Genetic effects on lamb survival traits

François Dominique [1], Raharivahoaka C. [1],
Tortereau F[1], Poivey J.P. [2], Tiphine L.[3]

[1] INRA, UR 631 SAGA, CS 52627, 31326 Castanet-Tolosan cedex, France,
[2] INRA, UMR 112 SELMET, 2 place Viala 34398 Montpellier , France
[3] Institut de l'Elevage, MNE, 149 rue de Bercy, 75595 Paris cedex 12 , France

INRA SCIENCE & IMPACT

UMT Génétique des Petits Ruminants

lamb survival:
component of the maternal value of ewes

- context: estimation of breeding value (EBV) for maternal value of suckling ewes (terminal breeds and hardy breeds)
- Milk potential based on growth of the litter: Weight at 30 days estimated from a weighting between 21 and 42 days with a correcting coefficient for twins (and eventually triplets)
- But when there are lamb mortalities before weaning, the model with growth is biased
- it was necessary to integrate information on lamb survival which is the second predictor of maternal value
- the French national maternal EBV (Poivey *et al*, 1995) combines 2 index:
    - EBV Milking potential estimated from ADG10d-30d till 2007 and now from 30dLiveWeight
    - EBV Mortality

Genetic parameters of French national EBV

	Milk potential		Mortality	
	direct	maternal	direct	Maternal
Heritability	0,20	0,35	0,10	0,15

Genetic parameters estimated in the 90's on a data set from Région Limousin
(JP Poivey & JP Praud, personal communication)

EBV expression :

Milking Value EBV= ½ G direct **Milk potential**
+ G maternal **Milk potential**
+ G maternel **Survival**
expressed in g of ADG 0-30d of alive lamb

→ need of new estimates of the lamb mortality genetic parameters

Data from INRA-Animal Genetics Division flocks

- 2 flocks with both Romanov and Romane ewes (Langlade, La Sapinière)

Romanov

Romane

(ex-*INRA401*:
50% Romanov - 50% Berrichon du Cher)

Data from INRA-Animal Genetics Division flocks

- 2 flocks with both Romanov and Romane ewes (Langlade, La Sapinière)
- Survival trait registered since 70's with codification of mortality causes
- Data set used: survival of lambs born from 2003 to 2012

	Romanov	Romane
Lambs	4 215	22 428
Sires	207	313
Dams	924	4489

- Study from birth to 60 days of age
- By linear models with direct effects or with direct and maternal effects

Mortality (survival) rates

means

	Romanov breed	Romane breed
Mortality at birth	16,7% (83,3%)	5,5% (94,5%)
Cumulated mortality at 60 days	30,5% (69,5%)	12,6% (87,4%)

Heritability and repeatability coefficients

Birth mortality	Romanov breed	Romane breed
Direct heritability	0.05±0.03	0.09±0.01
Maternal heritability	0.05±0.03	0.01±0.01
Maternal repeatibility	0.13±0.03	0.10±0.01

60 days Mortality	Romanov breed	Romane breed
Direct heritability	0.06±0.03	0.07±0.02
Maternal heritability	0.07±0.04	0.02±0.01
Maternal repeatibility	0.07±0.03	0.06±0.01

Correlation with birthweight

	Romane
Phenotypic correlation between survival at birth & birthweight	0.18±0.01
Genetic correlation between survival at birth (direct effects) & birthweight (direct effects)	-0.07±0.11
Genetic correlation between survival at birth (direct effects) & birthweight (maternal effects)	0.02±0.11

Correlation with 30days_weight

	Romane
Phenotypic correlation between 60 days_survival & 30days_weight	0.28±0.02
Genetic correlation between 60 days_survival (direct effects) & 30days_weight (direct effects)	-0.12±0.16
Genetic correlation between 60 days_survival (direct effects) & 30days_weight (maternal effects)	0.23±0.17

references

Estimations of heritability following different periods, different scales, different genetic models (direct, direct + maternal)…

breed	number of lambs	period	scale	direct heritability	maternal heritability	reference
US MARC crossbreds	16 881	At birth	binary	0.02±0.03	-	Gama *et al.* (1991)
Romney	55 146	At birth	binary	0.03±0.01	0.01±0.01	Morris *et al.* (2000)
Scottish Blackface	4 459	At birth At 8wk	Normal	0.09±0.03 0.07±0.03	-	Riggio *et al.* (2008)
Scottish Blackface	15 652	At birth 15-120d	Normal Weibull	0.05±0.02 0.18±0.04	0.09±0.02 -	Sawalha *et al.* (2007)
Romane Romanov	22 428 4 215	At birth 1-60d At birth 1-60d	Normal « « «	0.09±0.01 0.07±0.02 0.05±0.03 0.06±0.03	0.01±0.01 0.02±0.01 0.05±0.03 0.07±0.04	This study

Low estimates →

– large importance of environmental effects (key for improvement)

– can be improved by appropriate selection design (← progeny test on maternal traits)

prospects

- To extend the study to our other flocks
  Dairy Lacaune,
  Mérinos d'Arles,
  « outdoors » Romane
- To modify Survival EBV computing programmes