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How birth weight impacts life trajectory ?

Amélie Mugnier, Sylvie Chastant

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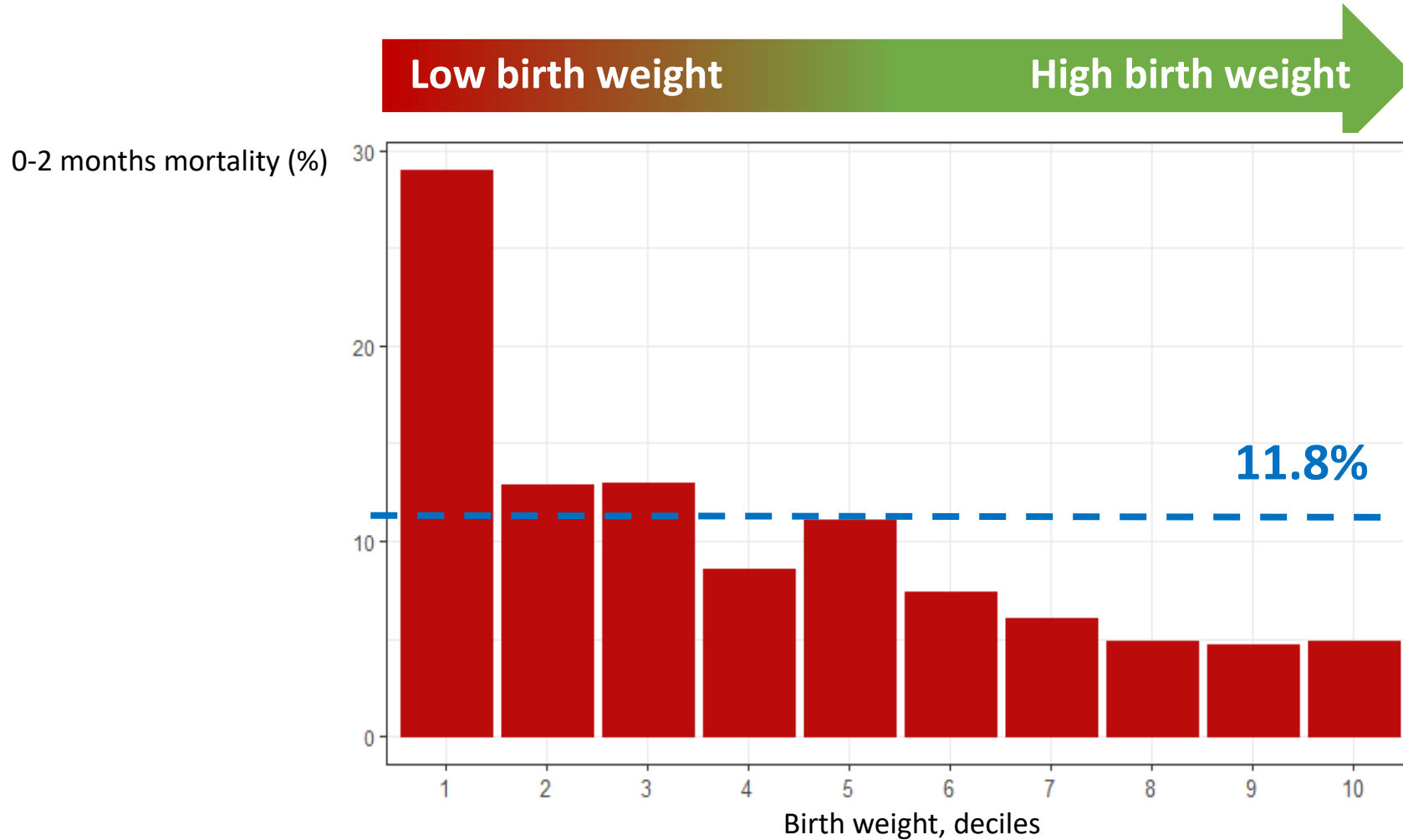
HOW BIRTH WEIGHT IMPACTS LIFE TRAJECTORY

DR Amélie MUGNIER & Pr Sylvie CHASTANT

AND THE ALL THE HAPPY MEMBERS OF THE **NeoCare** TEAM



Low birth weight: a major risk factor for neonatal mortality

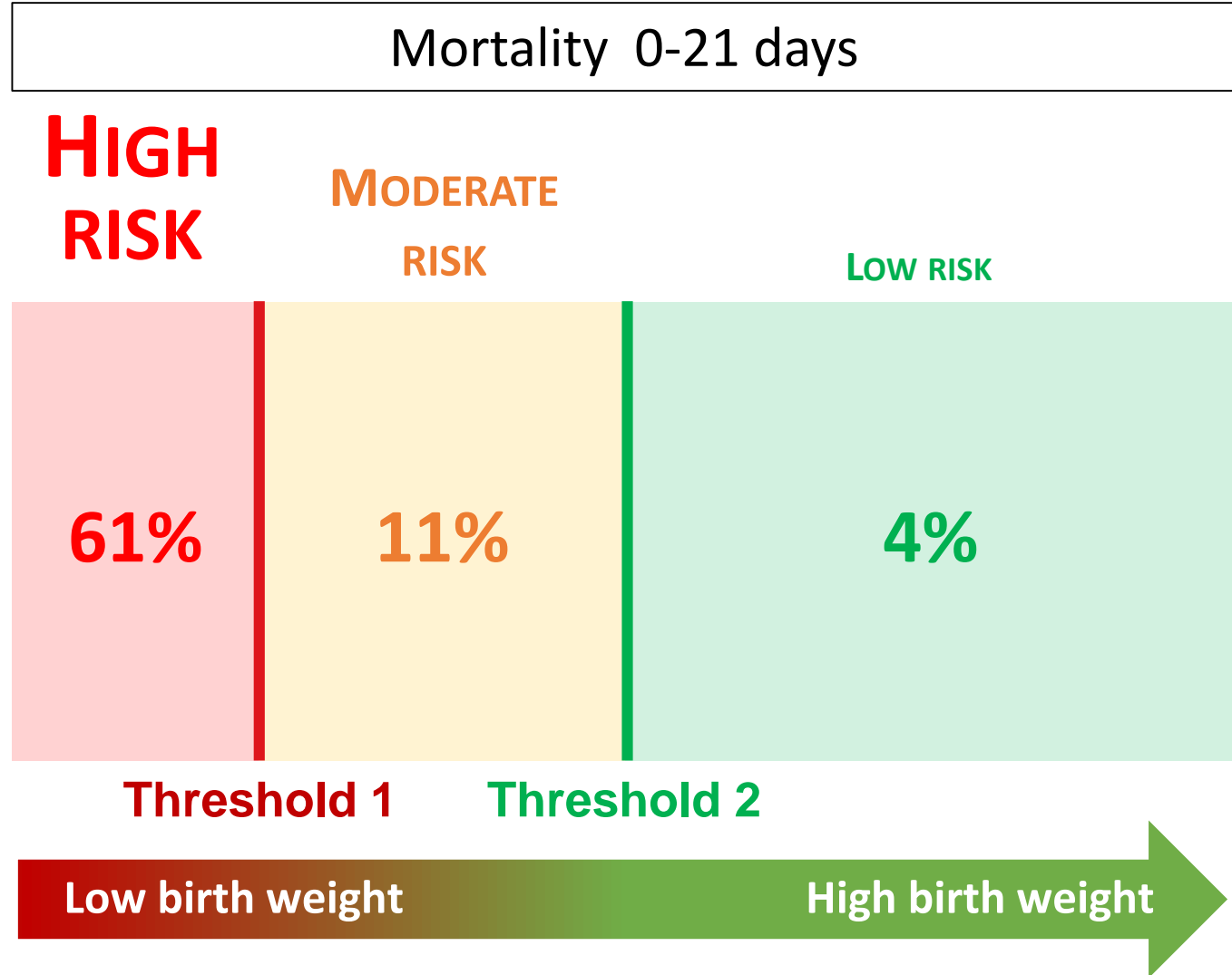


6,694 puppies
27 breeds
75 kennels

Low birth weight: a major risk factor for neonatal mortality



4,971 puppies



What about my Labrador puppy?



332 g

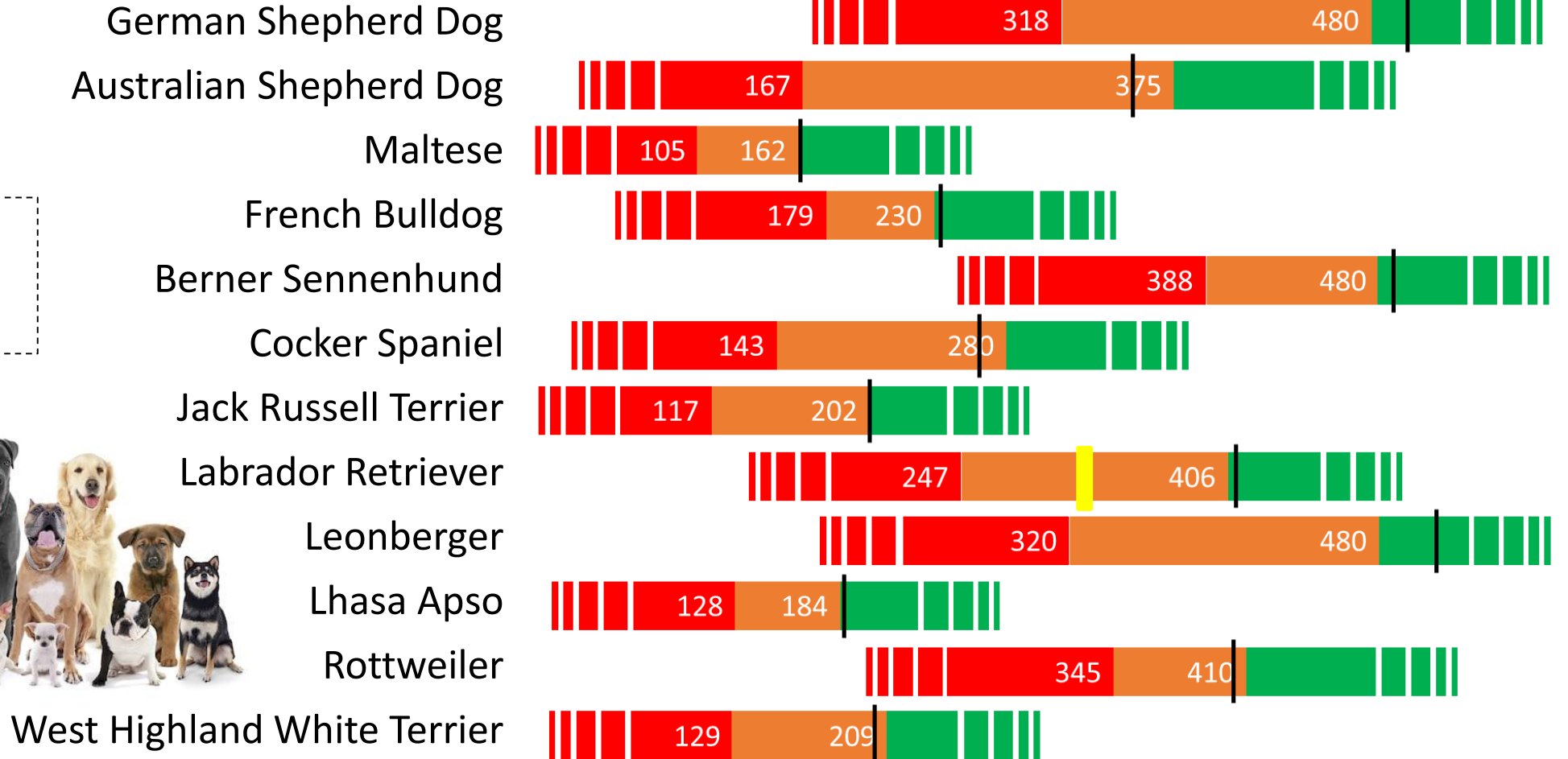
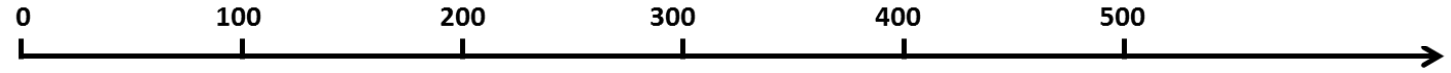
©Warren Photographic

Birth weight thresholds in 12 dog breeds



Mugnier et al., 2020

6,694 puppies
27 breeds
75 kennels



Where to find the thresholds values per breed

Preventive Veterinary Medicine 171 (2019) 104746



Contents lists available at [ScienceDirect](#)

Preventive Veterinary Medicine

journal homepage: www.elsevier.com/locate/prevetmed



Birth weight as a risk factor for neonatal mortality: Breed-specific approach to identify at-risk puppies



Amélie Mugnier^a, Hanna Mila^a, Florine Guiraud^a, Julie Brévaux^a, Manon Lecarpentier^a, Clara Martinez^a, Claire Mariani^b, Achraf Adib-Lesaux^b, Sylvie Chastant-Maillard^{a,*}, Claude Saegerman^c, Aurélien Grellet^a

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^b Royal Canin, 650 Avenue de la Petite Camargue, 30470, Aimargues, France

^c UREAR-ULiège, FARAHA, Université de Liège, Faculté de Médecine Vétérinaire, B42, Quartier Vallée 2, Avenue de Cureghem 7A, 4000, Liège, Belgium

NeoCare library
www.neocare.pro



This Rottweiler puppy ?



330 g

Various susceptibilities to low birth weight



Birth weight
 410 ± 70 g

Prolificacy
 $7.3 (\pm 2.6)$ puppies

Birth weight
 404 ± 59 g

Prolificacy
 $7.6 (\pm 2.0)$ puppies

Threshold 1

247 g

345 g

332 g



**MODERATE
RISK**

- 100 g

HIGH RISK

330 g

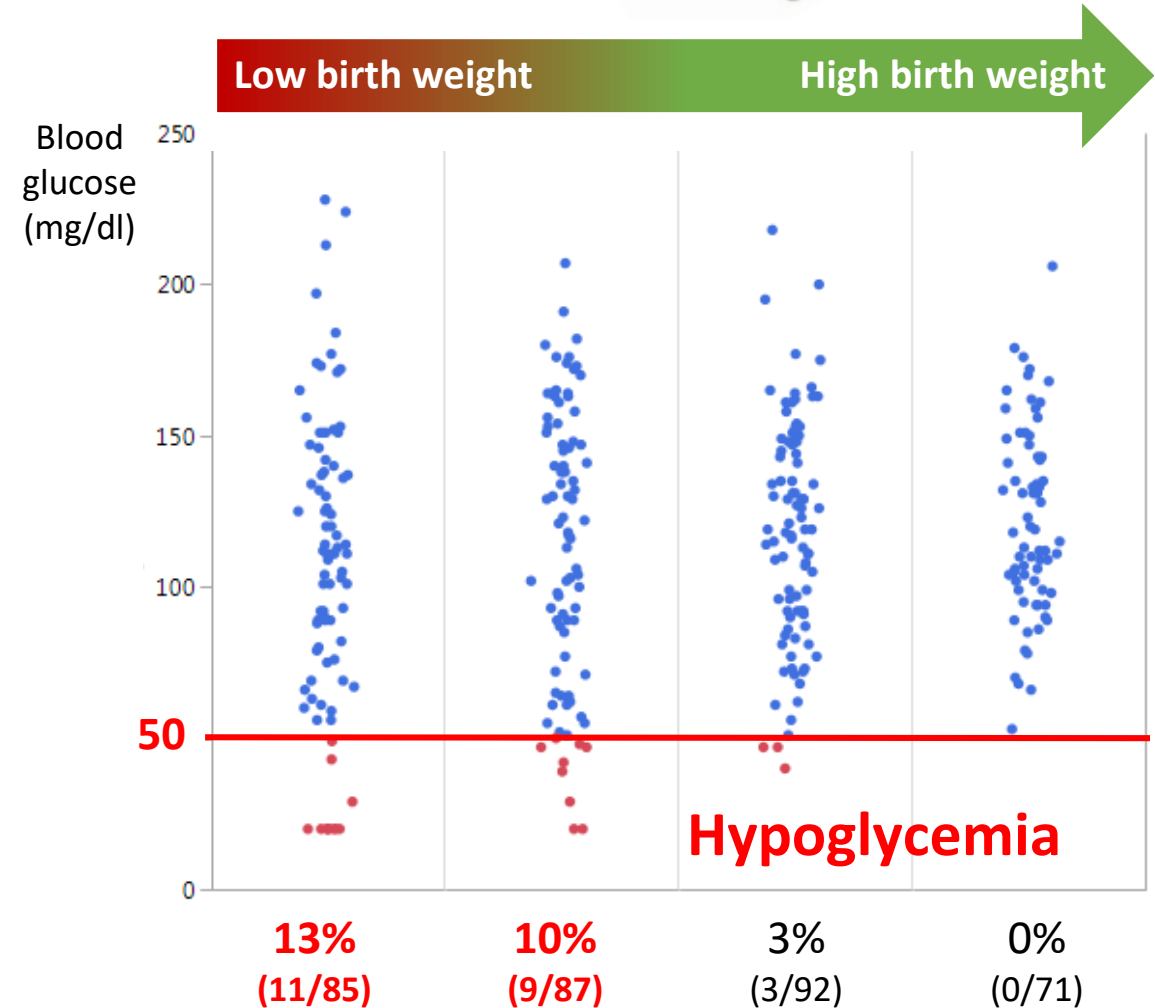
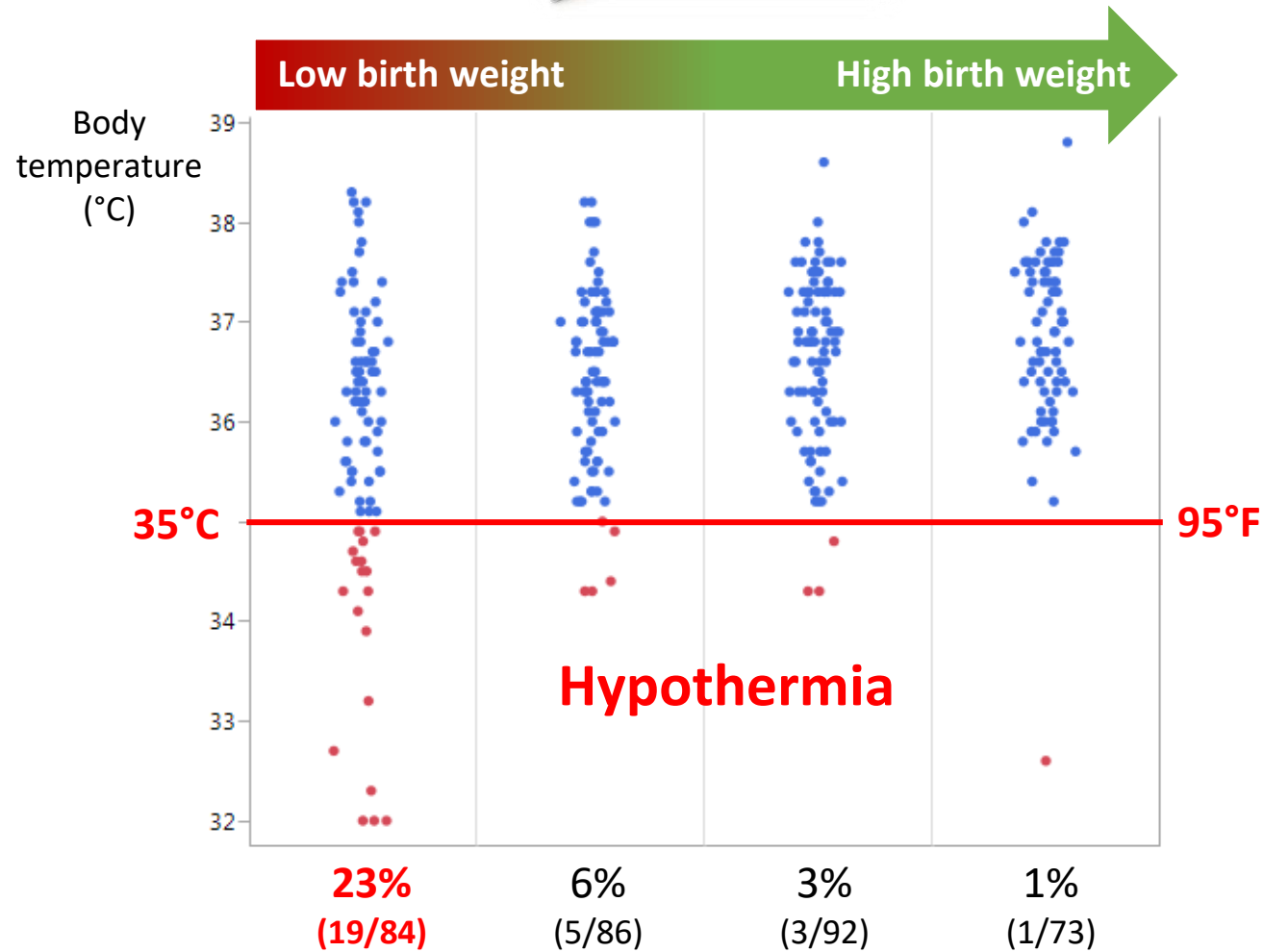


Lower energy reserves in low birth weight newborns

Mila et al.
Unpublished data
477 puppies



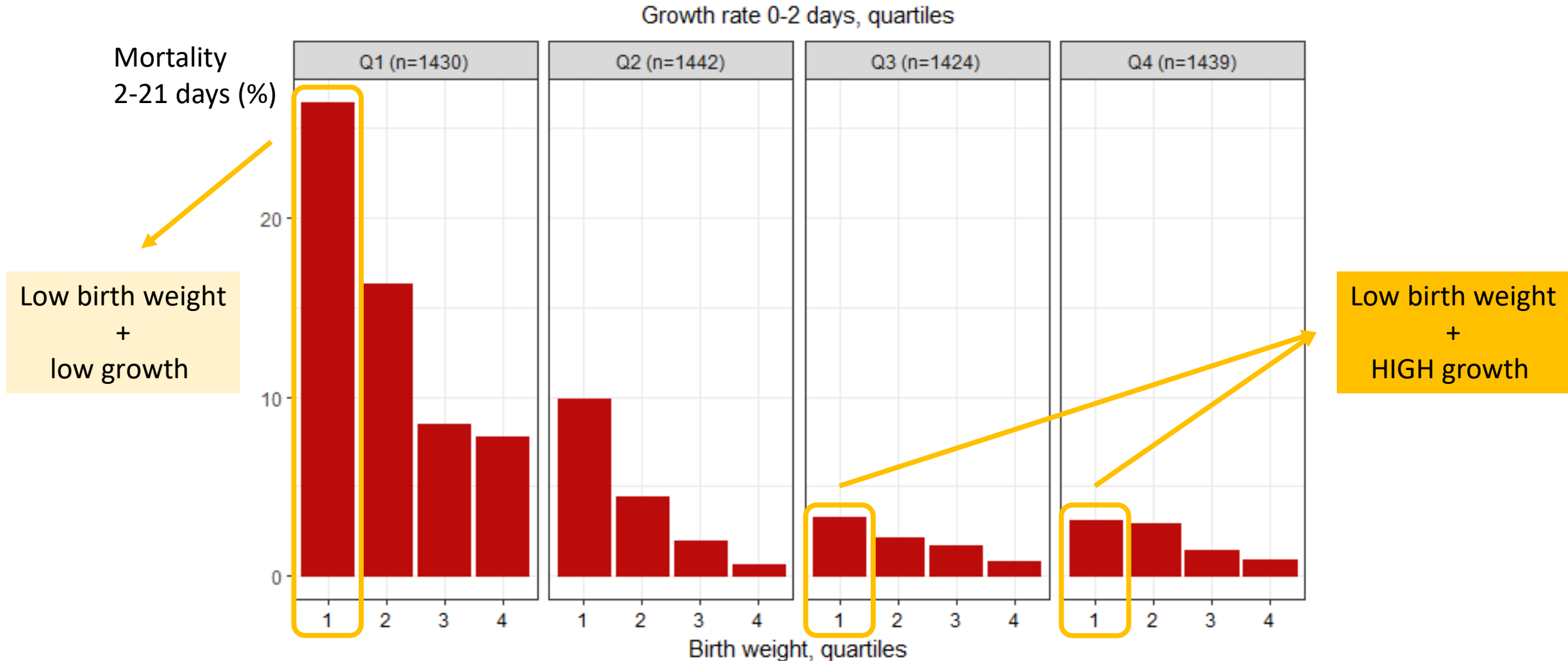
Hanna MILA



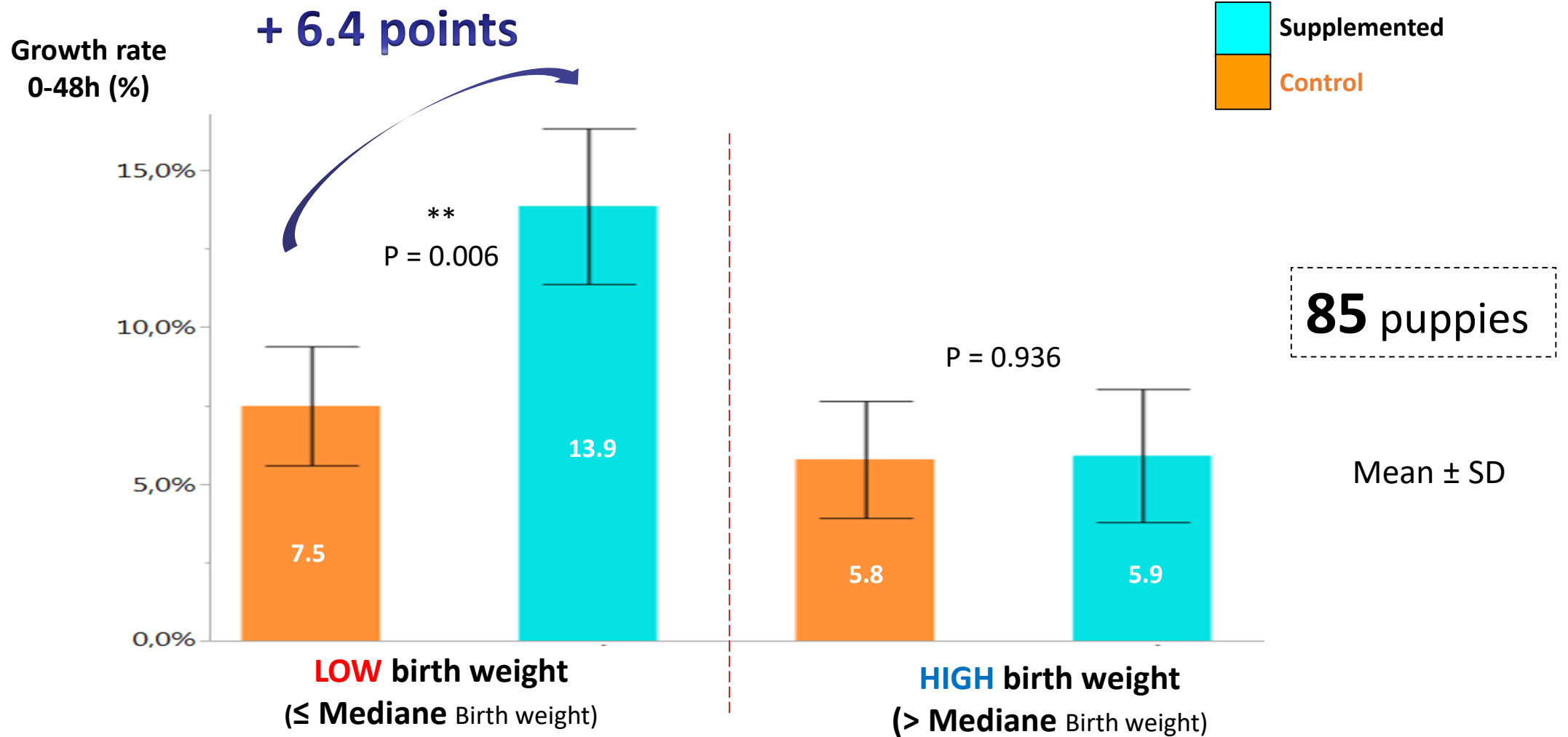


**HOW TO HELP
LOW BIRTH WEIGHT
PUPPIES?**

Early growth rate reverses the effect of low birth weight



Energy supplementation of low birth weight puppies



Birth weight and suckling behaviour

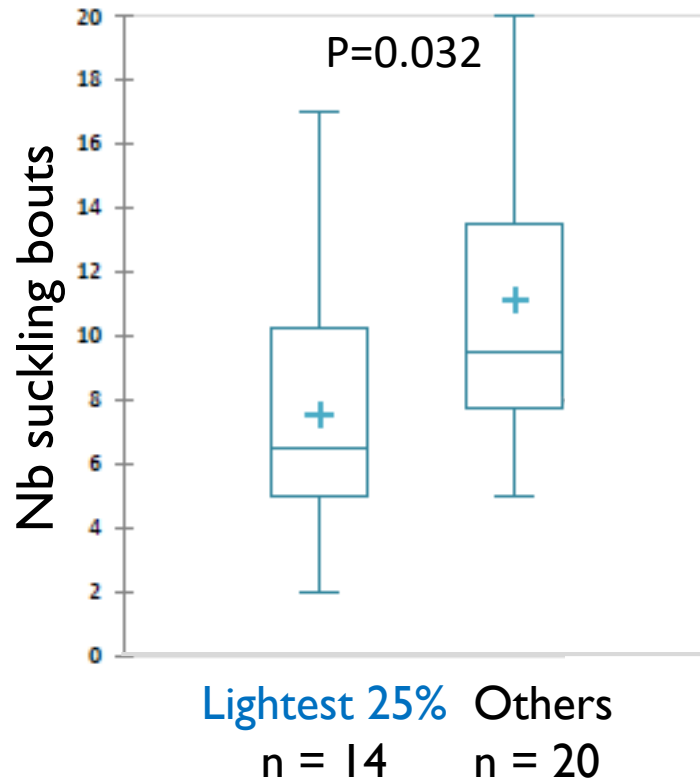


Camille VIAUD

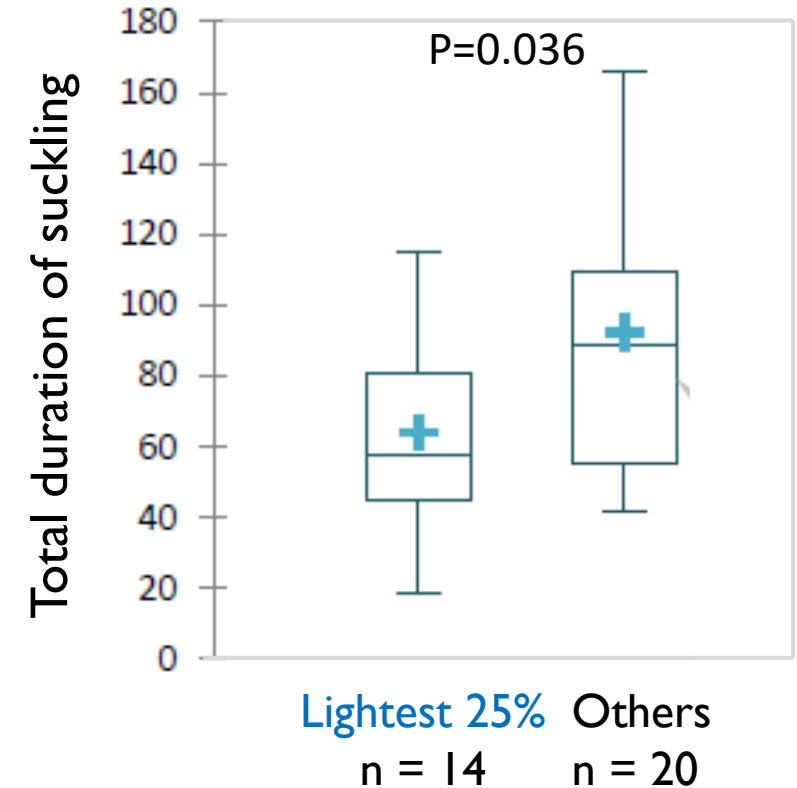


5 litters
34 puppies
from National French
Guide Dog Breeding
Center

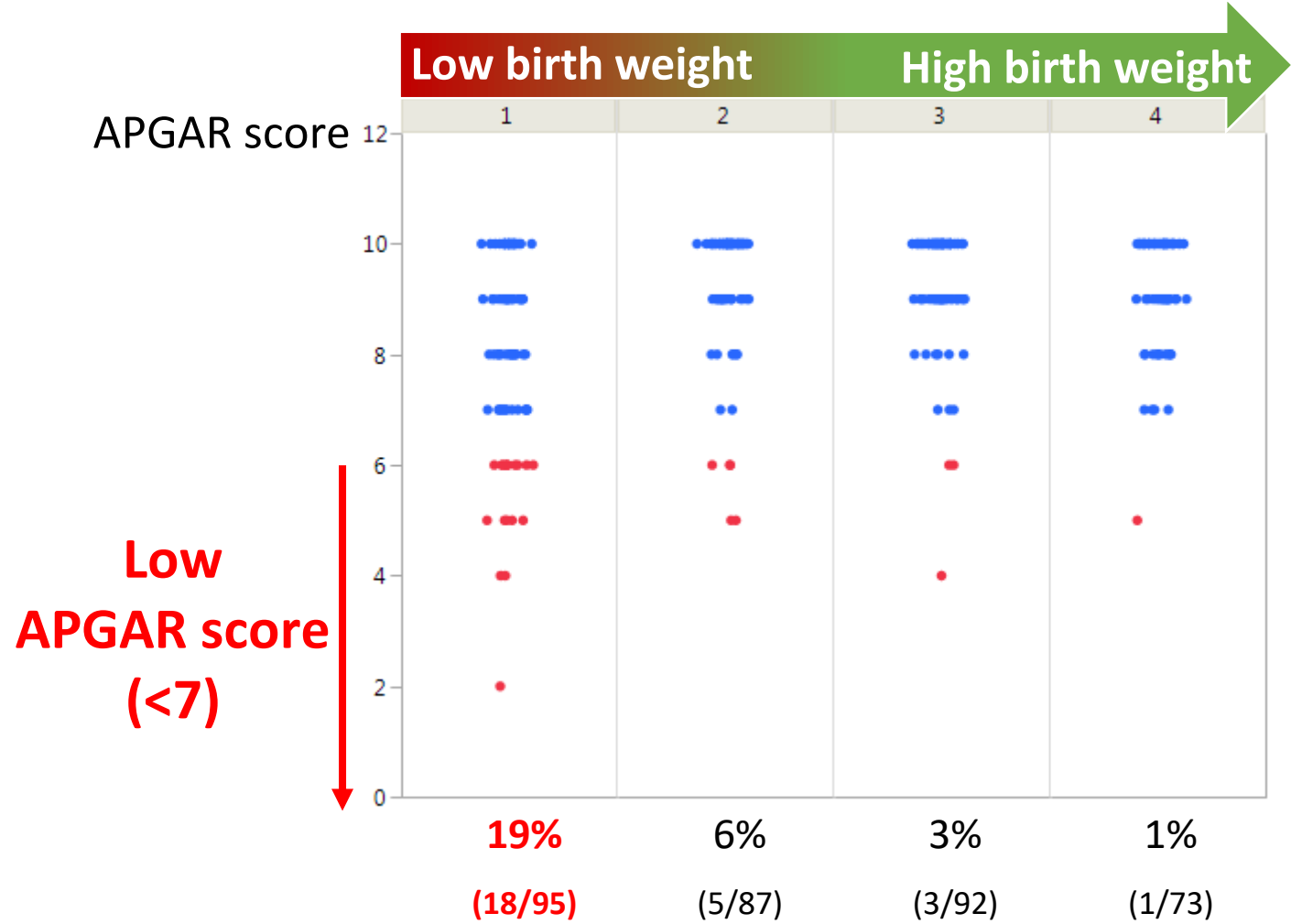
NUMBER OF SUCKLING BOUTS over the first 12 hours of life



TOTAL DURATION OF SUCKLING over the first 12 hours of life

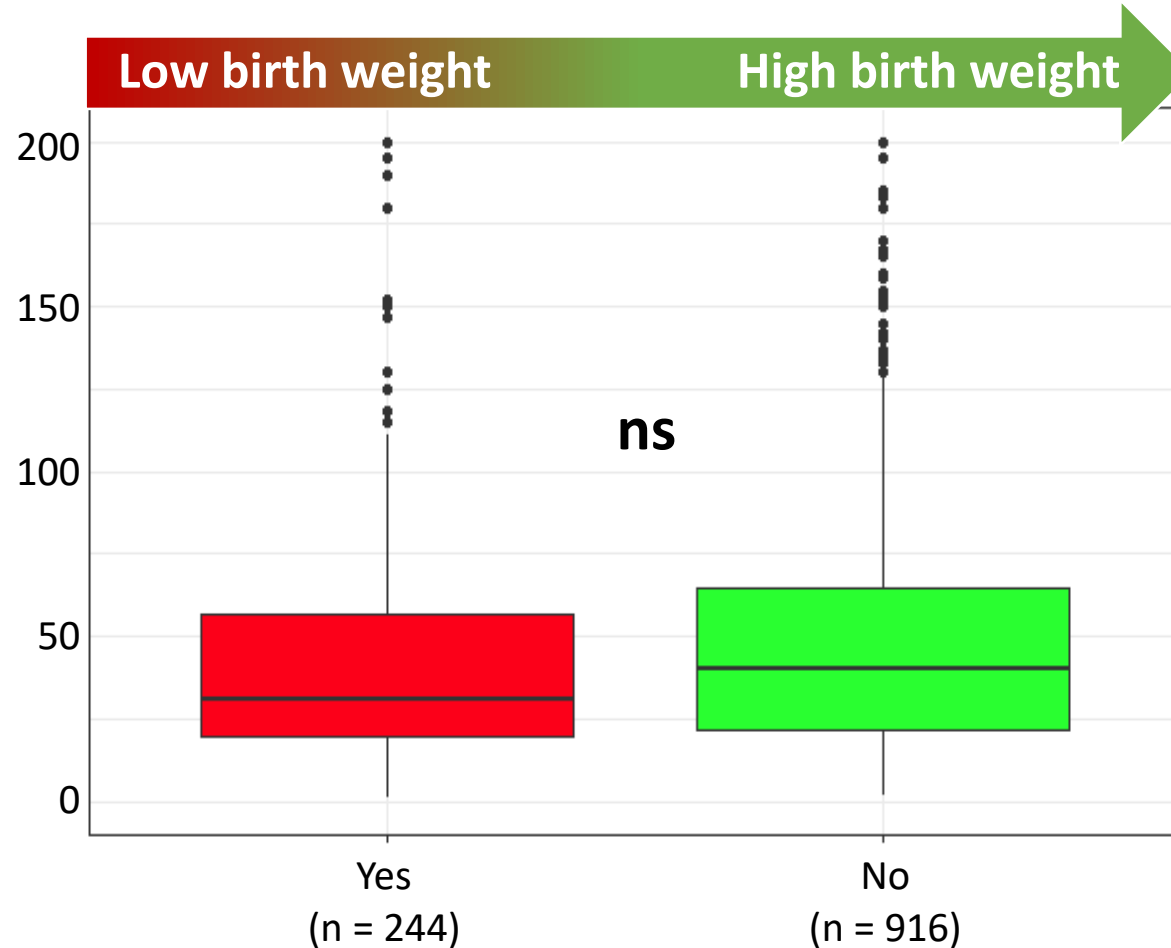


Low vitality in low birth weight newborns



Low vitality at birth is not related to length of parturition

Delay between
expulsion of
Puppy n
and
Puppy n+1
(minutes)



Among the 25% lightest in the study population



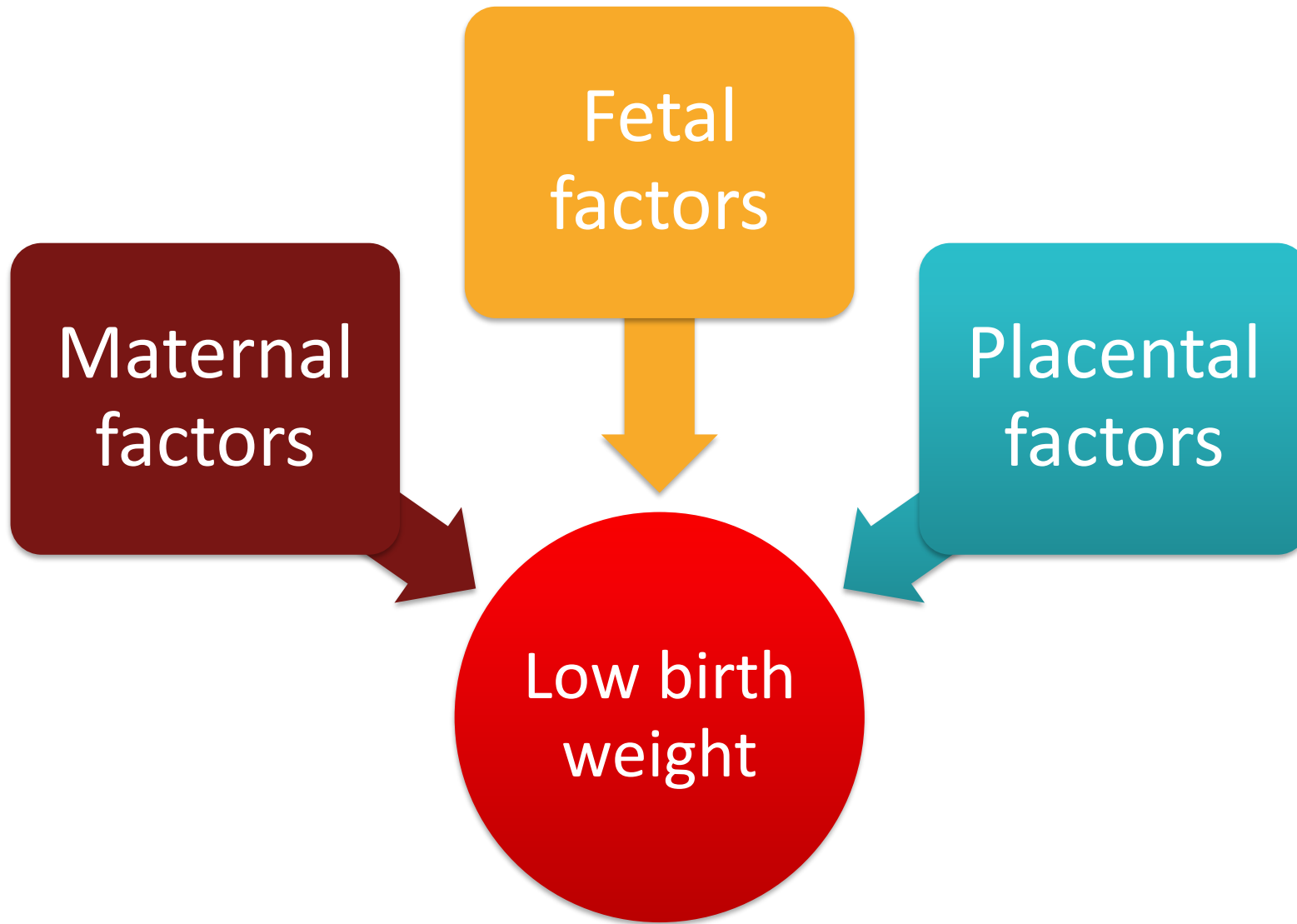
Emeline SCHIEBEL

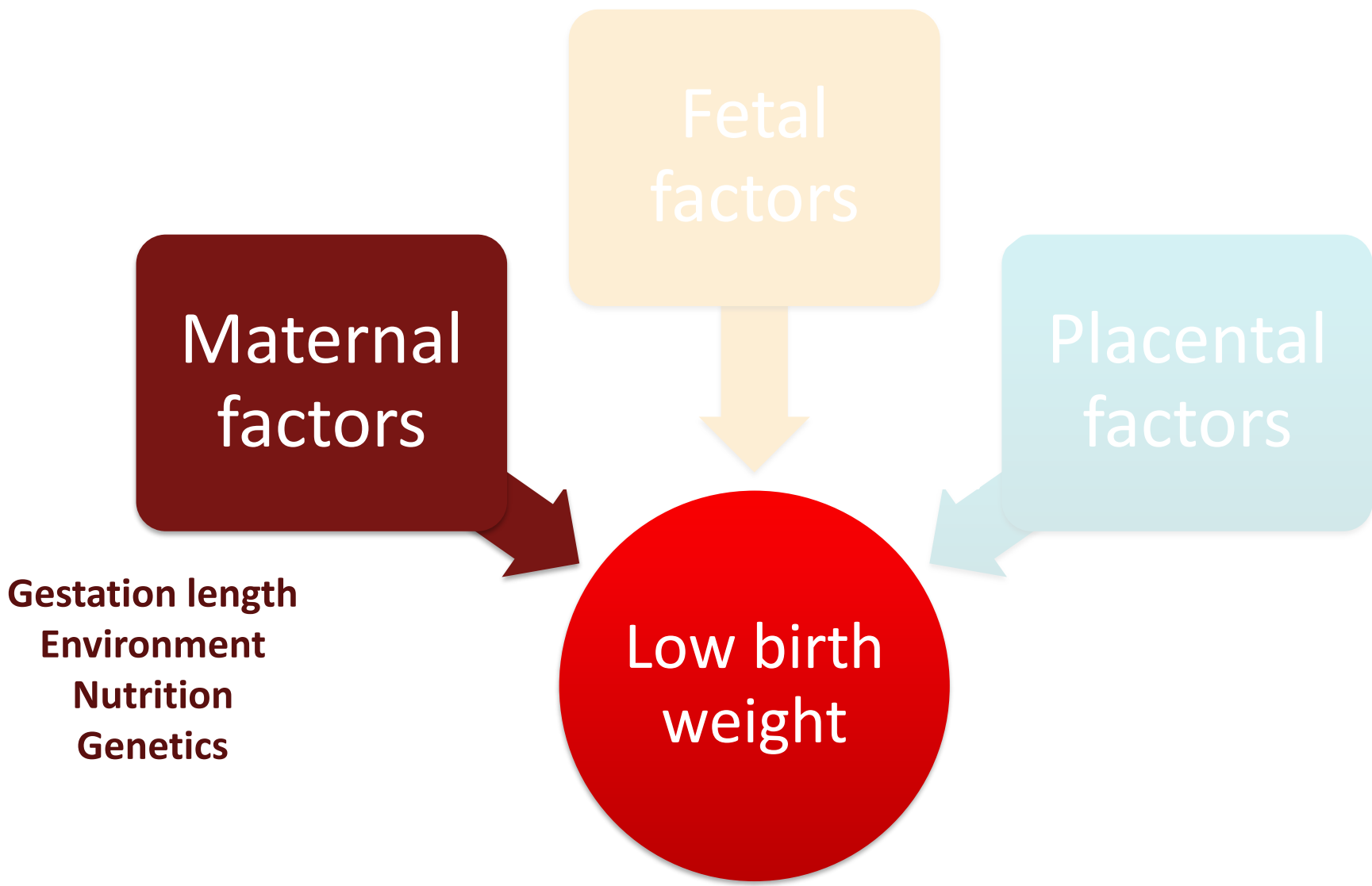


1160 Labradors
from National
French Guide Dog
Breeding Center



**IS IT POSSIBLE TO
PREVENT THE BIRTH OF
LOW BIRTH WEIGHT
PUPPIES?**





Birth weight and maternal BCS

34 bitches
1 kennel



Hanna MILA

Low birth weights
(25% lightest within each breed)

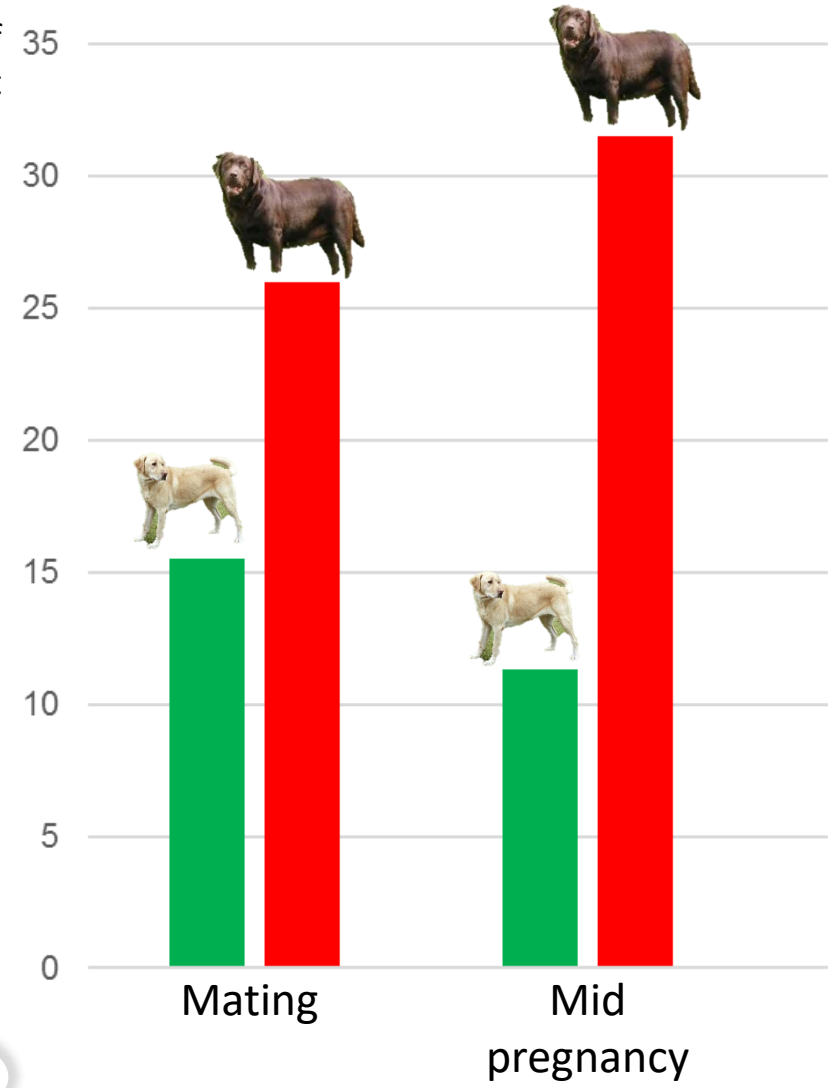


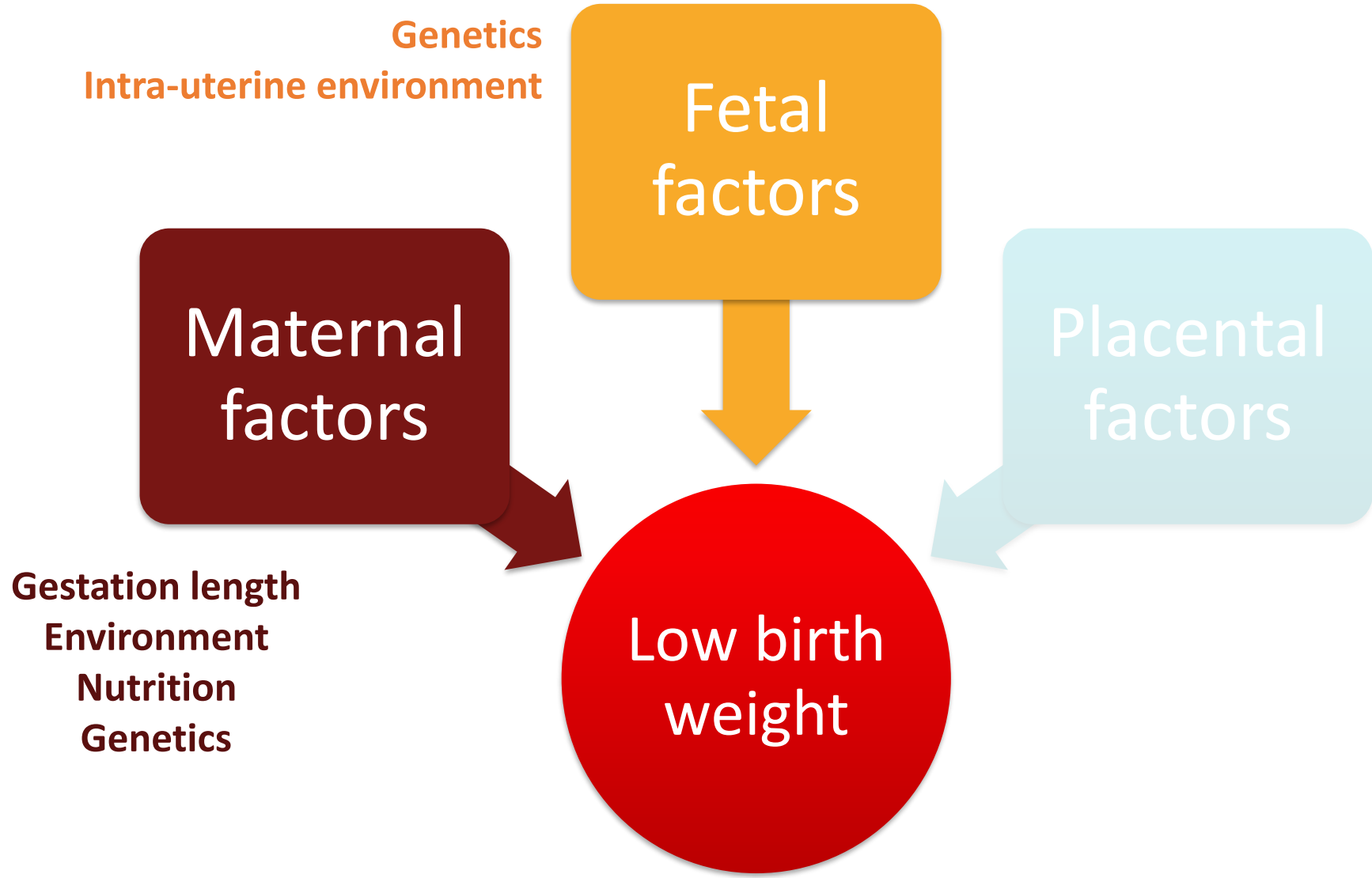
Overweight/obese



Lean/ideal

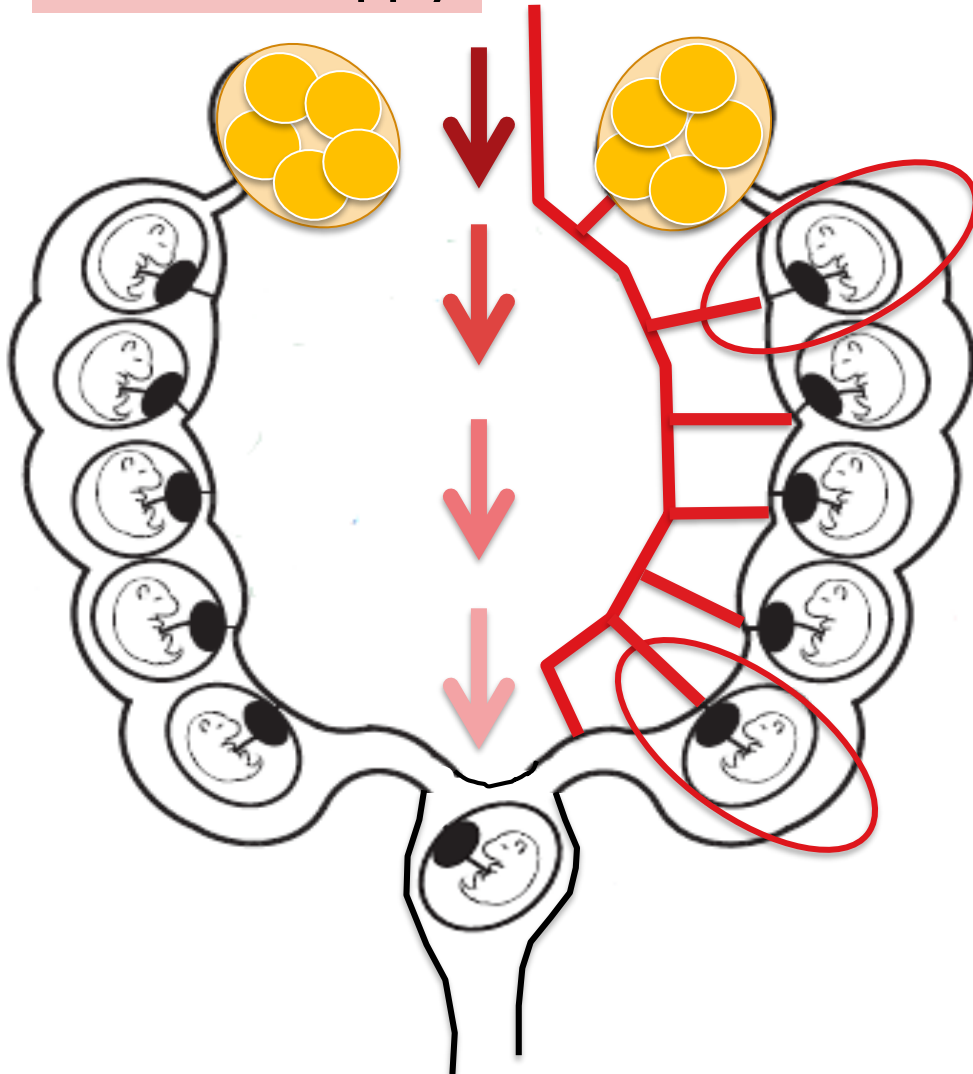
Proportion of low birth weight puppies (%)





Impact of intrauterine position

Nutrient supply



Space available



Kurt De CRAMER



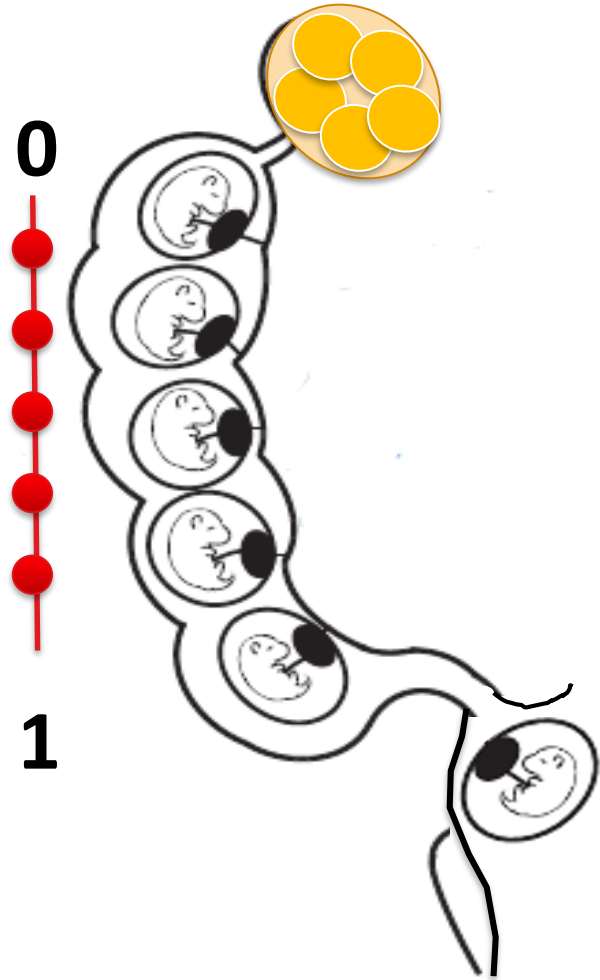
Emilie MALLAURAN



86
puppies
+
placentas



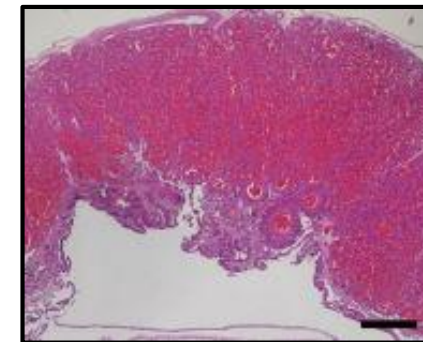
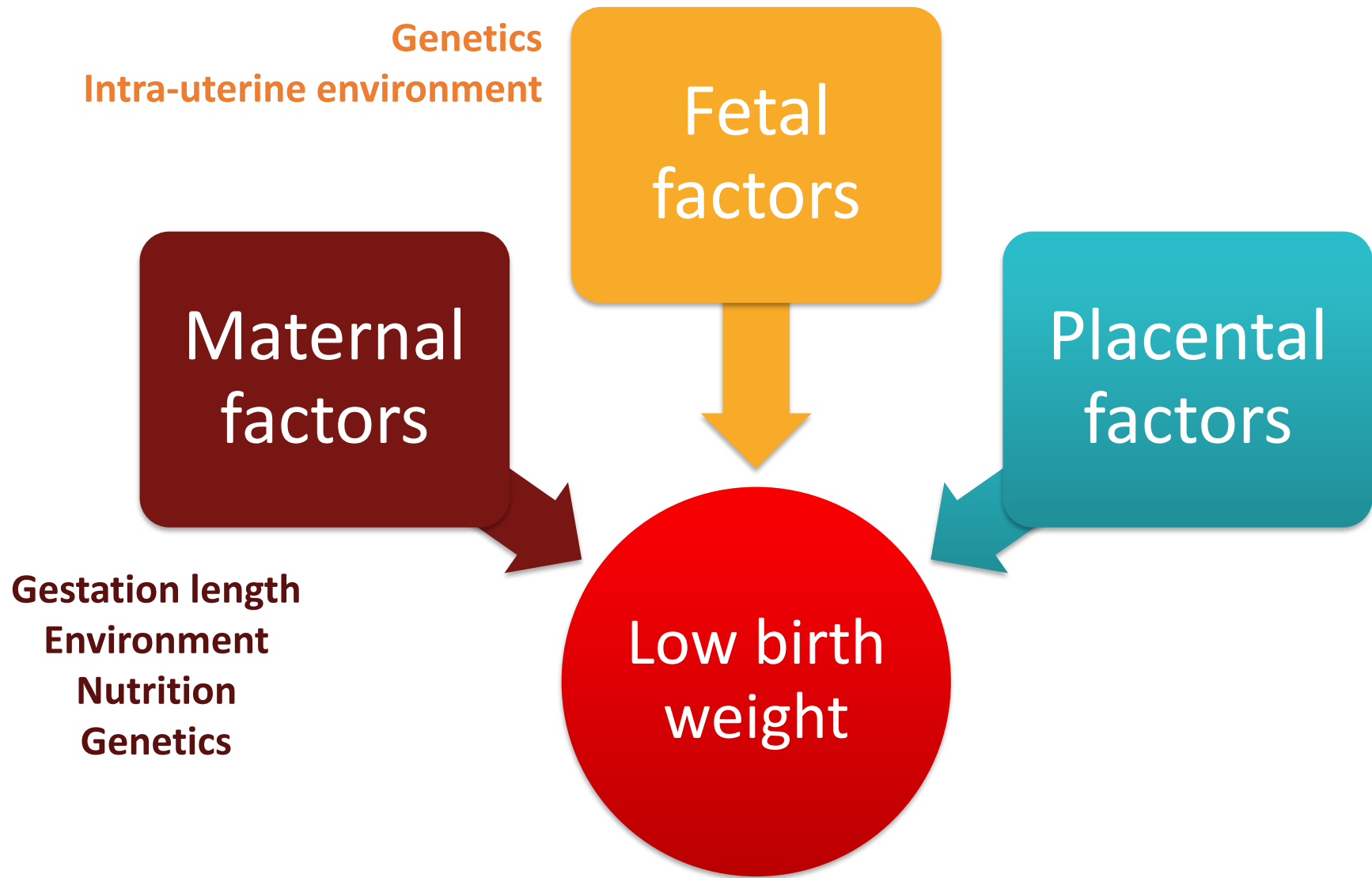
Impact of intrauterine position



Litter ID	Heaviest puppy
1	0
2	0
3	0
4	0
5	0
6	0
7	0
8	0
9	0
10	0.5
11	1

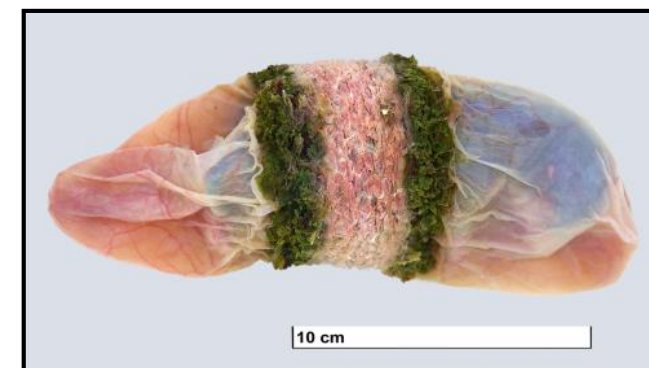


Lightest puppy	Litter ID
0	1
0	2
0	3
0	4
0.4	5
0.42	6
0.75	7
0.8	8
1	9
1	10
1	11



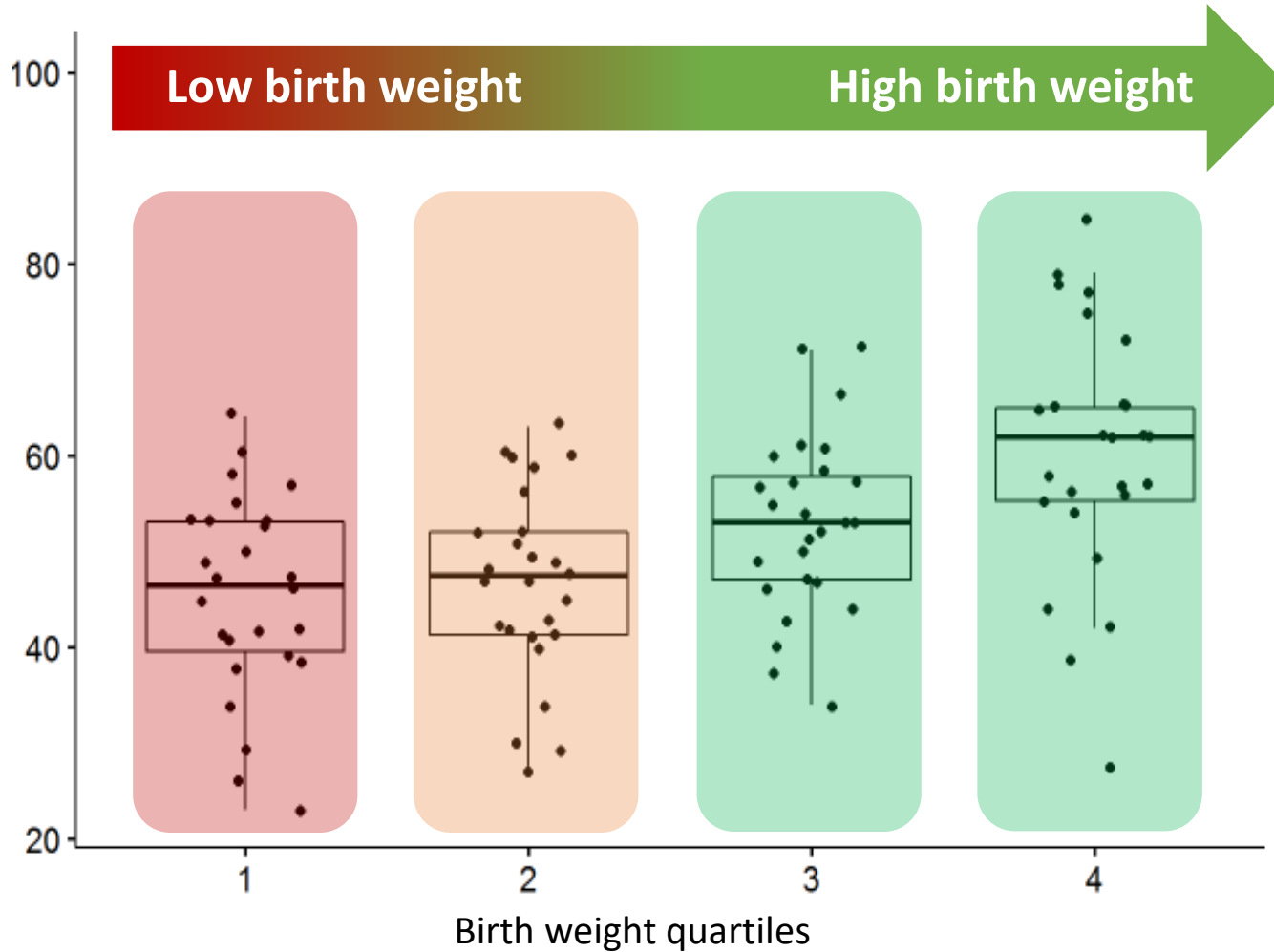
Microscopic characteristics

Surface/Weight



Significant differences in placenta characteristics

Placental weight



Kurt DE CRAMER

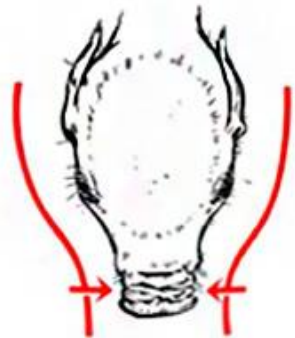
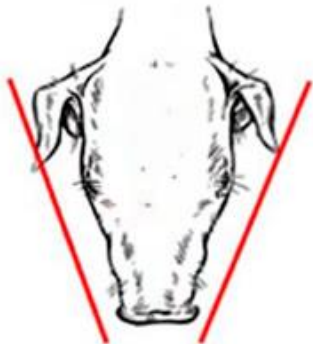
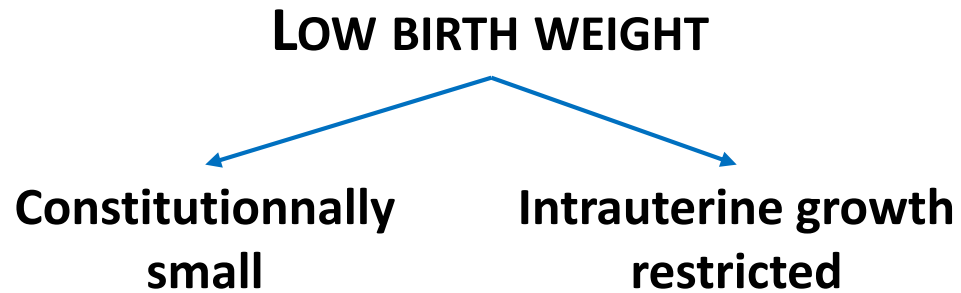


Estelle PICAROUNGNE

104 puppies
15 litters



Not all at LBW for the same reasons



Hales et al., 2014

Huting et al. *Porcine Health Management* (2018) 4:21
<https://doi.org/10.1186/s40813-018-0098-1>

Porcine Health Management

RESEARCH

Open Access



Once small always small? To what extent morphometric characteristics and post-weaning starter regime affect pig lifetime growth performance

A. M. S. Huting^{1*}, P. Sakkas¹, I. Wellock², K. Almond² and I. Kyriazakis¹



WORK IN PROGRESS



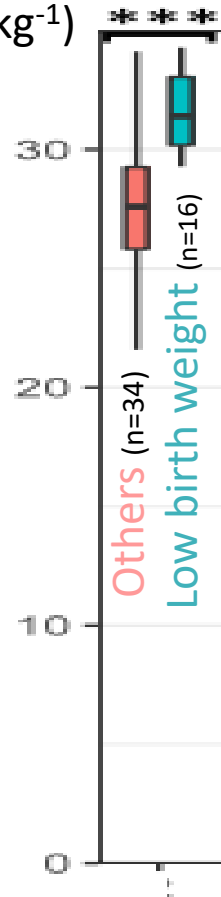
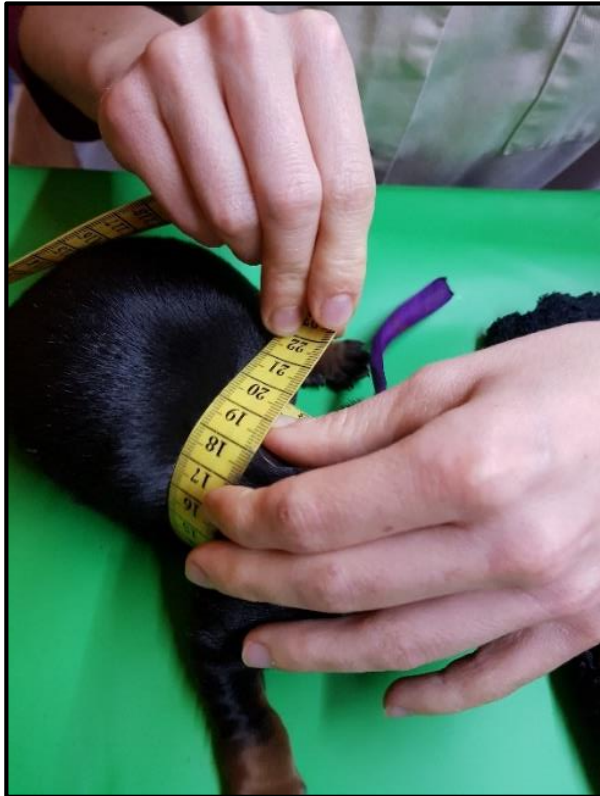
RANT-EN-DAL
Animal Hospital



école
nationale
vétérinaire
toulouse

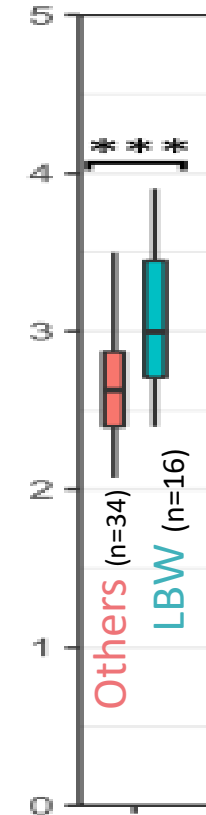
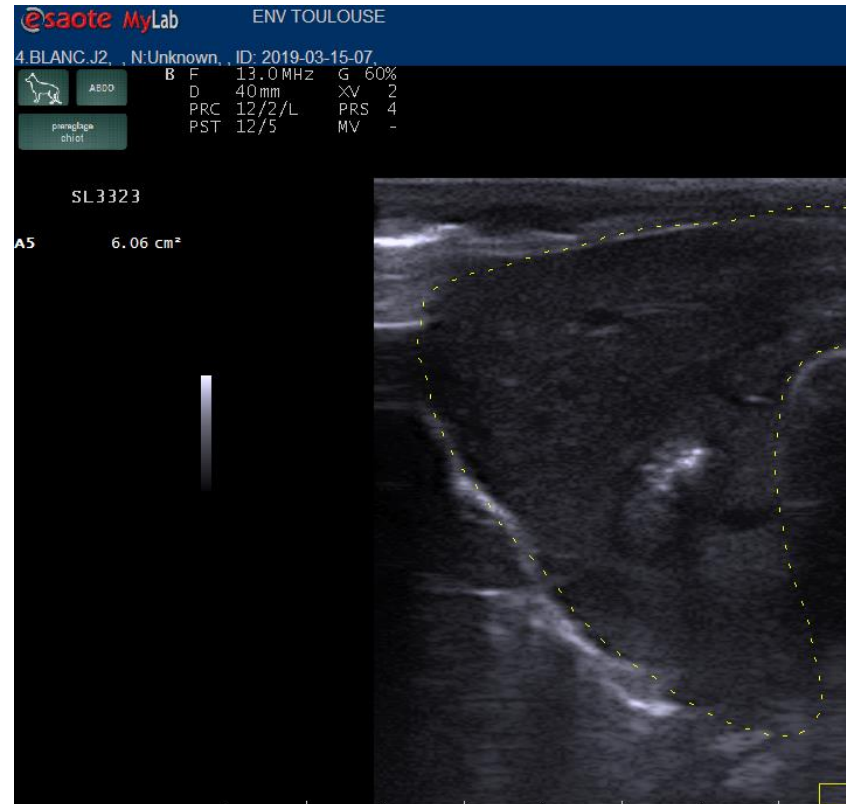
Brain-sparing effect

Skull perimeter:body weight (cm.kg⁻¹)



p < 0.001

Skull perimeter:hepatic surface (cm⁻¹)



p < 0.001



Amélie
TONIOLO



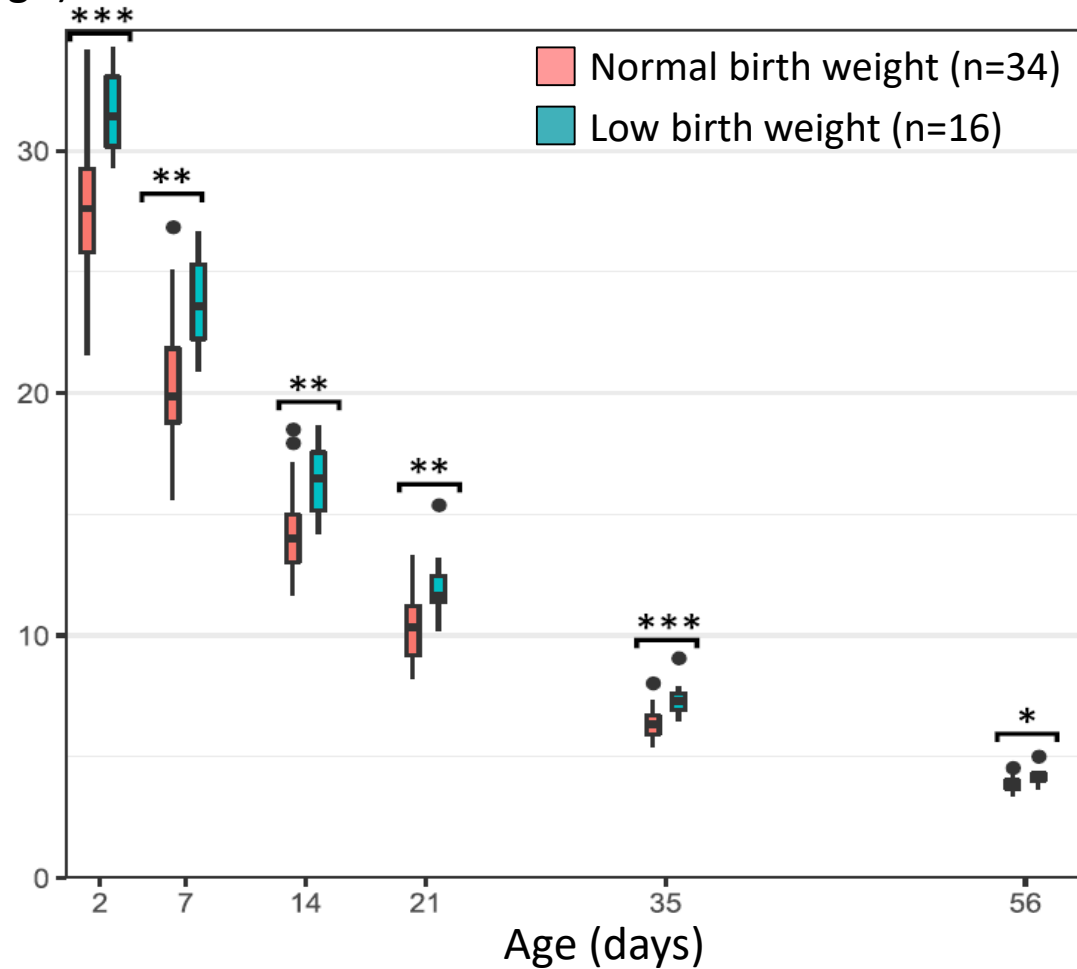
Elodie
RICHARD



AND AFTER?

Brain-sparing effect

Skull perimeter:body weight (cm.kg⁻¹)



Amélie
TONIOLO

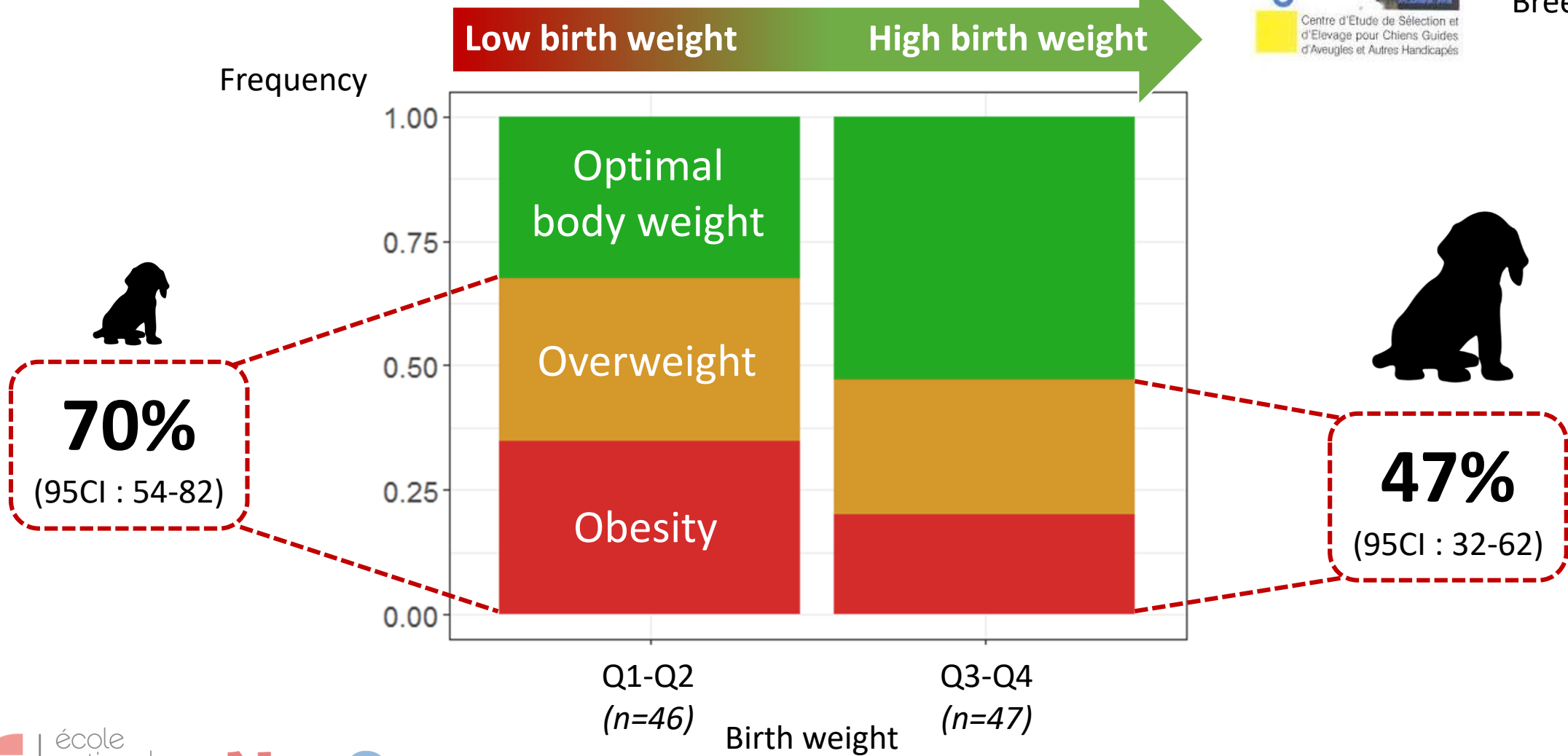


Elodie
RICHARD

Increased risk of obesity



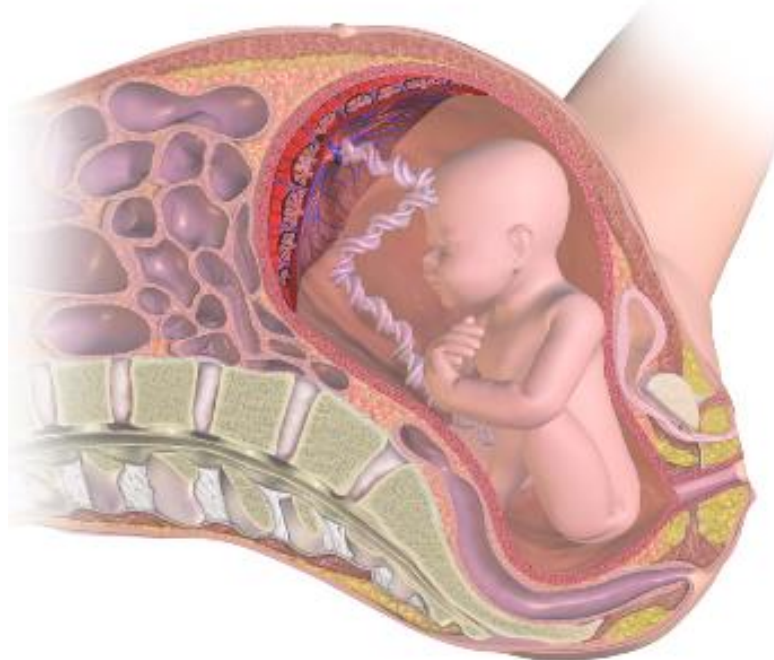
98 Labradors
from National
French Guide Dog
Breeding Center



Increased risk of obesity

PREGNANCY

Limited availability of resources



Development of a
THRIFTY PHENOTYPE

EXTRA-UTERINE LIFE

Resources available



**LOW BIRTH
WEIGHT**

**OVERWEIGHT
METABOLIC ISSUES**

Developmental Origins of Health and Diseases



D
O
H
a
D

FIRST 1000 DAYS

Long term health

Life expectancy

Overweight

Diabetes

Cardiovascular diseases

Developmental Origins of Health and Diseases

Intrauterine
life

Birth
weight



*What happens
in the womb lasts
a lifetime*

« The 1000 days concept » applied to dogs



Conception

Birth

Gestation

Development

1000 days

270 days

+2x365 days

Conception

Birth

Gestation

Development

120 days

63 days

+56 days





