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Implementation of French national genetic evaluation of beef calf temperament from field data

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Introduction

Increase of beef cattle herd size

X

Reduction of work force available to handle animals

Temperament improvement
new important goal to help breeders
with animal handling and herd management

- **since 90's, several studies have been performed on Limousine breed to set up a temperament test on bulls tested in performance or progeny test stations**
  - ➔ **« docility test » to get rid of worst breeding bulls**
  - ➔ **evidence of moderate genetic variability for the different traits**
  - ➔ **test not feasible on farm**

Research project COSADD

- between 2007 and 2009, research project to define temperament traits measurable on farm
- data recording on farm and result analysis done by Haïfa Benhajali & Florence Phocas at INRA
- based on results of “docility test”, 12 Limousine bulls were used in 24 herds to get at least 40 progeny / bull

moderate heritabilities for the different measured traits:

~ 0.3 in constrained conditions

~ 0.2 if temperament is scored

2 on-farm selection criteria of calf temperament

Number of movements in constrained conditions during the 10 first seconds of the weighing at weaning

REAC

Constrained conditions

age between 4 et 10 months (opt. 5 - 8 months)

2 on-farm selection criteria of calf temperament

Number of movements in constrained conditions during the 10 first seconds of the weighing at weaning	Calf temperament score given by a qualified technician along with the other 19 type traits
REAC	**COMP**
Constrained conditions	Field and Farm conditions
age between 4 et 10 months (opt. 5 - 8 months)	age between 4 and 12 months (opt. 5 - 8 months)

Beef calf temperament recording system

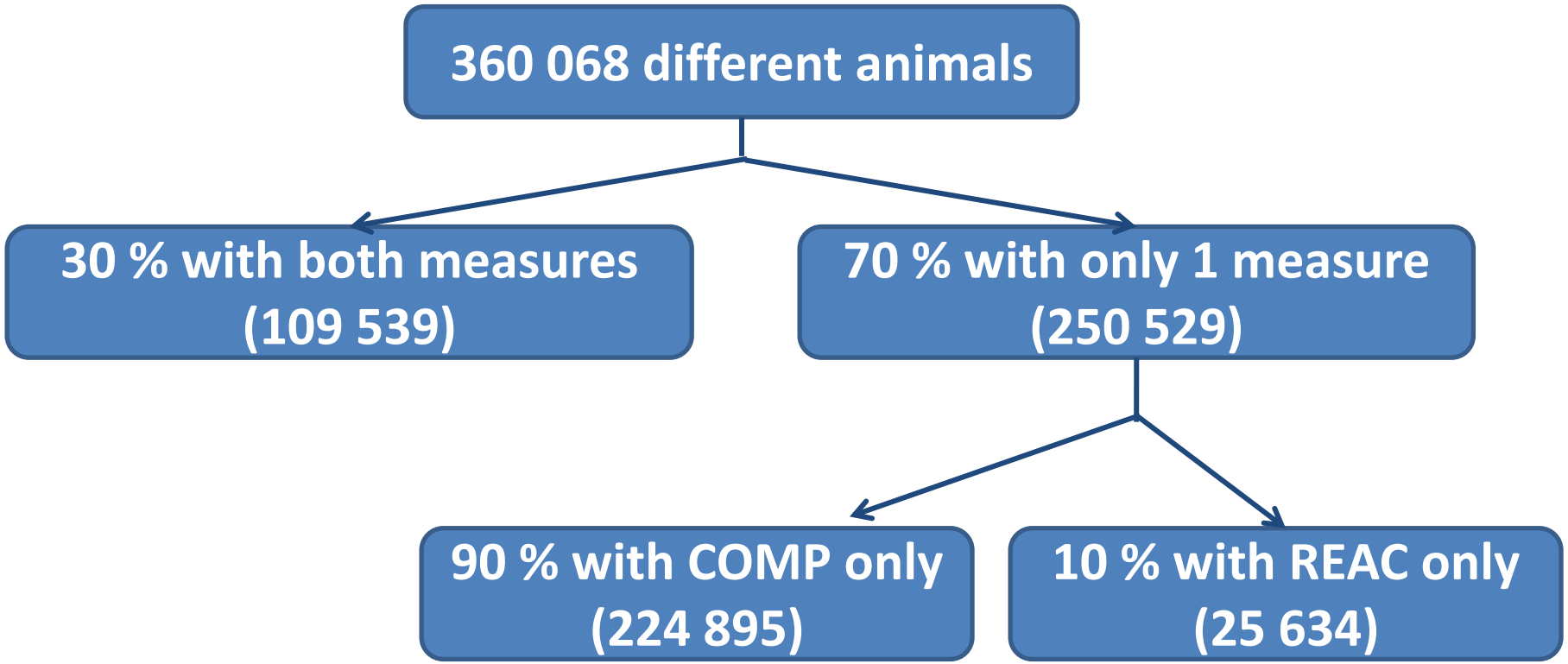
Since end 2011:

- specific beef technician training course on calf temperament measure on farm, prepared by IDELE (with video examples)
- specific table set up in the French National database + all practical tools associated

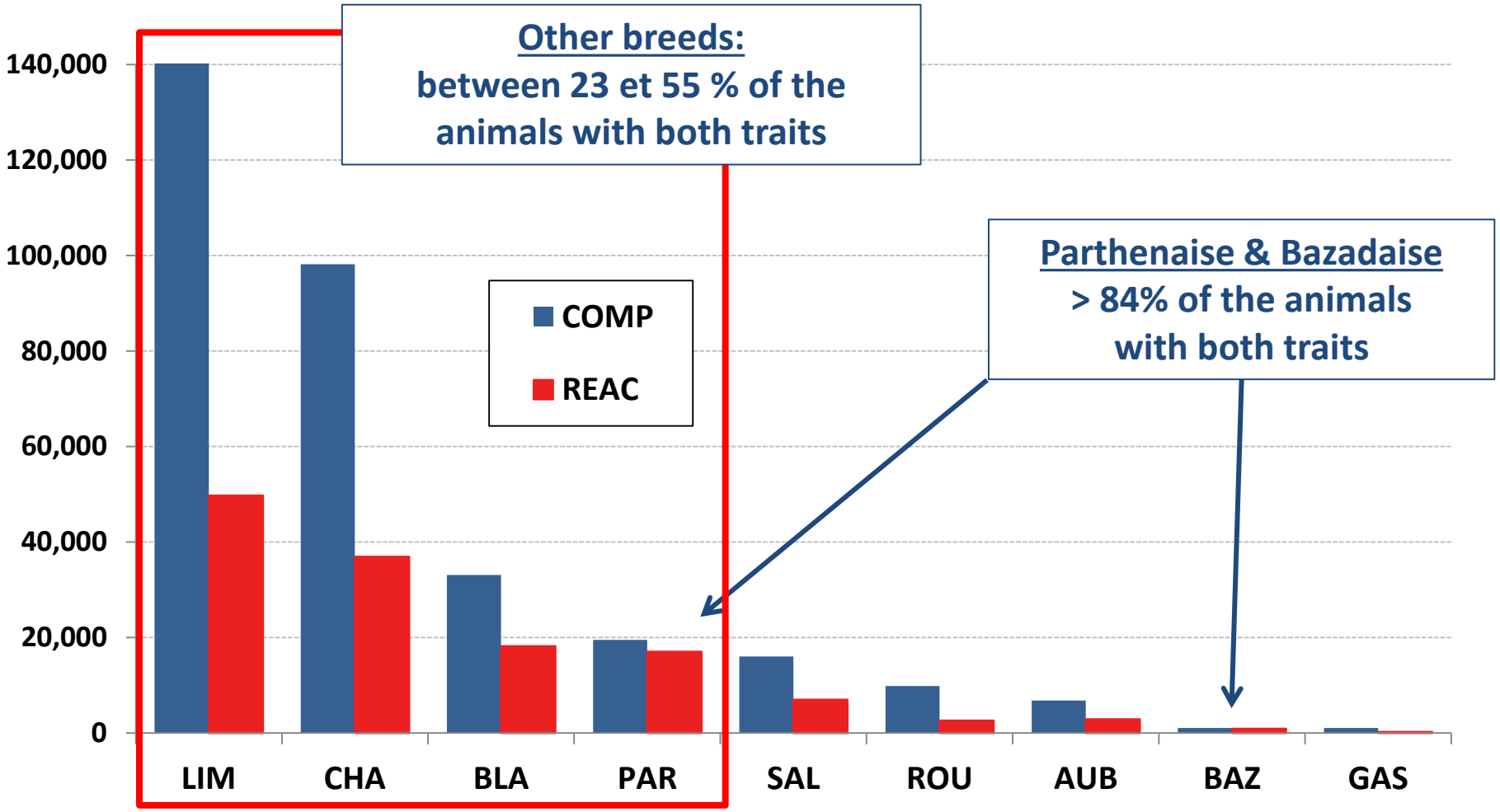
temperament recording on farm
for the 9 beef cattle breeds under selection in France

Data available

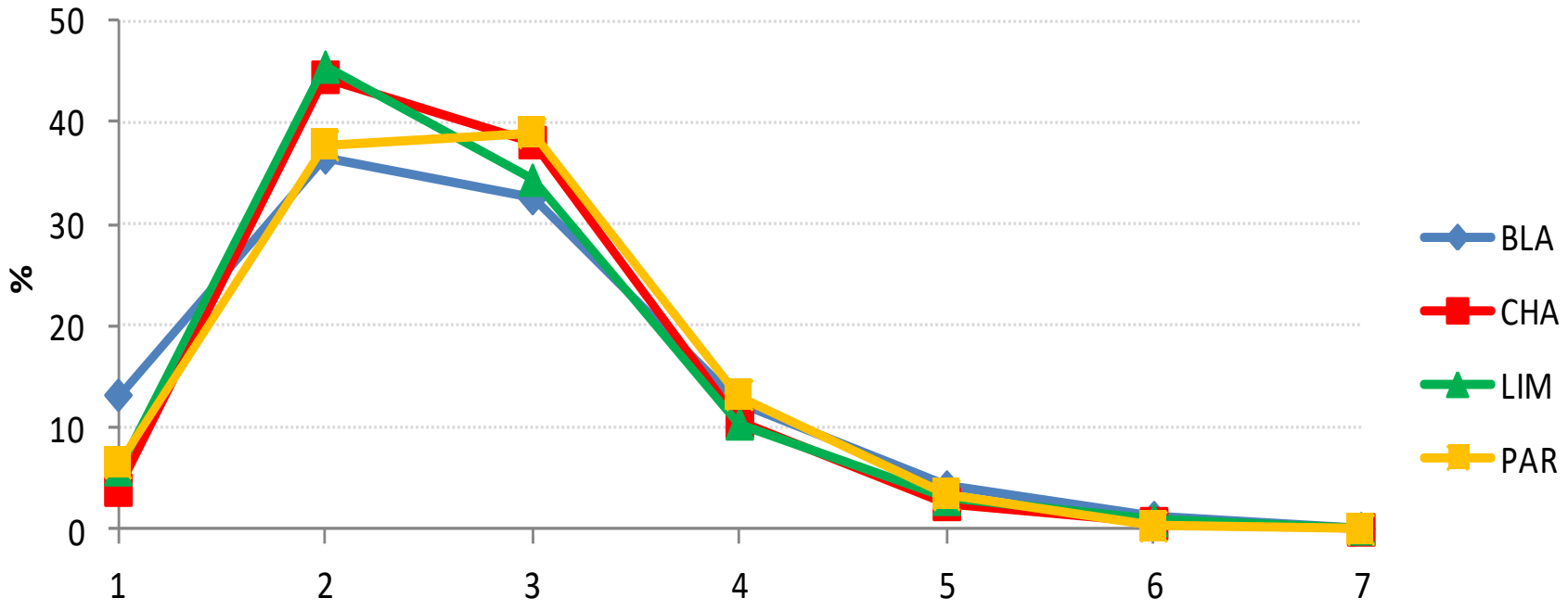
- national database extraction => 474 177 records
  - animals born between November 2011 and May 2014



Data available



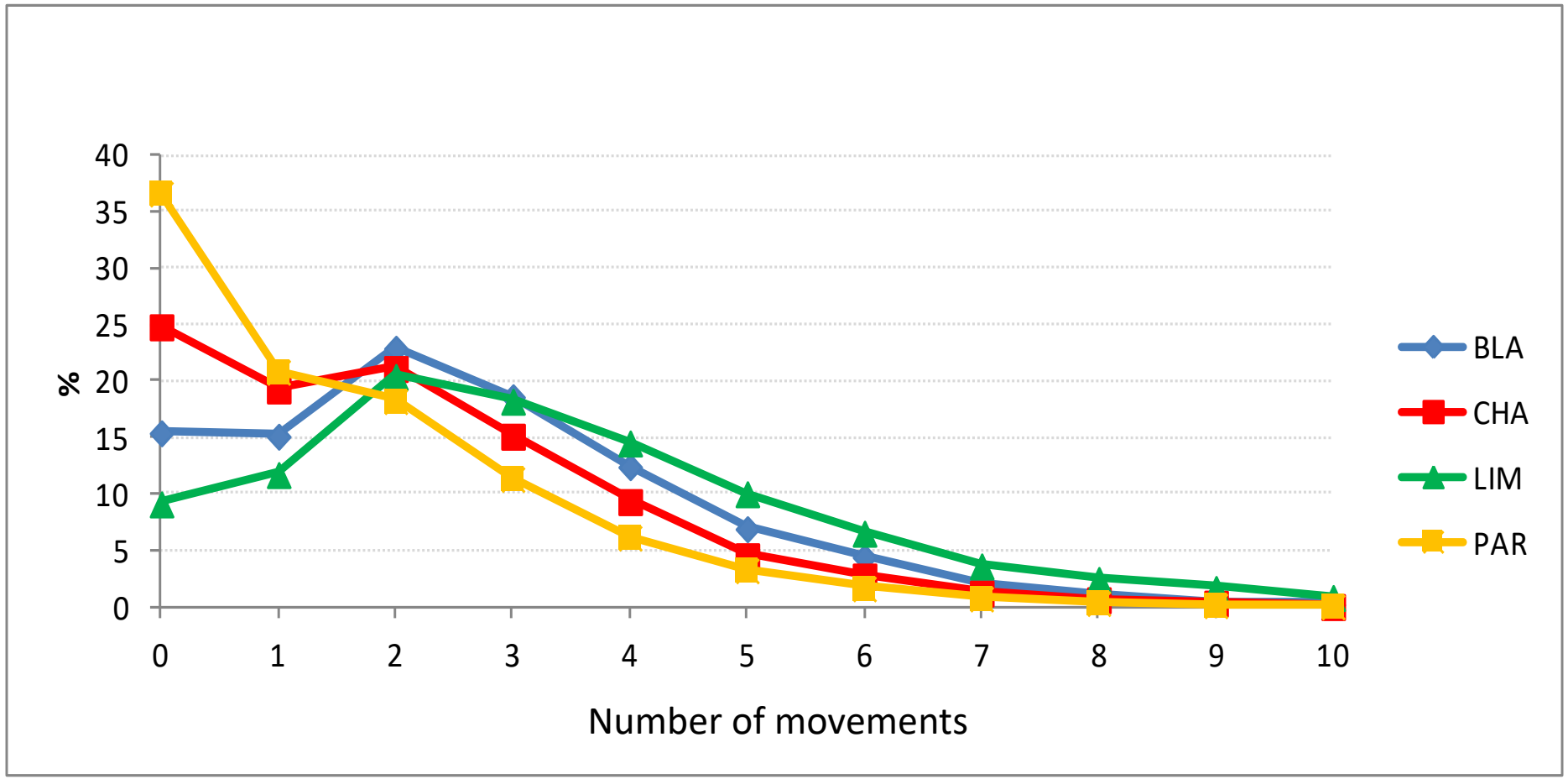
Temperament score distribution



1	2	3	4	5	6	7
Comes to the technician	No movement	Walks	Quick walk	Runs	In Alert	Attacks

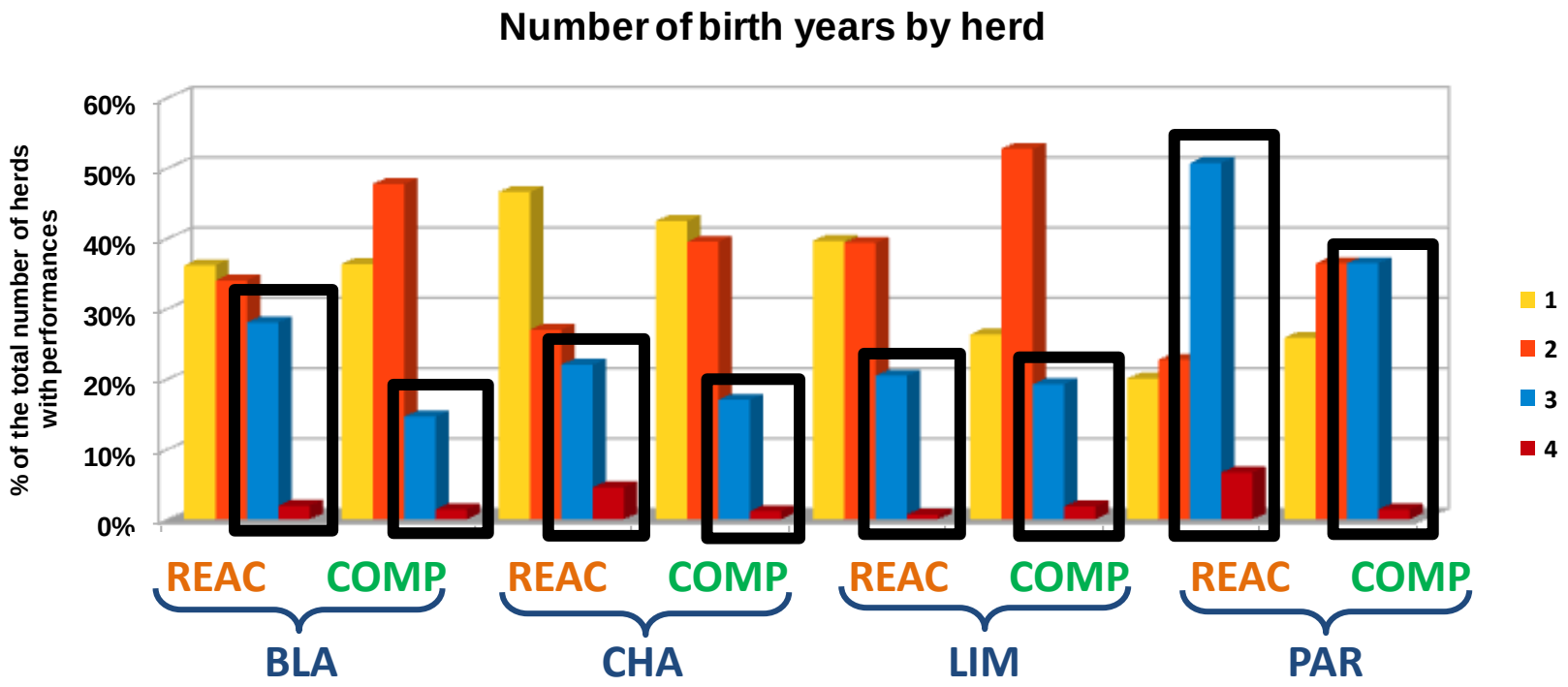
Number of movements during the first 10 seconds of weighing

► 0 to 9 (and +)



Data selection for genetic parameter estimation

- **Performance exclusion**
  - twins and embryo transfer calves
  - tied calves (very few)
  - calves with unknown dam
  - Contemporary group with less than 3 calves with REAC and 5 for COMP
- **Only herds with at least 3 birth campains kept**



Data description

	REAC				COMP			
	BLA	CHA	LIM	PAR	BLA	CHA	LIM	PAR
Number of performances	8 599	16 846	15 636	12 297	14 724	37 484	67 420	13 096
Number of herds	124	122	156	86	191	302	591	97
Herd size	29 (23)	49 (28)	41 (31)	49 (31)	32 (27)	46 (31)	41 (31)	50 (28)
Performance mean	2,5 (1,9)	2,1 (1,8)	3,0 (2,0)	1,5 (1,7)	2,7 (1,1)	2,7 (0,9)	2,6 (0,9)	2,7 (0,9)

Fixed effect model definition

- **Associated information available in French national database**
  - age at the measure, sex…
  - technician associated with the measure
  - dam parity
  - management group

+ only for scoring measure COMP:

- **COSEPO**: weaning status (not weaned, just weaned, weaned),
- **SIAPCO**: measure condition (Box, on field or tied animal)
- **DIAPCO**: distance between technician and animal scored (<5m, 5-10, >10m)
- **PREFEM**: dam presence during scoring

Fixed effect model definition

- Contemporary group (HERD x TECHNICIAN x SEX x MANAGEMENT GROUP x BIRTH GROUP)
- Age in class

+ <u>only for temperament score:</u>
  - **PREFEM**: dam presence during scoring
  - **DIAPCO x SIAPCO**: Distance Animal-Technician x Measure condition

Genetic parameter estimation

► Test with uni-trait models including **maternal effects** (genetic and/or Perm. Envt)

➡ **no evidence of maternal effect**

► **Results for uni-trait models:**

		BLA	CHA	LIM	PAR	Previous COSADD results
REAC	Heritability	0,16 (0,03)	0,13 (0,02)	0,17 (0,02)	0,12 (0,02)	0,31
COMP	Heritability	0,11 (0,03)	0,09 (0,01)	0,10 (0,01)	0,10 (0,02)	0,17

Genetic parameter estimation

- Test with uni-trait models including **maternal effects** (genetic and/or Permanent envt)
  → **no evidence of maternal effect.**

- **Results for uni-trait models:**

		BLA	CHA	LIM	PAR
REAC	Heritability	0,16 (0,03)	0,13 (0,02)	0,17 (0,02)	0,12 (0,02)
	Phenotypic Variance Coeff.	43%	52%	41%	57%
	Genetic Variance Coeff.	17%	19%	17%	19%
COMP	Heritability	0,11 (0,03)	0,09 (0,01)	0,10 (0,01)	0,10 (0,02)
	Phenotypic Variance Coeff.	27%	27%	27%	25%
	Genetic Variance Coeff.	9%	8%	8%	8%

Direct genetic correlation between REAC and COMP

BLA	CHA	LIM	PAR
0,33 (0,13)	0,43 (0,09)	0,39 (0,14)	0,32 (0,13)

COSADD PROJECT LIM
0,28 (0,28)

Number of movements at weighing
et
Temperament score at weaning

are 2 different traits.

REAC	COMP
« Ease of manipulation » & « Security »	« Ease of animal raising »

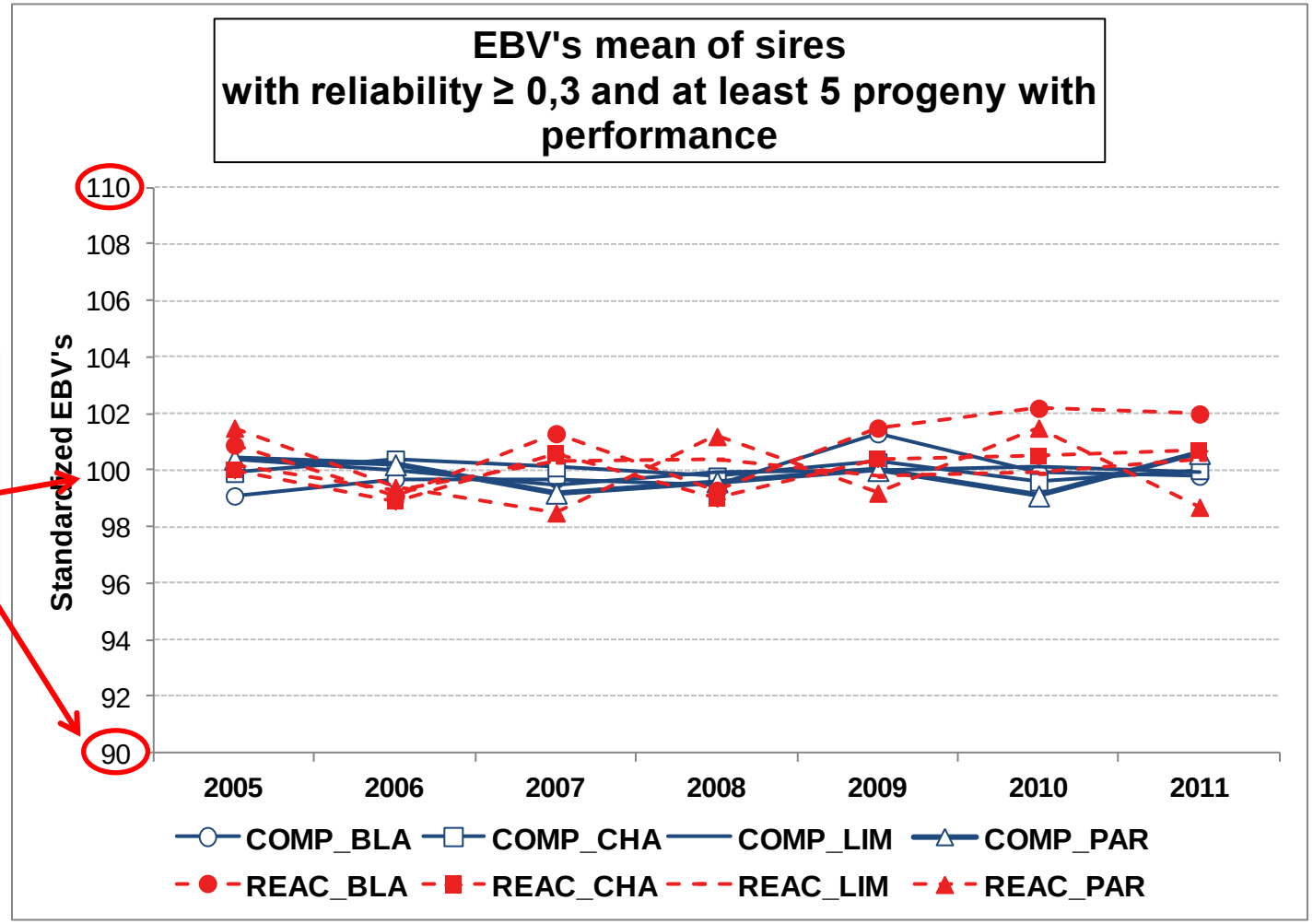
Pilot genetic evaluations

- Genetic parameters for other breeds: h^2_{REAC}=0,15 et h^2_{COMP}=0,10
- Sires with reliability ≥ 0,5 and at least 25 progeny with performance included in genetic evaluation

	LIM	CHA	BLA	PAR	SAL	ROU	AUB	BAZ	GAS
Total number of publishable bulls in 2014	16455	23482	4513	1432	2663	925	2054	29	271
REAC	601	239	161	165	83	24	21	3	0
	4%	1%	4%	12%	3%	3%	1%	10%	0%
COMP	1023	417	187	177	90	69	35	1	2
	6%	2%	4%	12%	3%	7%	2%	3%	1%

Pilot genetic evaluations – genetic trends

French EBV expression:
Mean = 100
1 genetic std = 10



CONCLUSION

- previous studies showed the interest and feasibility of calf temperament genetic evaluation (at weaning).
- based on these results, a new organization has been set up to:
  - train technicians through a specific training course,
  - update technician tools to collect these info on farm
  - update National database.
- this study confirms the feasibility of calf temperament genetic evaluation base on data collected on farm

Both traits are now included in French national evaluation: first official publication beginning 2016