



National genetic evaluations in dairy sheep and goats in France

INRA - SAGA



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Introduction



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Introduction

Sheep dairying in France

1,500,000 ewes

5,000 breeders

250 (ML) milk



Roquefort area
Lacaune breed
870,000 ewes

Corsica island
Corsican breed
95,000 ewes

Western Pyrenean
Manech red faced
Manech black faced
Basco-Béarnais breeds
480,000 ewes

Sources: FAOSTAT, Institut Elevage

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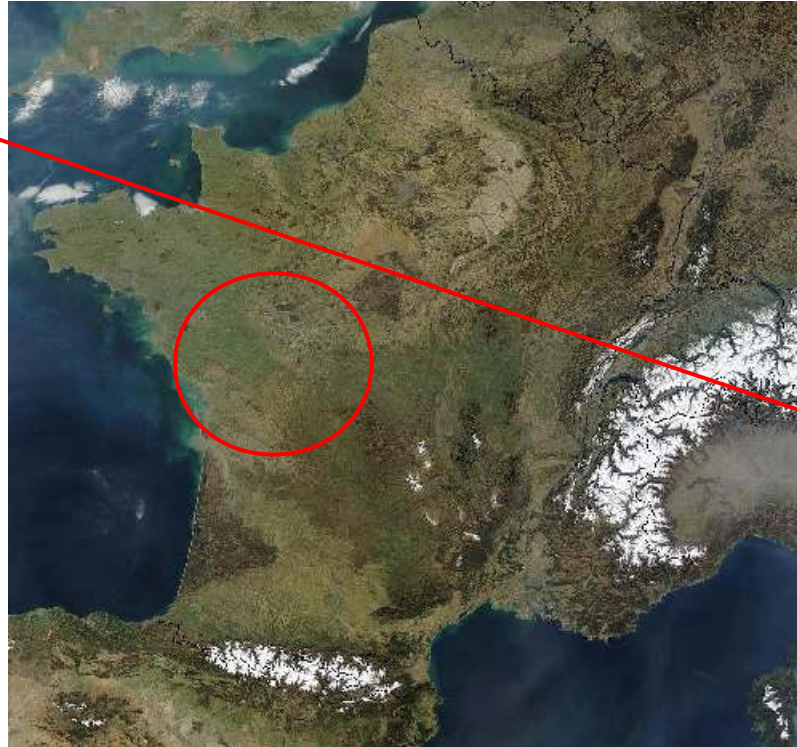


Introduction

Goats dairying in France

888,000 goats
4,900 breeders
584 (Mkg) milk

West and south
2 main breeds:
Alpine (59%)
Saanen (38%)



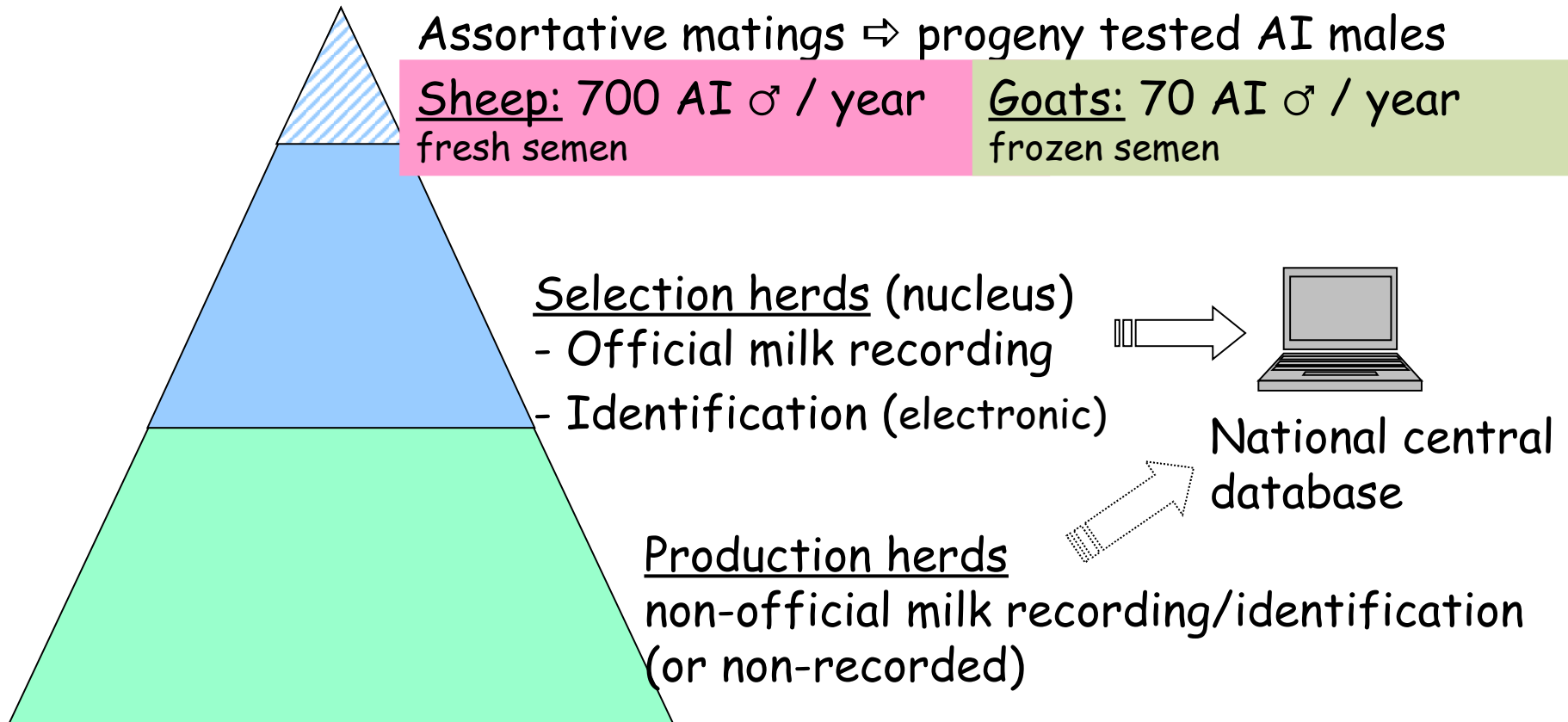
Sources: FAOSTAT, IE

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Pyramidal management of the populations

Pure breeding selection programs



Breeding programs

	Population Size	% Official milk recording	%AI in nucleus	AI progeny tested sires	Milk yield
Alpine	530 000	30	20	40	833 kg (273d)
Saanen	360 000	30	20	30	861 kg (277d)
Lacaune	870 000	20	85	445	288 l (165d)
Manech red faced	480 000	23	50	151	194 l (155d)
Manech black faced			45	36	142 l (140d)
Basco Béarnais			50	52	167 l (143d)
Corsican	95 000	21	30	31	144 l (186d)

Source: Institut Elevage (2010)

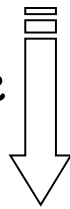
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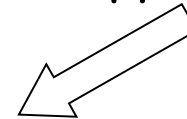
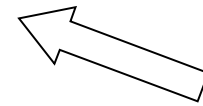
Genetic improvement in France: a national collective organization

Ministry of agriculture
legislation, control,
financial supports(-)

delegate



support



**France Génétique Elevage (France Livestock Genetics):
a grouping of professions and users**

**Operational management
(breed organization, identification and performance
registration, AI organizations, data management)**

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Recording traits



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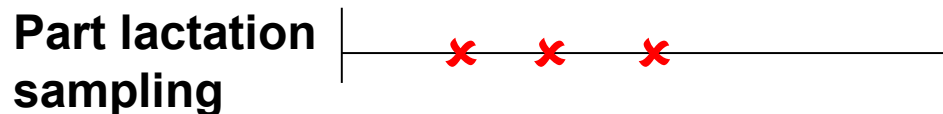
Production traits recording programs

For Sheep a simplified recording system:

- AC design for MY
- part lactation sampling for milk composition and SCC



Monthly recording of MY
morning milking
(adjusted for milk tank)



F%, P%, SCC
not available in corsican

average: 3 test days

Production traits recording programs

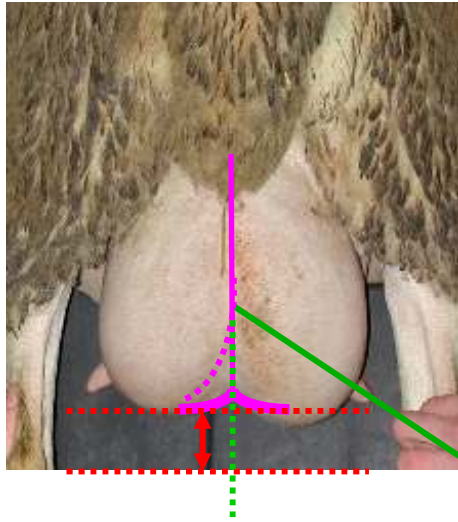
For Goats 3 types of approved methods:

- A, AT(46%), AZ(2%)
- 4 weeks or 5 weeks between records

As dairy cattle for protocol and milk recording management

⇒ a simplified design (3 controls) under study

Udder traits recording programs

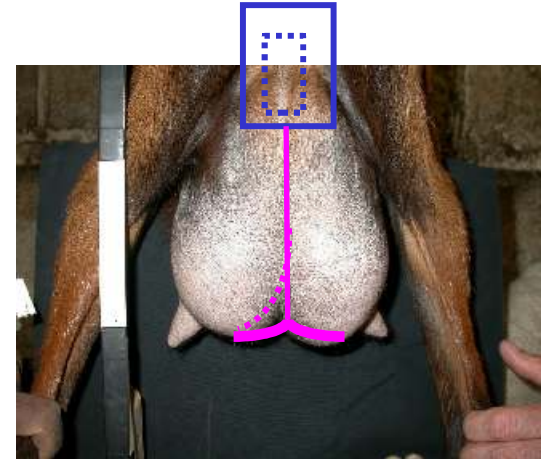


Teat direction

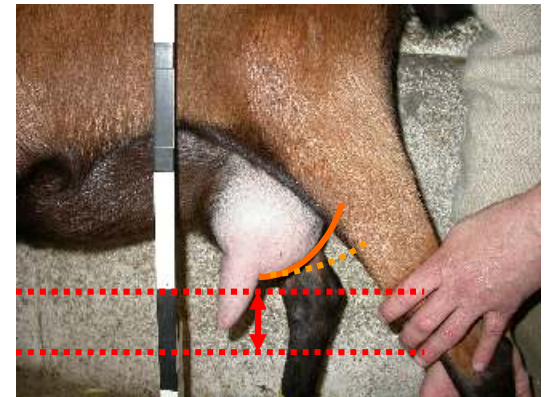
Udder cleft

Udder depth

Rear udder attachment



Rear udder attachment side view



Goats: since 1998
 ♀ Alpine & Saanen
 parity 1 or 2
 registred herds
 12 classifiers

Sheep: since 2000
 ♀ Lacaune 1st parity
 nucleus flocks
 15 classifiers

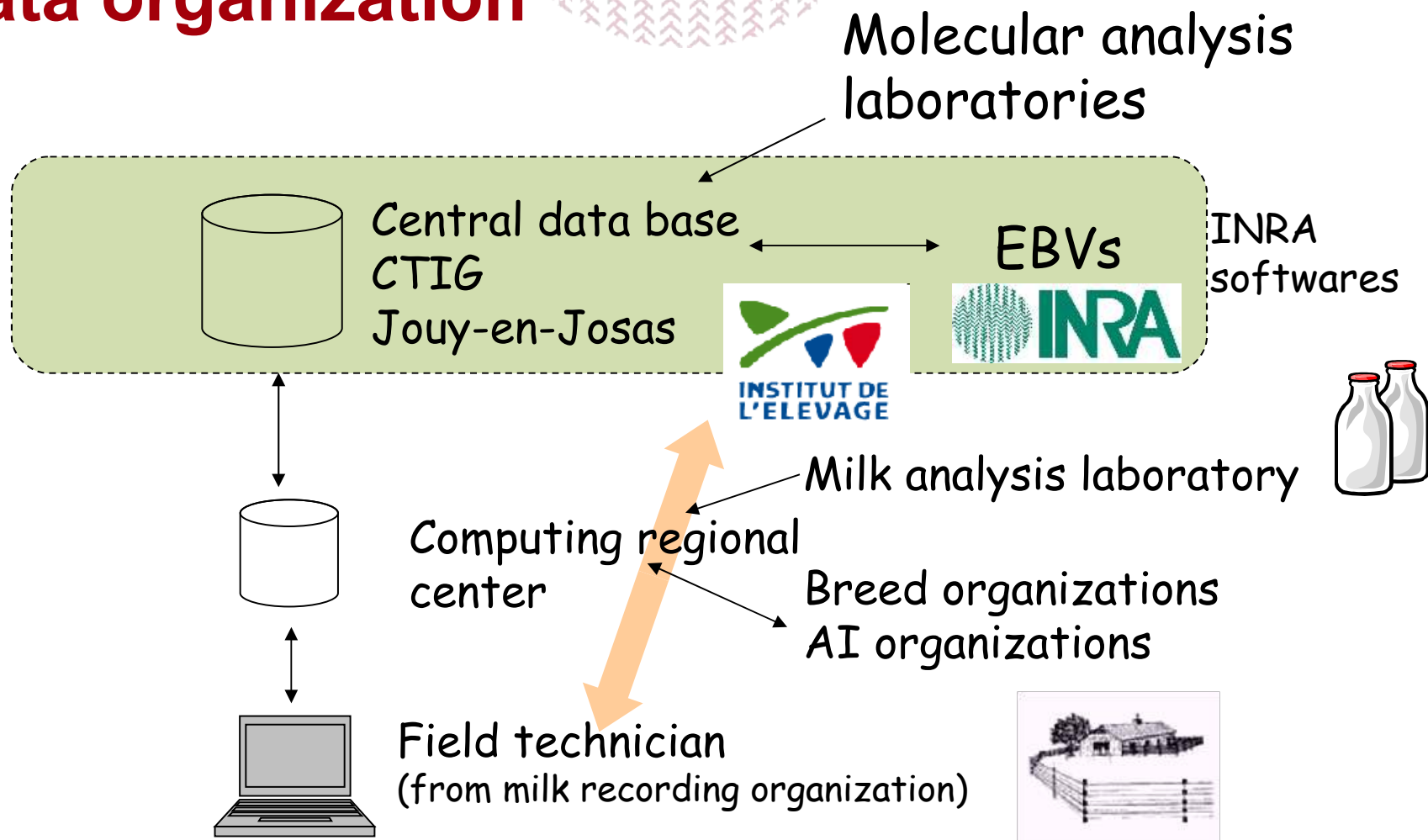
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Data organization



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Breeding objectives



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Genetic parameters: production traits

Used for genetic evaluations

	h^2	Rep.
Milk Yield (MY)	0.30	0.50
Protein Yield (PY)	0.30	0.50
Fat Yield (FY)	0.30	0.50
Protein content (P%)	0.45	0.70
	0.50	0.70
Fat Content (F%)	0.35	0.60
	0.50	0.70
LSCS (Lacaune)	0.13	0.31
LSCS	0.21/0.20	0.50/0.45

Sheep

Goats: Saanen/Alpine

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Genetic parameters: udder traits

	Udder depth	Udder cleft	Teat direction	Rear udder attachment	Rear udder attachment S.V.
Udder depth	0.19 0.35/0.31	0.14 0.22/0.10	-0.49	0.74/0.71	0.09/0.14
Udder cleft		0.26 0.23/0.31	-0.37	0.12/-0.02	-0.39/-0.54
Teat direction			0.33		
Rear udder attachment				0.29/0.27	0.19/0.19
Rear udder attachment S.V.					0.25/0.37

Sheep: Lacaune

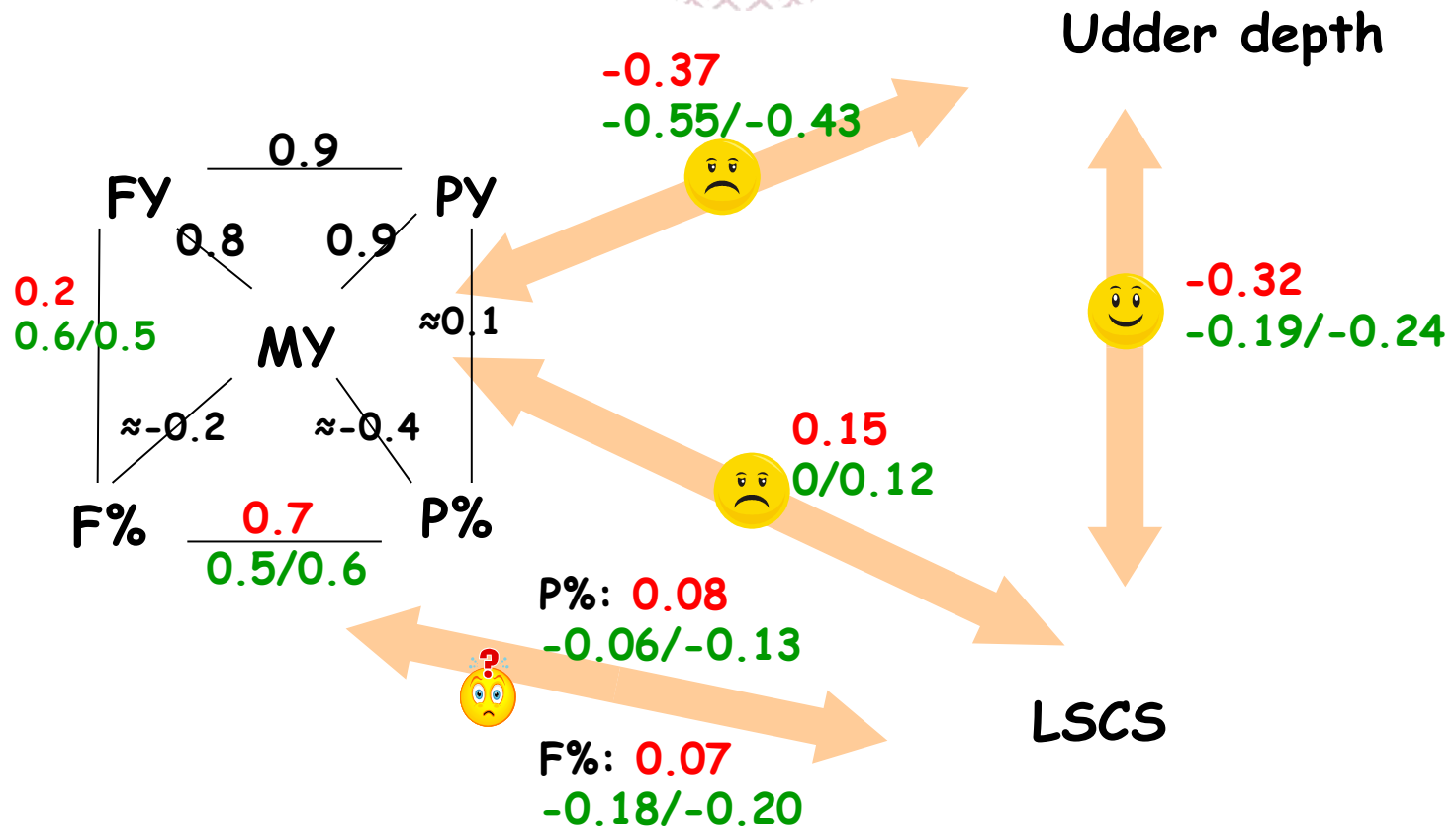
Goats: Saanen/Alpine

Source: Institut Elevage

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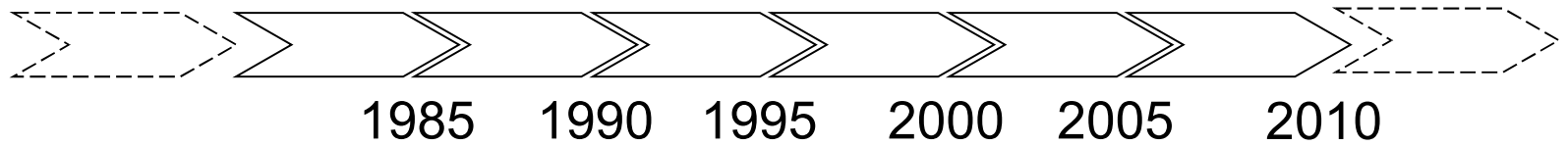


Genetic correlations:

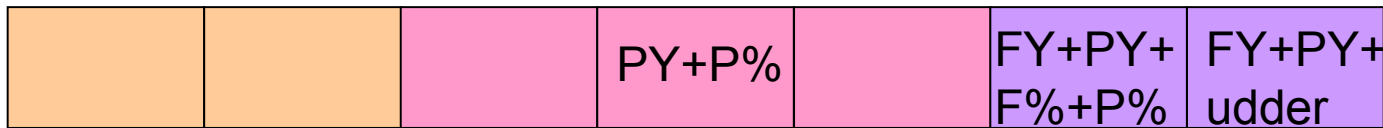


Sheep: Lacaune Goats: Saanen/Alpine

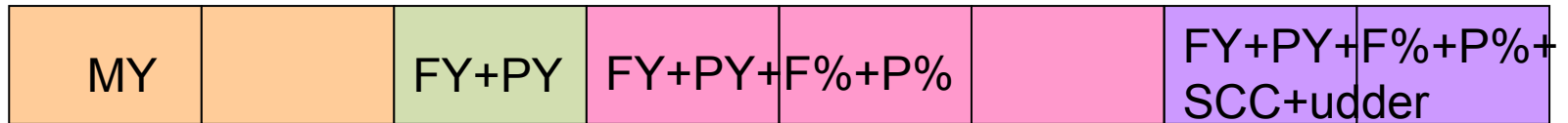
Selection objectives



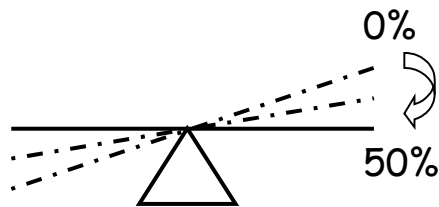
**Alpine
Saanen**



Lacaune

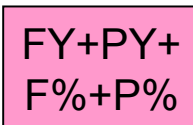


**Production
traits**

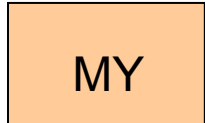


**Functional
traits**

**Manech red faced
Manech black faced
Basco Béarnais**



Corsican



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Genetic evaluations



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Model: milk production traits and LSCS

(lactation traits - all breeds)

BLUP single trait

repeatability animal model

unknown parents genetic groups

Assuming (not LSCS):

heterogeneous residual variances

known constant variance ratios



Log-linear model for residual variances

fixed effect of year*parity *area

random effect of herd*year*parity

(without autocorrelation)

Goats

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Environmental fixed effects

	MY	FY, PY, F%, P%	LSCS
Herd*year*parity	x	x	x
Age at lambing/kidding ⁺	x	x	x
Period of lambing/kidding ⁺	x	x	x
Interval: lambing-1 st test-day ⁺	x		x
Number & times of sampling ⁺ (AC)		x	
Parity (corsican/western pyrenean)	x		
Length of dry period ⁺	x	x	x

+: within year*parity

Sheep: effects defined according to area

Goats: effects defined within 4 areas

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Model: udder traits (Lacaune – Alpine/Saanen)

BLUP multiple-trait animal model

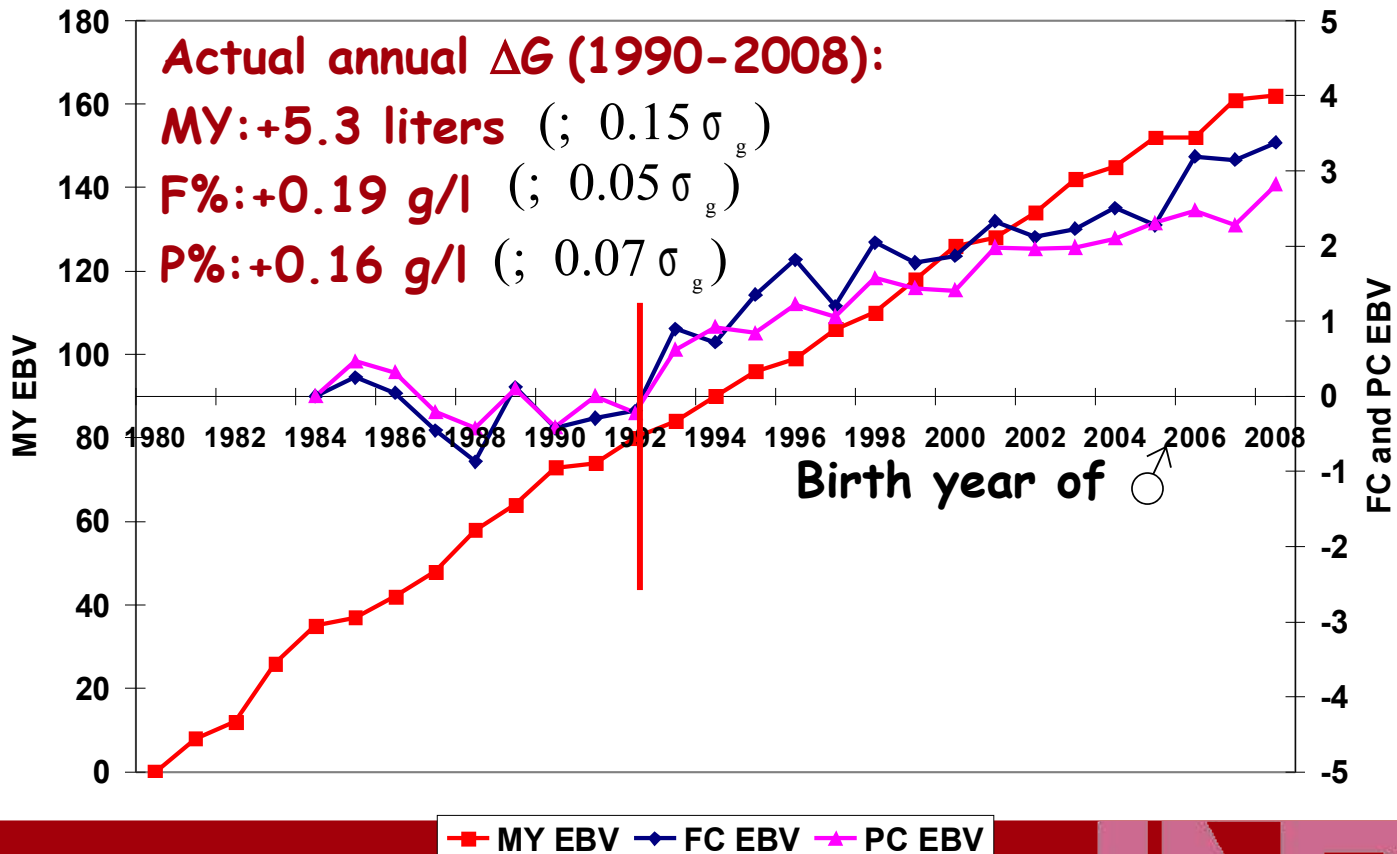
environmental fixed effects:

Lacaune	Saanen/Alpine
Herd	Herd*year
Year	Lactation stage
Classifier	Age at scoring
Time milking-scoring	
Age at lambing	
Lactation stage	
Litter size	

Figures of the genetic evaluations

	Nb. records (MY)	Nb. Animals (pedigrees)	Nb evaluations/year	Published EBVs
Alpine	7,273,465	2,760,612	3	Rolling base Reliability:0.30
Saanen			January/June/September	
Lacaune	4,278,634	1,392,483	3 in spring 1 September	
Manech red faced	2,088,443	618,663		
Manech black faced				
Basco Béarnais				
Corsican	368,331	117,583		

Actual genetic gain of selected traits: Lacaune breed



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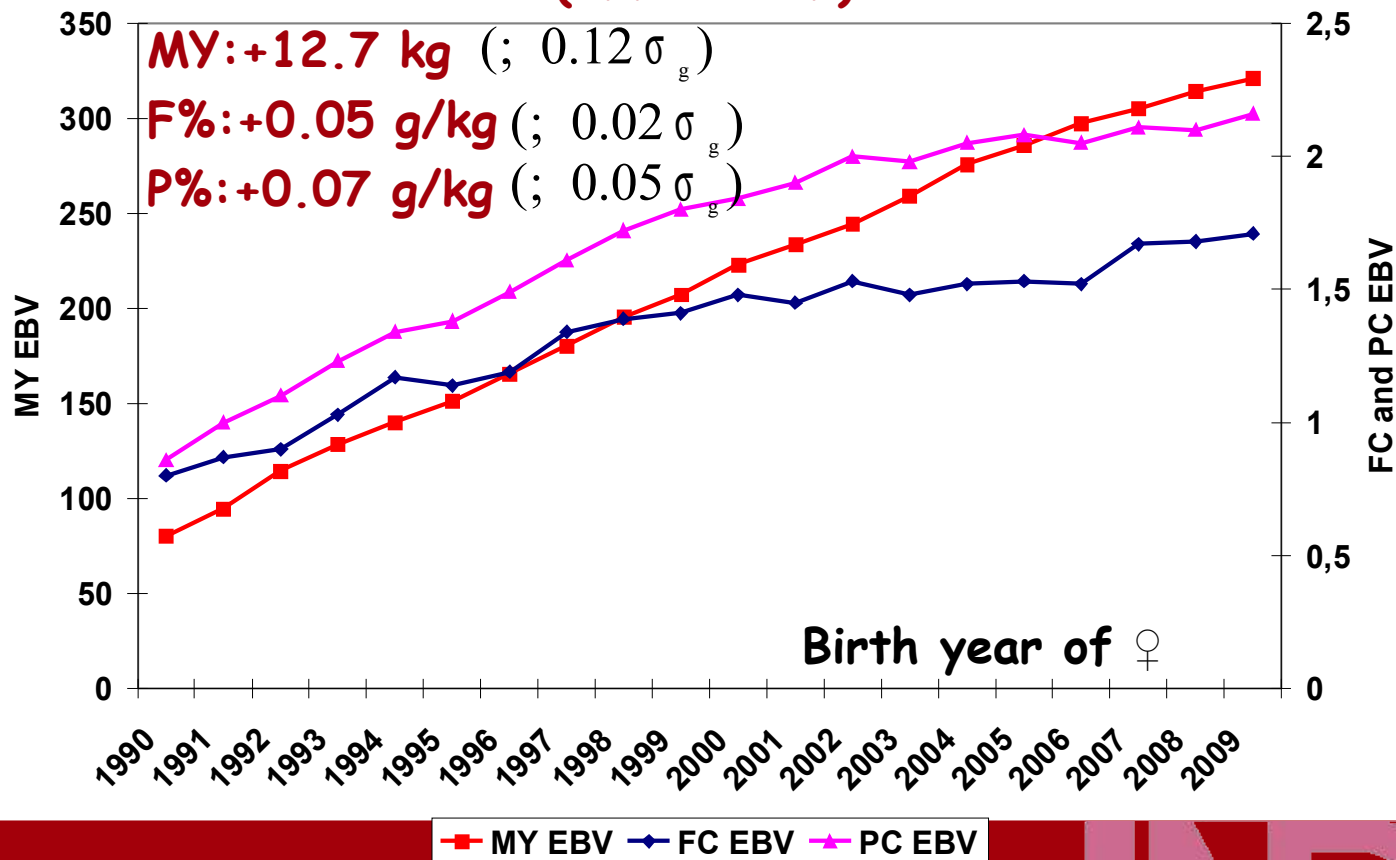
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Actual genetic gain of selected traits: Alpine breed

Actual annual ΔG (1990-2009):



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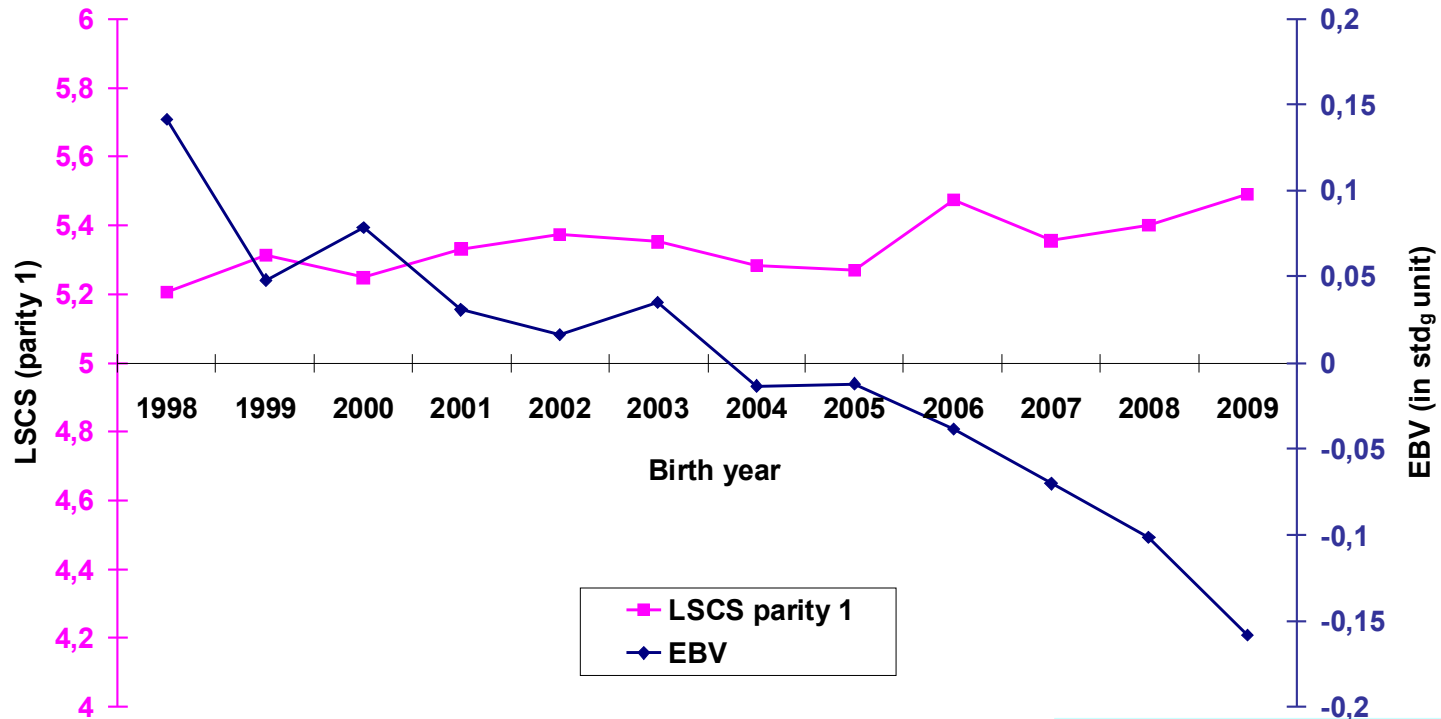
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Phenotypic and genetic trends of LSCS

Experimental evaluation – Saanen breed

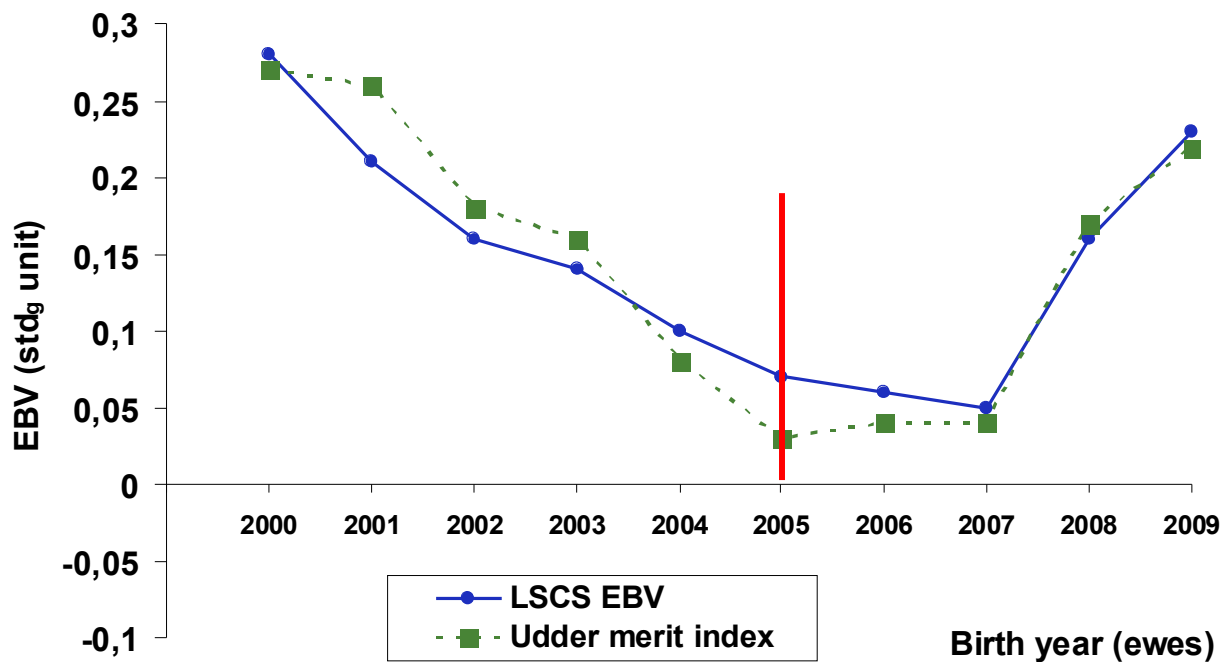


👉 EAAP2011: Caillat H.

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Actual genetic trends of LSCS and Udder: Lacaune breed



EAAP2011: Rupp R.

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New phenotypes for new breeding goals



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New phenotypes and EBVs...

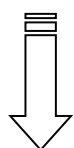
✓ Fine composition (fatty acids & proteins) : the French national program PhénoFinLait

72 000 goats / 58 000 ewes

Feeding and management recording

Genotyping

Phenotyping => fine milk composition based on MIR
available for FA/ in progress for proteins



- How genetic and feeding strategies impact fine milk composition
- Genetic parameters
- QTL detection



New phenotypes and EBVs...

✓ Milking ability and tolerance to once-daily milking

Goats:

Expected a major gene

Milking speed: milk emission recorded with Lactocorder®

Sheep: Roquefort'In project

Milking speed: specific ongoing technical developments of Lactocorder ®

Consequences of ODM

Traits to predict ability to tolerate ODM

...longevity, female fertility



... for new breeding goals

- ✓ Total merit index from technical assumptions
- ✓ New traits
- ✓ Genomic evaluations
- ✓ New production systems

☞ EAAP2011:
Baloche G., Robert-Granié C.

OSIRIS project:

Economical study of production systems/traits

A computing tool of weights

New total merit index

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Aknowledgements



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Thank you for your attention



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