

Session 7 Paper 9

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# Dog breeding practices: example of French dog breeds

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# Introduction and context

## Diversity of dog breeds



Pictures :  
VosChiens/SCC/Horvath

- More than 350 breeds recognized by the FCI (Federation Cynologique Internationale)
- A large number of uses and morphologies
- Breeds classification into 10 groups according to the FCI nomenclature, based on historical, morphological and use criteria

## Dog breeding in France

- 9 millions dogs in France (15-20 % of purebred dogs)
- More than 300 breeds raised
- Pedigree management supervised for all breeds by French kennel club (SCC)

A large majority of hobby breeders:

- In 2007, 95% of 14 500 purebred breeders produced less than 10 litters.
- Yet they still represented 65% of the 38 000 litters produced.

# Aim of the study

- To evaluate occurrence of some breeding practices in dog breeds
- To understand which factors may influence breeding practices at the breed level
- To analyse results regarding FCI nomenclature

# Material and methods

- 55 breeds belonging to the 10 FCI groups and having more than 1000 dogs registered between 2001 and 2005

## Data used

- Pedigree data from the 55 breeds, reference population being dogs born from 2001 to 2005
- Results of a survey concerning 985 dog breeders (Leroy *et al.* 2007)
- Some statistics given by SCC concerning year 2007

## II. Material and methods

Breeding practice	Code	Computation	Mean ( <i>SD across breeds</i> )
Generation interval	T	Generation interval computed over the four pathways	4.2 (0.6)
Working practice	Work	Average between % of dogs registered as working dog (SCC data) and % of breeders indicating they make their dog working	30.1% (20.1%)
Registrations with unknown parents	RUP	% of dogs registered without known parent	0.5% (1.3%)
Inbreeding practice	IbP	% of dogs having an inbreeding coefficient $\geq 12.5\%$ after 3 generations	6.1% (3.3%)

<b>Parameters</b>	<b>Code</b>	<b>Computation</b>	<b>Mean</b> ( <i>SD across breeds</i> )
<b>Population size</b>	Psize	Number of dog registered between 2001 and 2005	11 896 (11 103)
<b>Evolution of population</b>	Evol	Variation in number of registrations between 96-00 and 01-05	+35% (88%)
<b>Litter production per breeder</b>	LitB	Average number of litters produced by breeders between 2001 and 2005	18.7 (5.9)
<b>First year of breeding</b>	FirstY	Year of first litter produced, for breeders having produced between 2001 and 2005	2000 (1.5)
<b>Working practice</b>	Work	...	...

### III. Results

# Correlation analysis

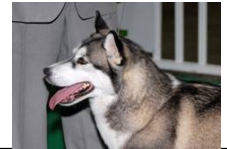
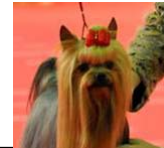
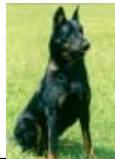
	Psize	Evol	LitB	FirstY	T	Work	RUP	IbP
Psize	1	-0.03	0.31	0.02	-0.02	0.20	-0.23	-0.32
Evol		1	0.00	0.68	-0.47	-0.13	-0.06	-0.21
LitB	*		1	-0.25	-0.02	-0.31	-0.33	0.28
FirstY		***		1	-0.56	-0.15	0.03	-0.48
T		***		***	1	0.51	0.09	0.26
Work			*		***	1	0.22	-0.30
RUP			*				1	-0.11
IbP	*		*	***		*		1

\*  $P < 0.05$ , \*\*\*  $P < 0.001$



### III. Results

Working practice: a parameter clearly linked with breed groups



Group	1	2	3	4	5
Nb of breeds	8	13	6	2	2
Working practice (%) (sd)	34 (17)	19 (17)	18 (14)	31 (0)	26 (37)



Group	6	7	8	9	10
Nb of breeds	5	7	4	6	2
Working practice (%) (sd)	50 (10)	50 (6)	43 (10)	6 (8)	57 (3)

Significant effect of breed group on working practice ( $R^2=0.59$ ,  $P<0.0001$ )

## Parameters influencing generation interval $T$

Two parameters were found to have a significant effect  
( $R^2=0.43$ ,  $P<.0001$ )

Parameter	Code	Estimate	<i>P-value</i>
Working practice	Work	+1.12	<0.0001
Evolution of population	Evol	-0.3	0.0003

Explanations:

- Working dogs are reproducing later
- Reduction of generation interval in fashionable breeds

## Parameters influencing mating between close-relatives

Three parameters were found to have a significant effect ( $R^2=0.42$ ,  $P<.0001$ )

Parameters	Code	Estimate	<i>P-value</i>
First year of breeding	FirstY	-0.01	<0.0001
Working practice	Work	-0.05	0.005
Population size	Psize	$-3 \times 10^{-7}$	0.03

Explanations:

- Inbreeding is more practiced by experienced breeders
- Supposed effect of inbreeding on working performances?
- Effect of population size on inbreeding?

### III. Results

## Parameters influencing registration of individuals with unknown parents

Two parameters were found to have a significant effect ( $R^2=0.41$ ,  $P<0.0045$ )

Parameter	Code	Estimate	<i>P-value</i>
FCI Breed groups	—	—	0.02
Litter production per breeder	LitB	-0.08	0.01



A larger proportion of registrations in scent hounds (group 6) (3% against 0.5% on average)



## Interest of breeding practice analysis for breed classification: example of Dalmatian breed (group 6)

Breeding practice	Working practice ( <i>s.d.</i> )	Registrations with unknown parents ( <i>s.d.</i> )
Dalmatian	34%	0.5%
6 <sup>th</sup> group ( <i>sd</i> )	54% (4%)	3.0% (2.4%)
55 breeds ( <i>sd</i> )	30% (20%)	0.5% (1.3%)

- Furthermore Dalmatian is not close to scent hounds from a morphological or a genetic point of view (Leroy *et al.* 2009)
- Then, why Dalmatian should be classed in 6<sup>th</sup> group?

# Conclusion

- Interest to combine different sources of data to investigate breeding practices
- Complex relationships between breeding practices and breed parameters
- Need for further investigations. Next step: analysis at the breeder's level?

**According to EU rules, no animal  
was hurt during this study**

