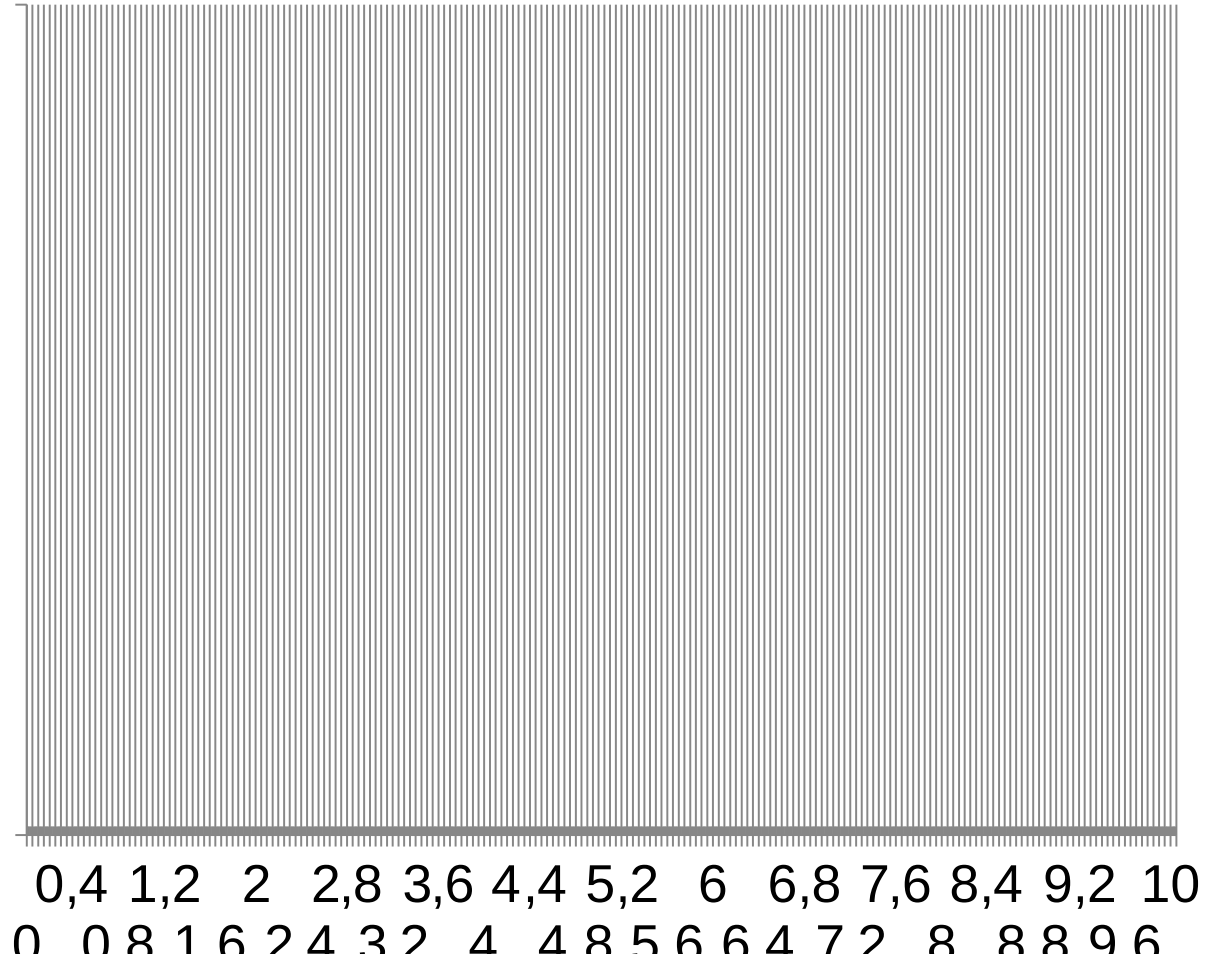


Threshold

- ❖ Linear model for continuous normally distributed traits

- ❖ ASREML software

Heritability estimates



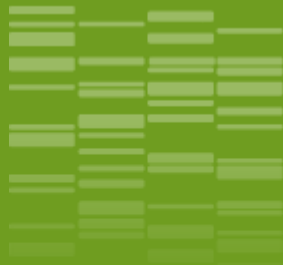
Genetic correlations

	Respiratory syndromes	Infectious syndromes	Infectious mortality	Carcass yield	Live weight (direct)	Live weight (maternal)
Digestive syndromes	-0.18	0.65	0.92	-0.40	0.11	-0.11
Respiratory syndromes		0.61	-0.27	-0.10	0.01	-0.06
Infectious syndromes			0.52	-0.35	0.06	-0.25
Infectious mortality				-0.18	0.00	0.14
Carcass yield					-0.21	0.23
Live weight (direct)						-0.10

Standard deviations ~ 0.07

Take-home messages

- ✓ **Low but significant heritability for disease traits**
- ✓ **Favorable genetic correlations between disease and production traits**
- ✓ **It is possible to select rabbits for general disease resistance**

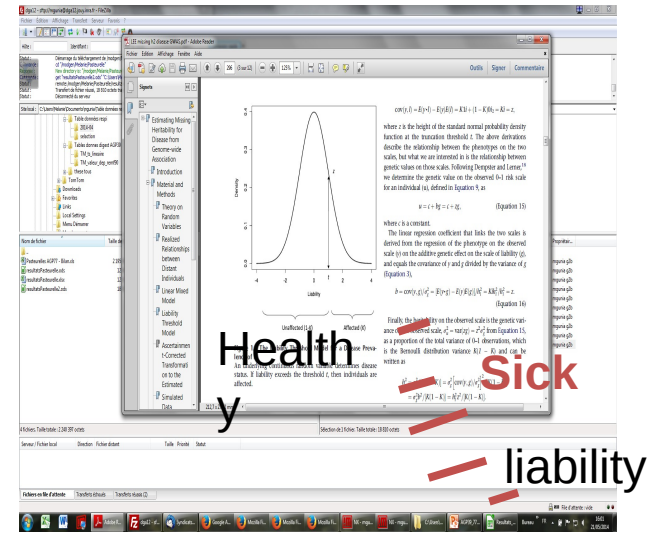


Thank you



Statistical analysis

- ❖ Threshold model create an underlying continuous unobservable trait, the liability
 - ⇒ theoretically better for binary trait
- ❖ Linear model for continuous normally distributed traits



$$y = Xb + Zu + Wm + Ql + e$$

Performance or liability

Fixed effects

Random genetic animal effects

Random genetic maternal effects

Random common litter effects

Random residual effects

- ❖ ASREML software

Threshold