

GCIRC Technical meeting

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Long-term performance of mixed-parities sows fed with 10% regular rapeseed meal during gestation and lactation

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The results of the nutritional trial described in the second part of this presentation (dia 16-33) were previously reported by

Nathalie Quiniou (IFIP)

at the meeting

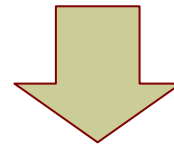
« Journées de la Recherche Porcine »

held in Paris on February 2008

Current evolution of the Rapeseed Meal (RSM) production in France

Bio-diesel programme

2006 to 2010



Increase of Rapeseed Meal availability

1,6 M tons



3,0 M tons



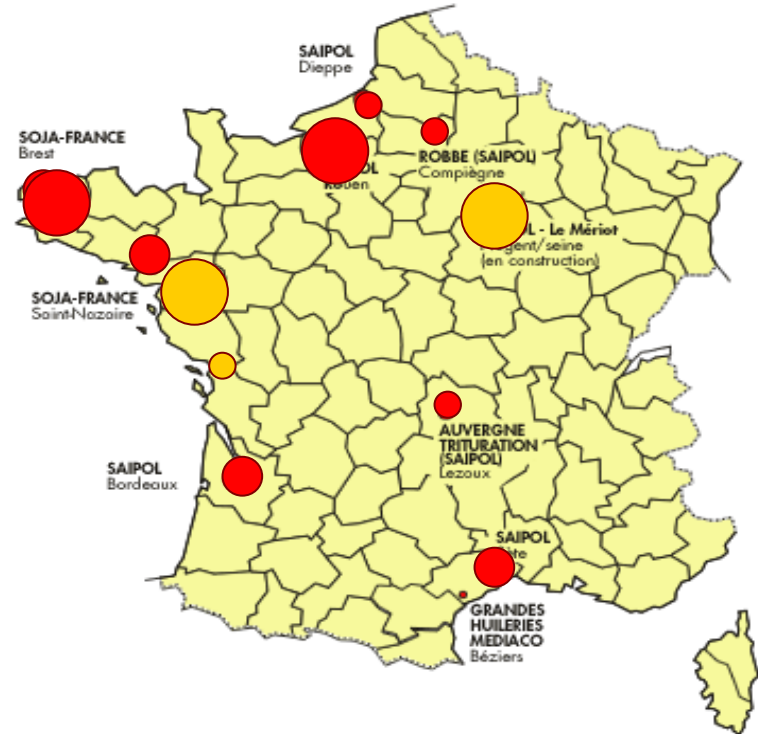
Crushing capacities in France

2006

2008



3.68 M t



6.50 M t

➔
+ 75 %



Uses of RSM in feedstuff

- **Mainly used for Ruminants (~ 60%)**
 - ◆ Dairy and meat cattle

- **Potentialities for Pig feeding**
 - ◆ Well balanced Amino-acids

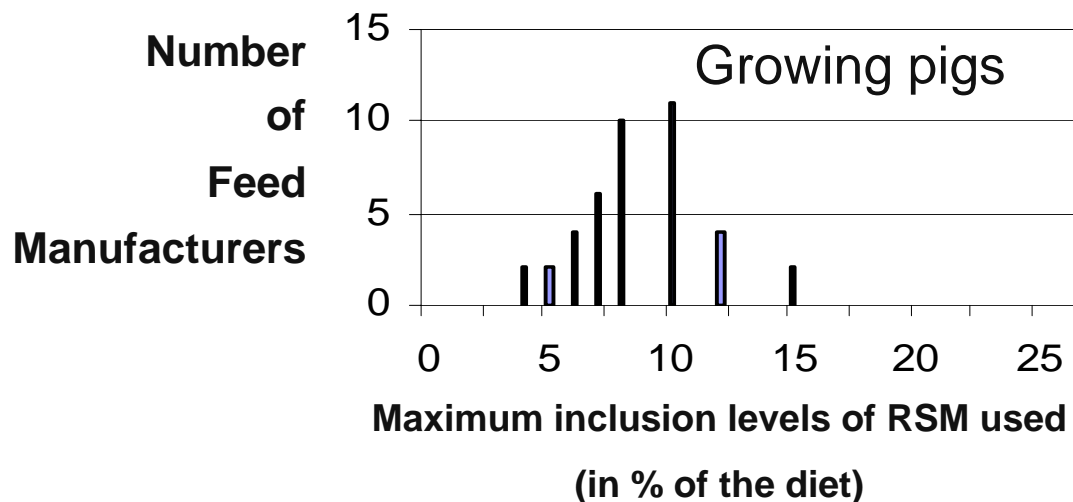
Use of RSM for monogastrics

Inclusion levels in feed	Applied	Recommended
Growing pigs	4 to 15 %	15 - 20 %
Piglets	0 to 5 %	10 %
Sows	0 to 5 %	5 - 10 %

Survey on RSM use

- involving 36 feed manufacturers, representing 70 % of the French production of feedstuff

(Cereopa, 2000)



Low inclusion level of RSM in pig feeding

Due to

- variability and lack of availability of RSM
- Lack of confidence for the nutritional value

Despite the growing of double-low varieties since the early 90's and their low content of glucosinolates (GSL), the users remember the high content of GSL in older varieties and its effect on animals.

Users easily associate RSM to any eventually problem observed on animals.

How to increase the use of RSM for swine feeding ?

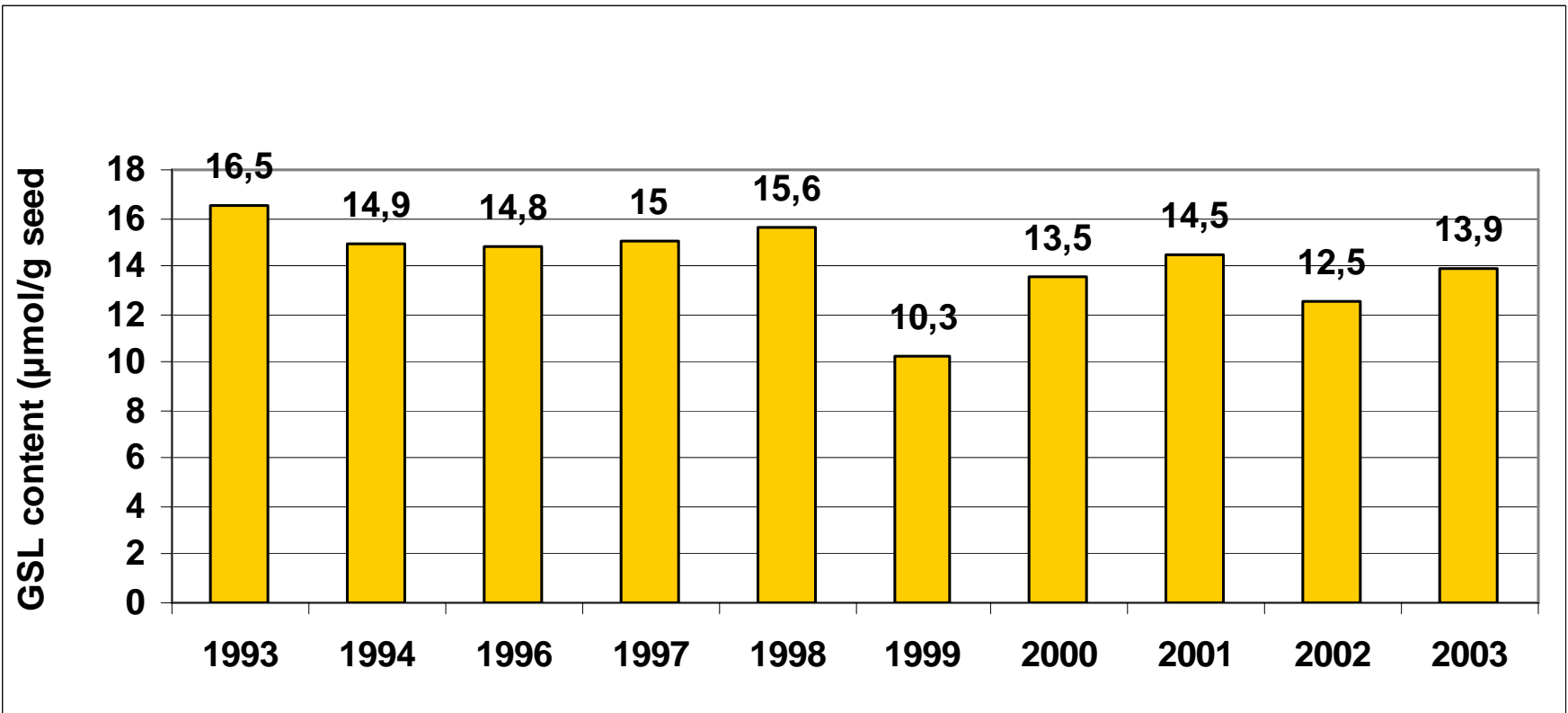
- **By improving availability and managing variability**
Production increase and quality survey

- **By increasing the confidence in the nutritional value**
Conception of a new experiment adapted to the users
 - on the most sensitive swine : sow in reproduction
 - on the long term to detect any risk of cumulative effect
 - using regular rapeseed meal available on the market

Glucosinolates content in seeds in France

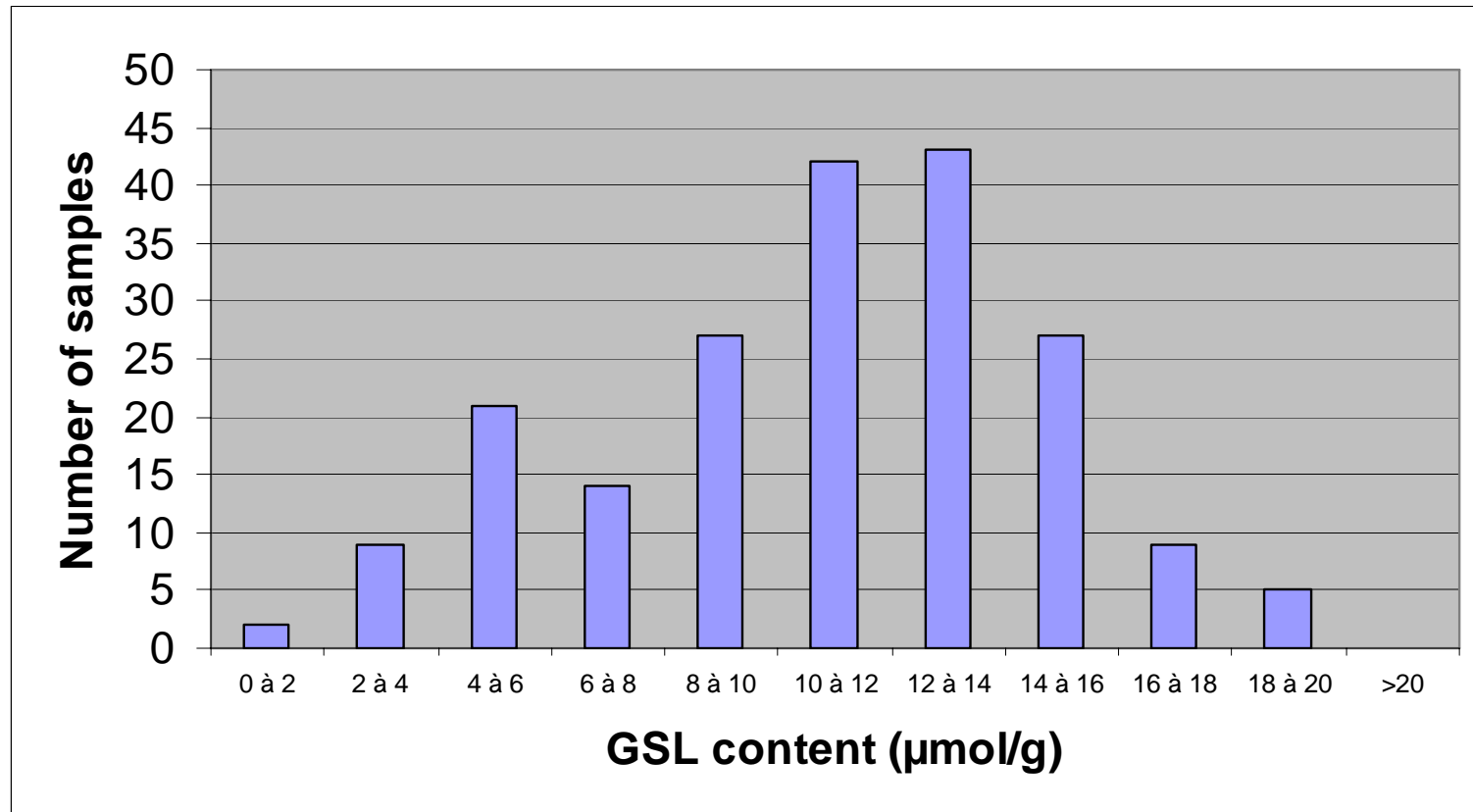


Evolution from 1993 to 2003



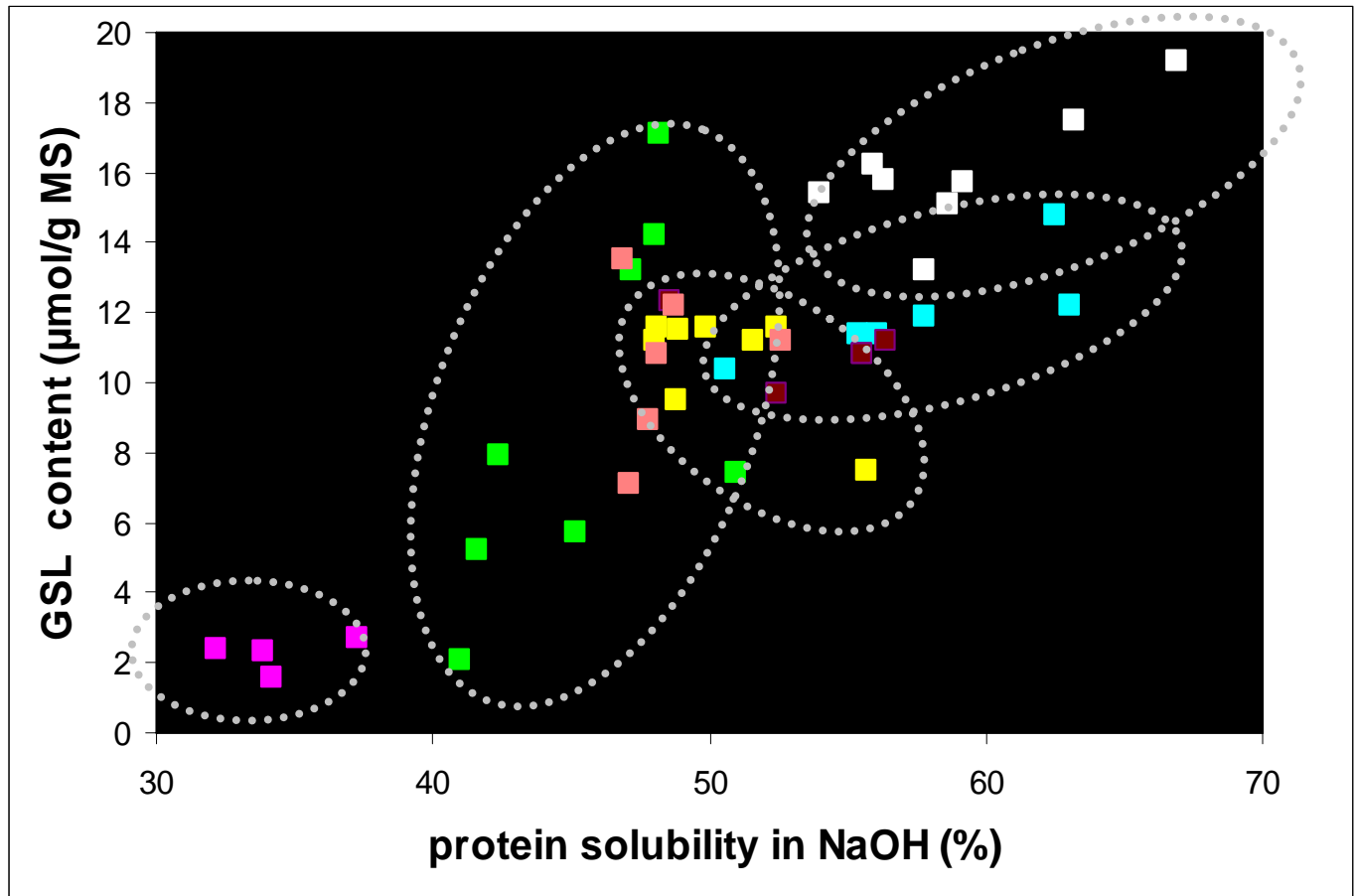
GSL content in rapeseed meal in France

Distribution of the samples collected
in 7 crushing plants (Survey 2003 - 2006)



Quality of Rapeseed meal production in 7 crushing plants in France

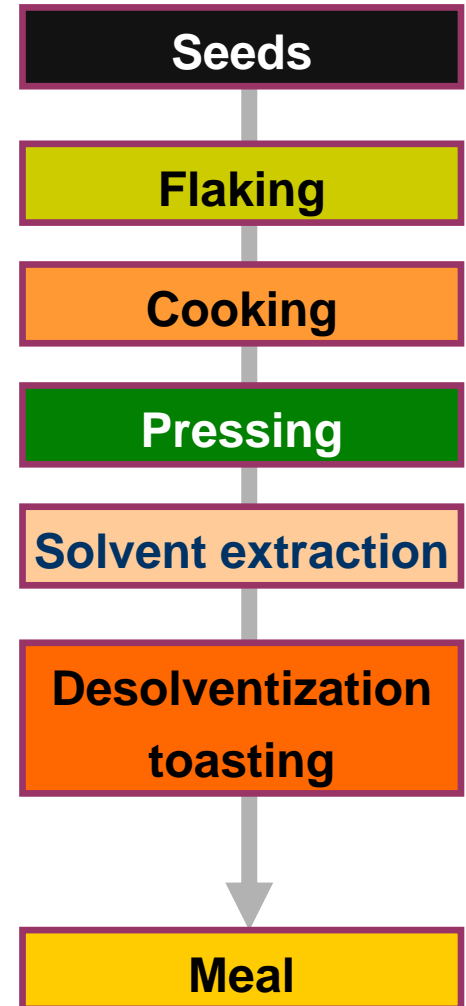
(85 % of total production in France)



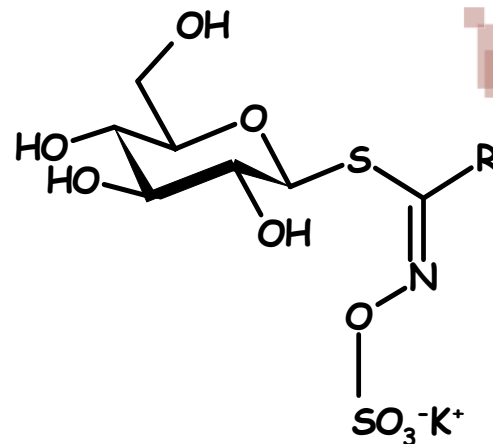


Effect of the process on the GSL content

GSL Breakdown
(from 25 to 90 %)



Glucosinolates in Rapeseed



Example : seeds with 15 μmol GSL /g

<i>R</i> variation	glucosinolate	class	content ($\mu\text{mol/g}$)	metabolites	risk
$\text{CH}_2=\text{CH}-\text{CHOH}-\text{CH}_2-$	Progoitrin	alkenyl-	7	VOT	++++
$\text{CH}_2=\text{CH}-(\text{CH}_2)_2-$	Gluconapin	alkenyl-	3	ITC	++
$\text{CH}_2=\text{CH}-(\text{CH}_2)_3-$	Glucobrassicinapin	alkenyl-	1	ITC	+
4-hydroxyindol-3-ylmethyl-	4-OH glucobrassicin	Indolyl-	3,5	SCN^-	+
Indol-3-ylmethyl-	glucobrassicin	Indolyl-	0,5	SCN^-	-

VOT : 5-vinyloxazolidine-2-thione,

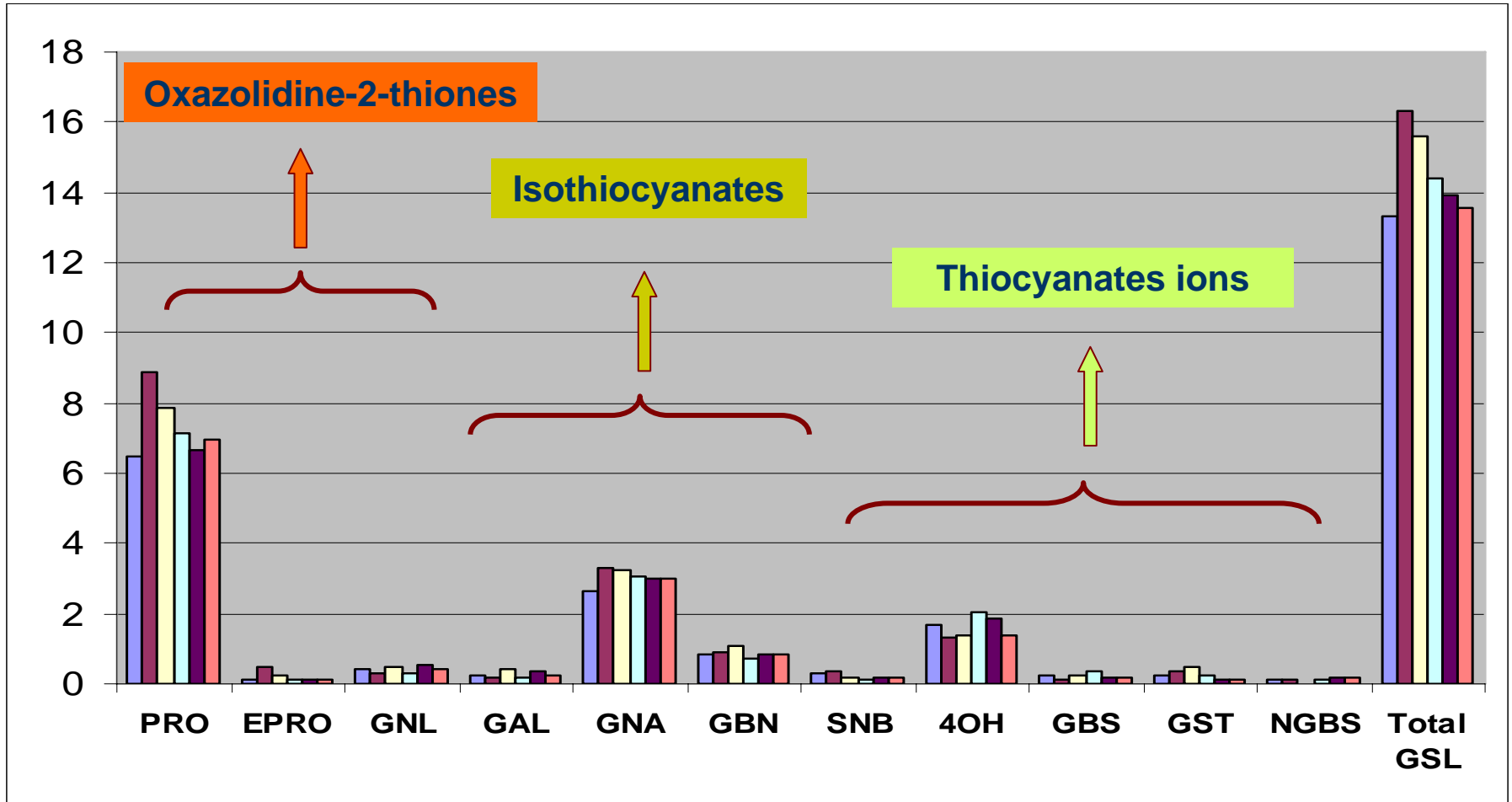
ITC : isothiocyanate,

SCN^- : thiocyanate ions

Glucosinolates in rapeseed meal



(6 batches used during 18 months, GSL average content : 14,5 $\mu\text{mol GSL/g}$)



Breakdown of the GSL in the RSM used in the nutritional trial

- Estimation -

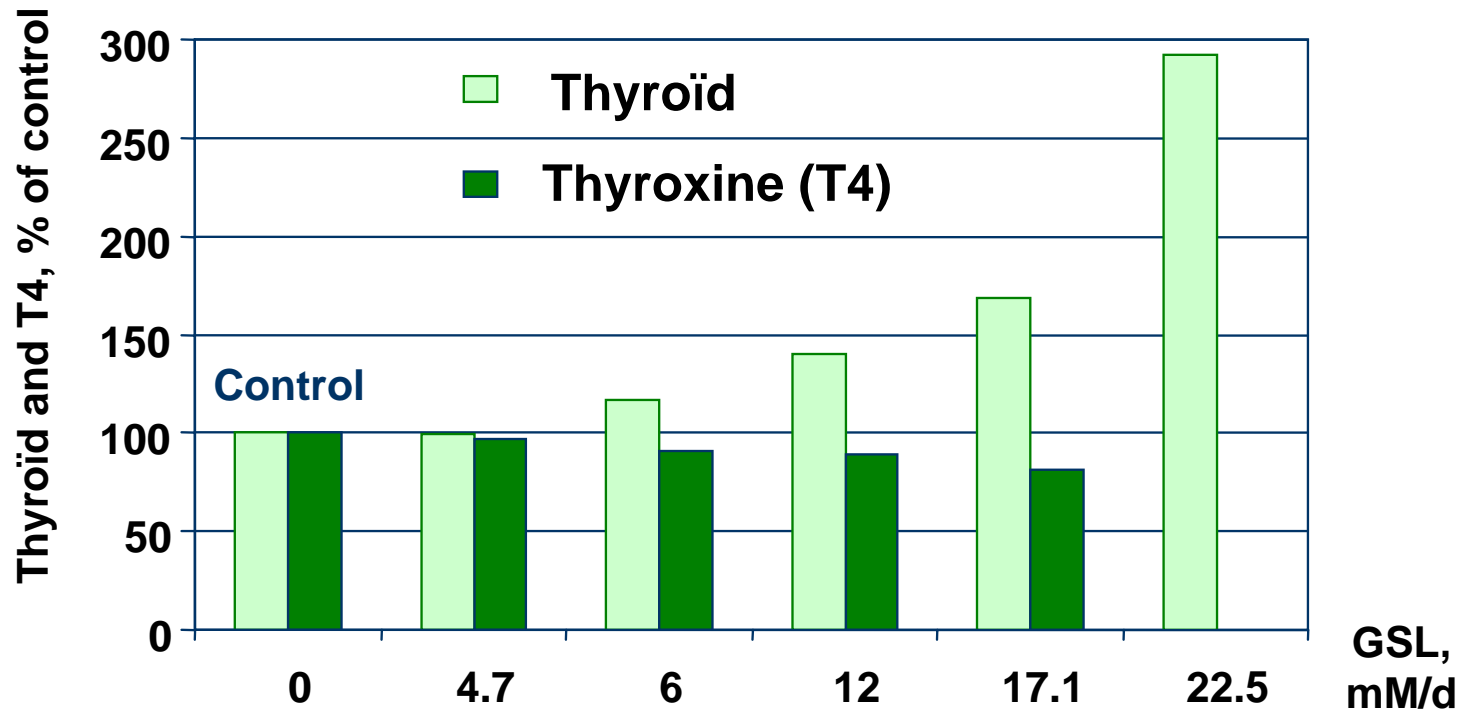
- Average level of GSL in seeds ~ 15,9 $\mu\text{mol/g DM}$
- Theoretical content of GSL in meal ~ 29 $\mu\text{mol/g DM}$
(no breakdown of GSL and concentration by oil removal)
- Measured content of GSL in meal ~ 14,5 $\mu\text{mol DM}$



50 % of the GSL are broken down

Effects of GSL on thyroid weight and T₄ in plasma of foetus (112 d)

Nutritional trials INRA 1987, 1990 and 1993



Incorporation rates



0 % 20 % 7 % 14 % 20 % 20 %

Cultivar



Tapidor Darmor Tandem

Experimental design



4 batches of sows LWxLD

- 30 sows inseminated by batch
→ 24 entered in farrowing room

2 treatments

- Control : Feed without rapeseed meal**
- Rapeseed : 10% rapeseed meal during G°+L°**
 - 10 manufactured lots of feed
 - 6 different lots of rapeseed meal
 - glucosinolates (GSL) content of the rapeseed meal
= $14.5 \pm 1.2 \mu\text{mol/g DM}$

3 reproductive cycles

Nutritional characteristics of the feed

- Pelletized
- Iso-energetic,
- Iso-digestible amino-acids
+ ideal protein pattern

- Net energy, MJ /kg
- Digestible lysine, g/kg

Gest	Lact
9.1	9.6
5.0	8.5

Manufacturing the experimental feed

- 9 batches of gestation feed (137 t) and 6 batches of lactation feed (65 t)
- manufactured by Euronutrition and stored in IFIP experimental station for sow feeding





Animals management



- Sows by groups of 12-13 or 6
- Rations during gestation adapted to the body condition at the artificial insemination
 - (litter parity, weight, backfat thickness)
- Feeding *ad libitum* during lactation, from the 5th day post-partum
- Weaning at 28 days
- Measurements



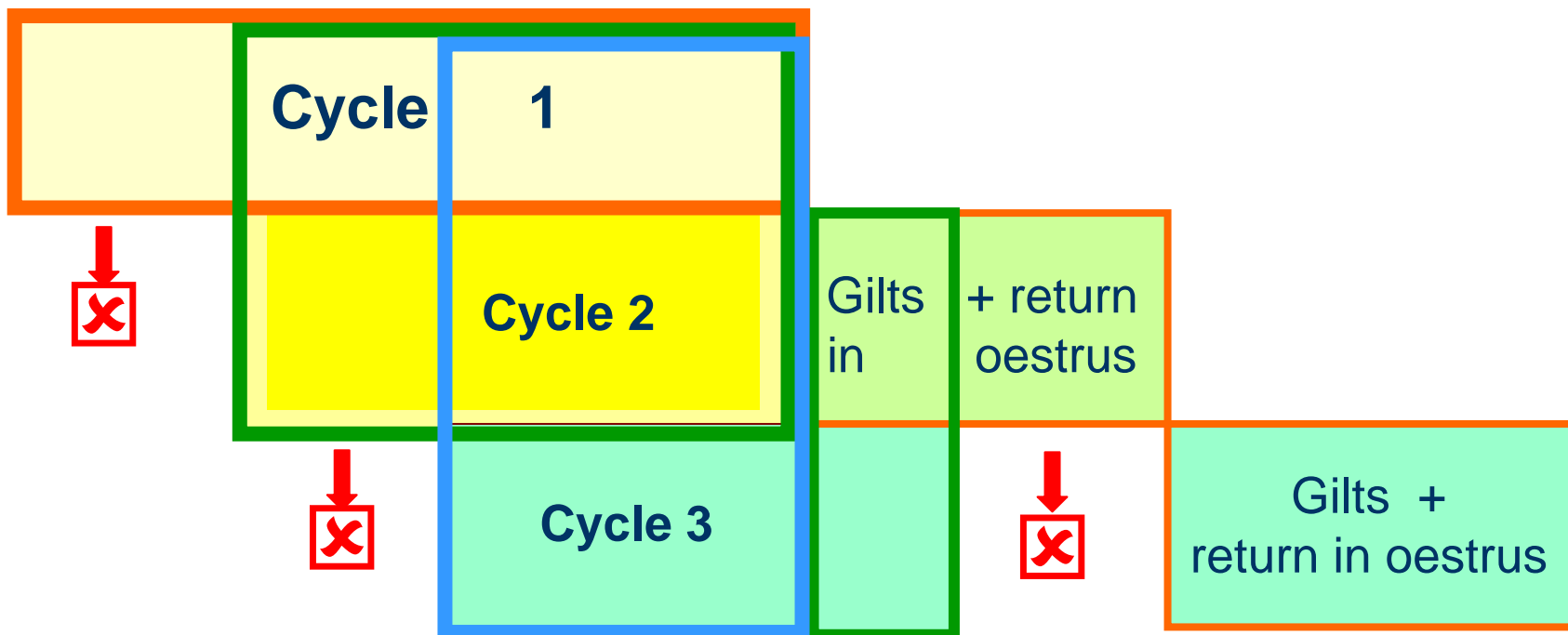


Measurements



		Ultrasono- graphy	Litter size	Weight	Back Fat Thickness	Blood samples	Daily feed intake
Sows	Weaning	Daily		Day 0	D + 1	Day 0	
	Gestation	D + 28		D + 1	D + 1	D + 1	Average
	Farrowing			D + 1	D + 1		
	Lactation						Average
	Weaning	Daily		Day 0	D + 1	Day 0	
Piglets	Birth		Total & alive Day 0, +1	Day 0		Day 0 (2 piglets per litter)	
	Weaning			Day 0			
	Death			Eventual.			

Statistical analyses



- On every sow after
- On the sows after
- On the sows after

1 occurrence in trial

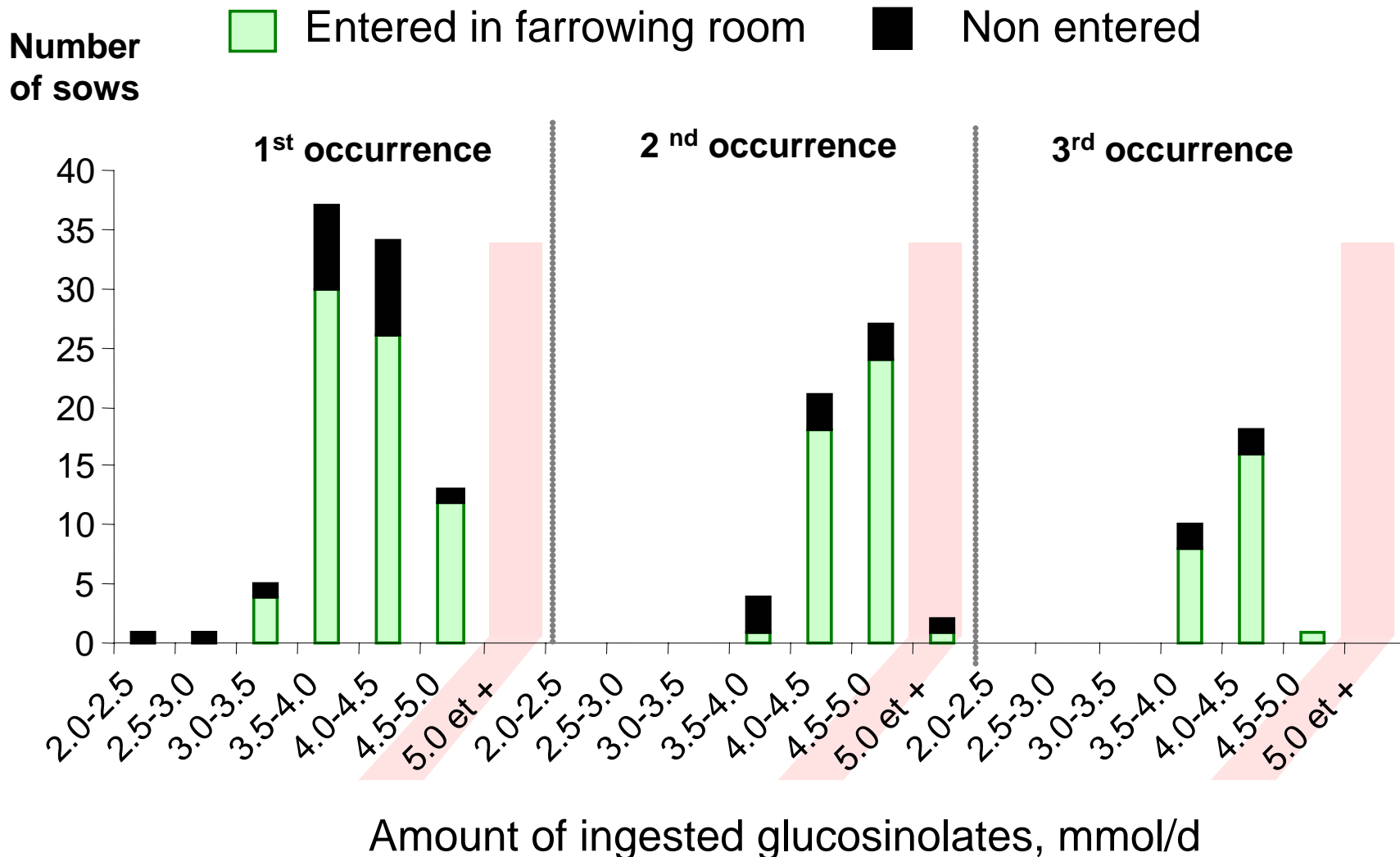
2 occurrences in trial

3 occurrences in trial

Inseminated sows

Lot	Rapeseed	Control	
Sows inseminated			
at the 1 st occurrence	91	96	
at the 3 rd occurrence	30	35	
Return in oestrus	17 (10%)	27 (14%)	ns
of which >28 d	9	6	
of which abort. after vaccin	1	0	
Culling	16 (19%)	25 (22%)	ns

GSL ingested during gestation

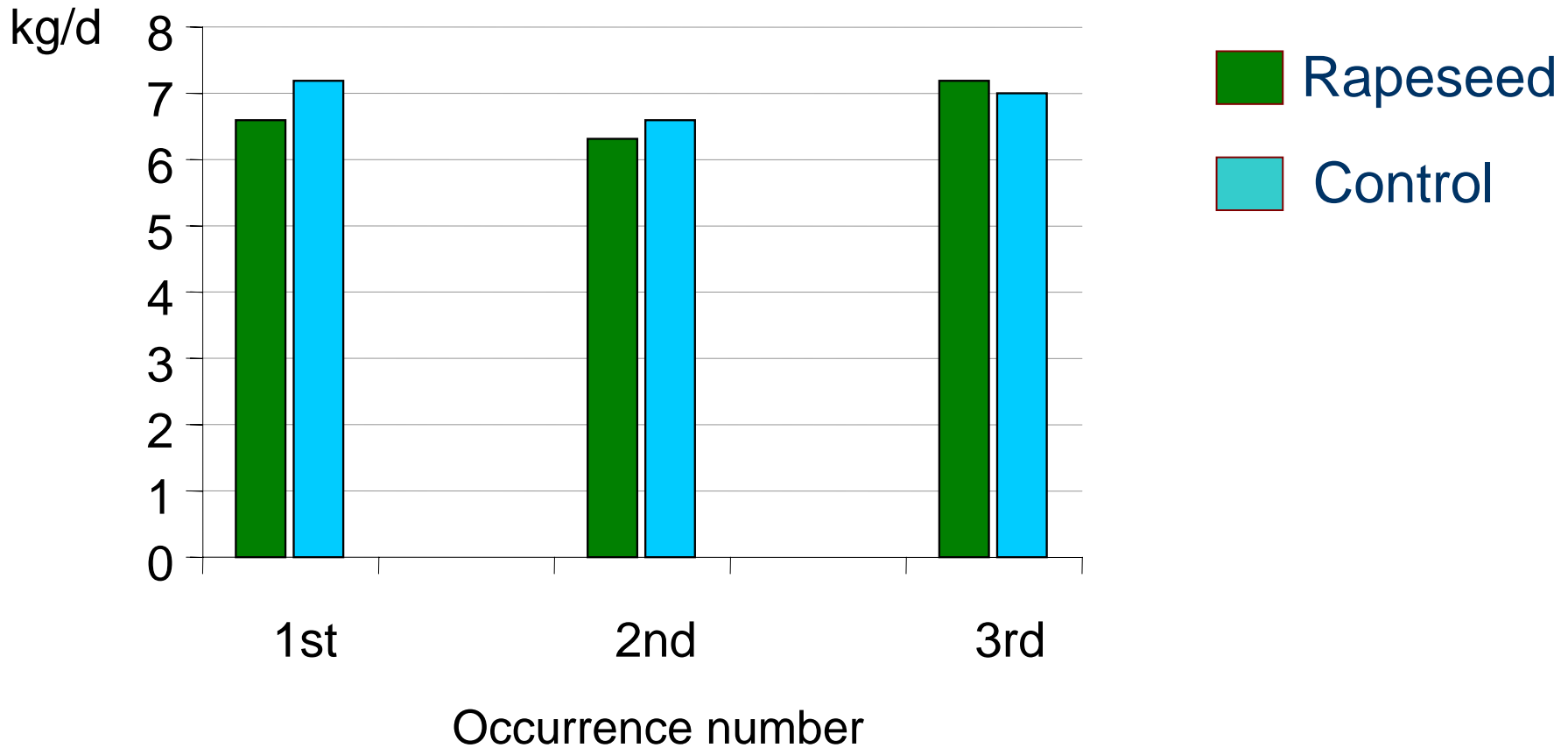


Daily Feed Intake of lactating sows



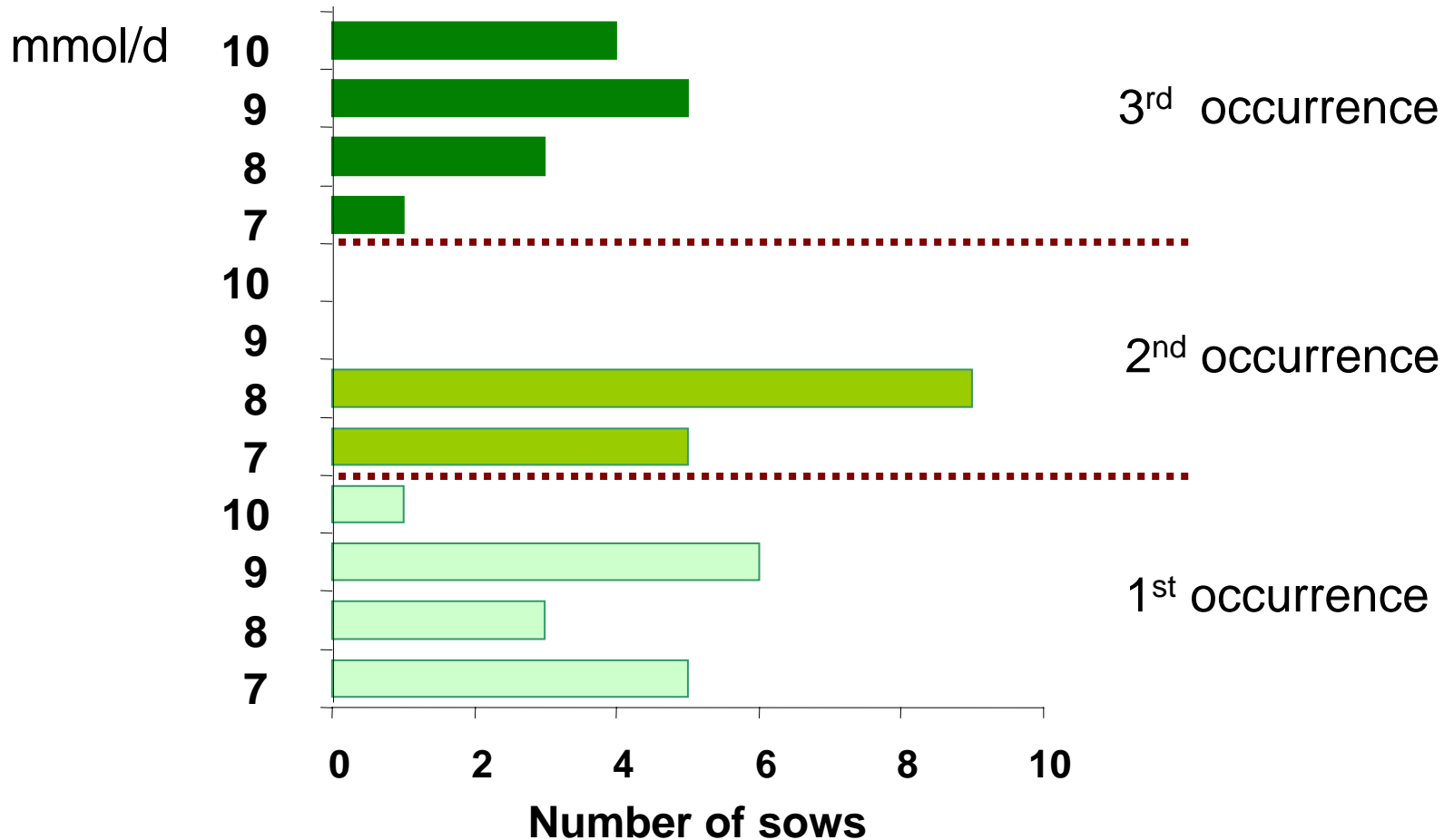
Treatment effect: ns

6,7 vs 6,9 kg



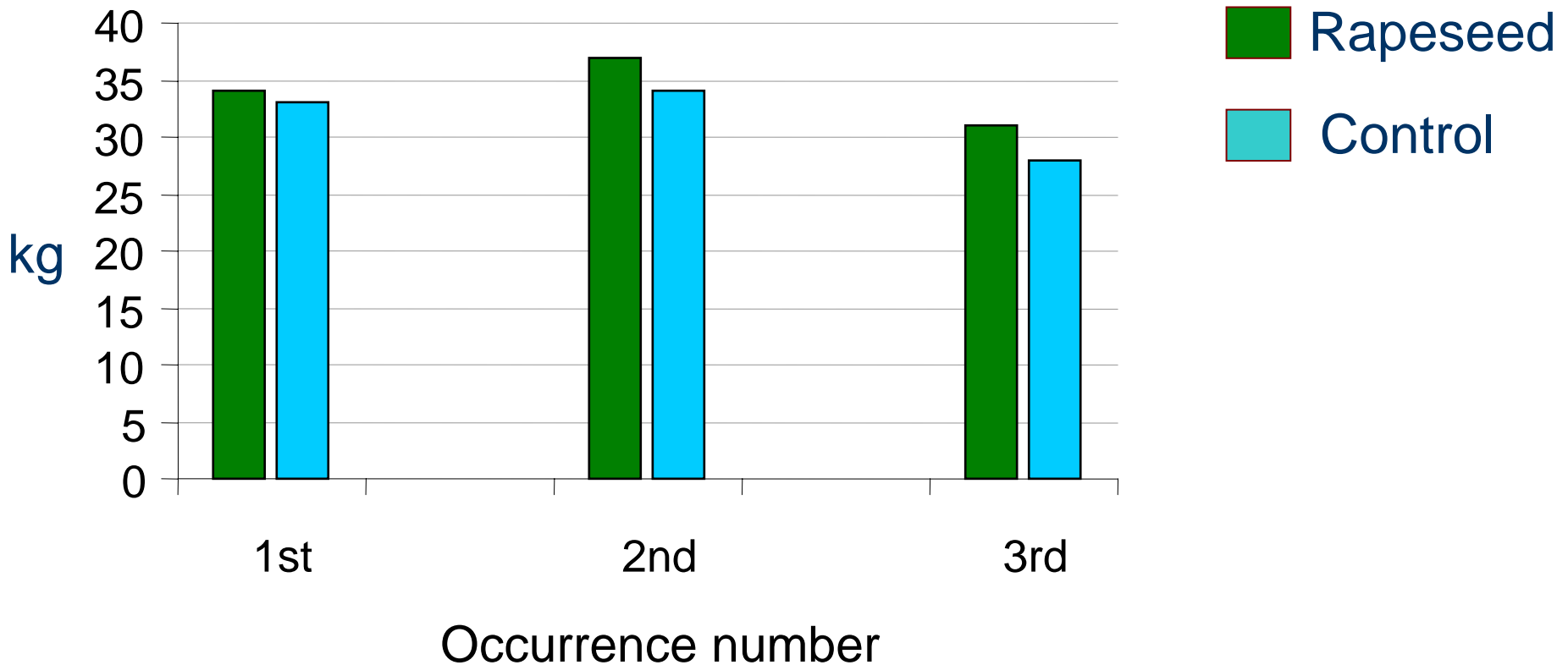


Amount of GSL ingested during lactation



Weight gain of sows by cycle

Treatment effect : ns 34 vs 32 kg



Prolificacy of the sows

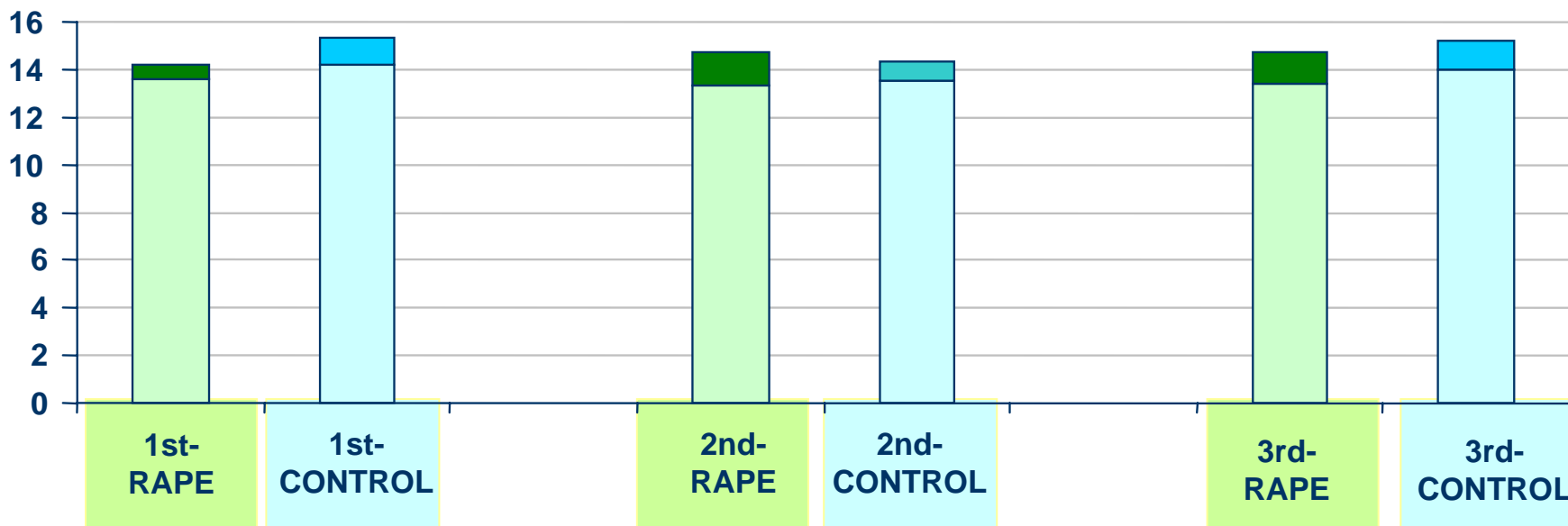
Born alive
 13,4 vs 13,9

Born dead
 1,1 vs 1,0

Number of piglets



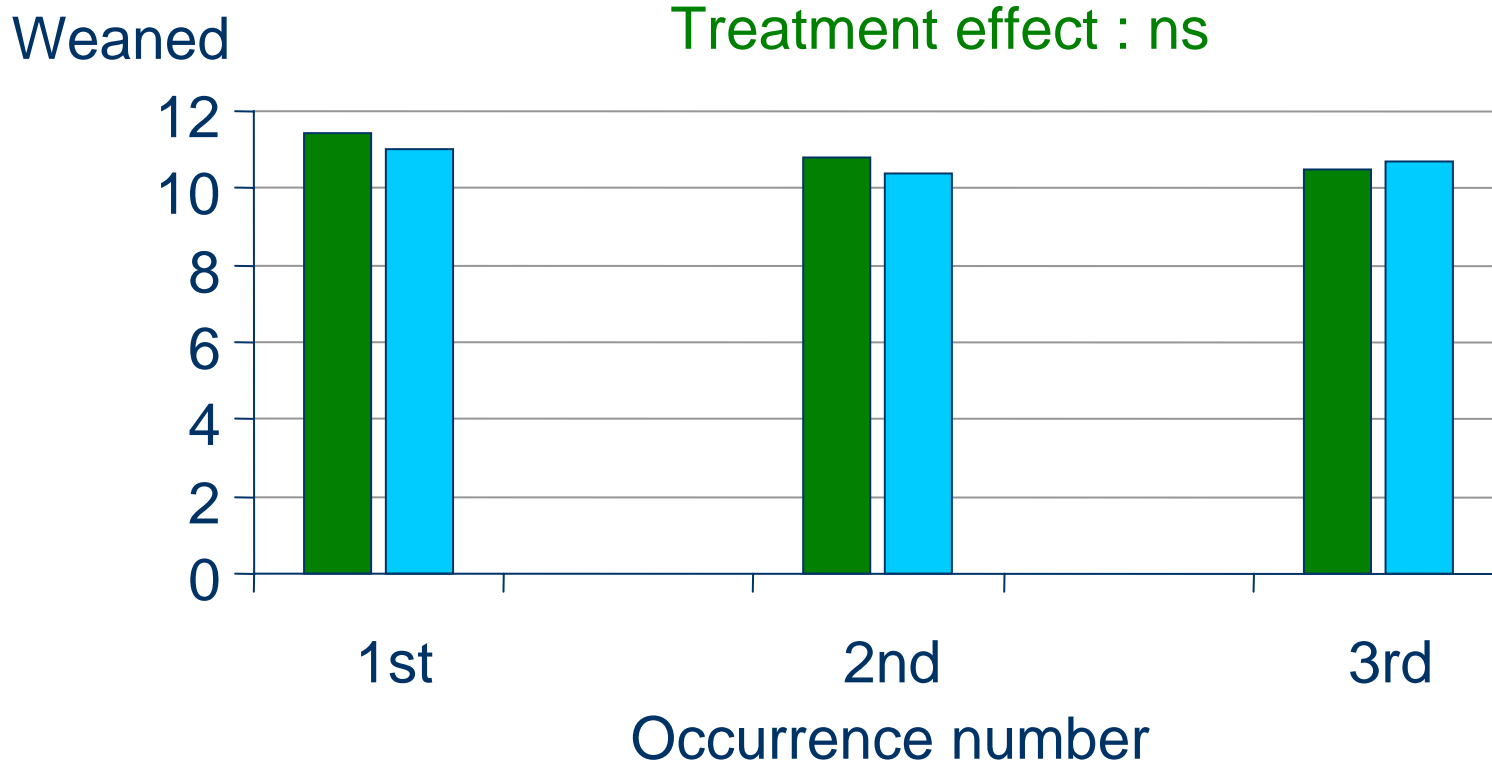
Treatment effect : ns



Occurrence number – FEED



Litter size at weaning



Lot



Rapeseed



Control

Weaned on 3 cycles

32.6

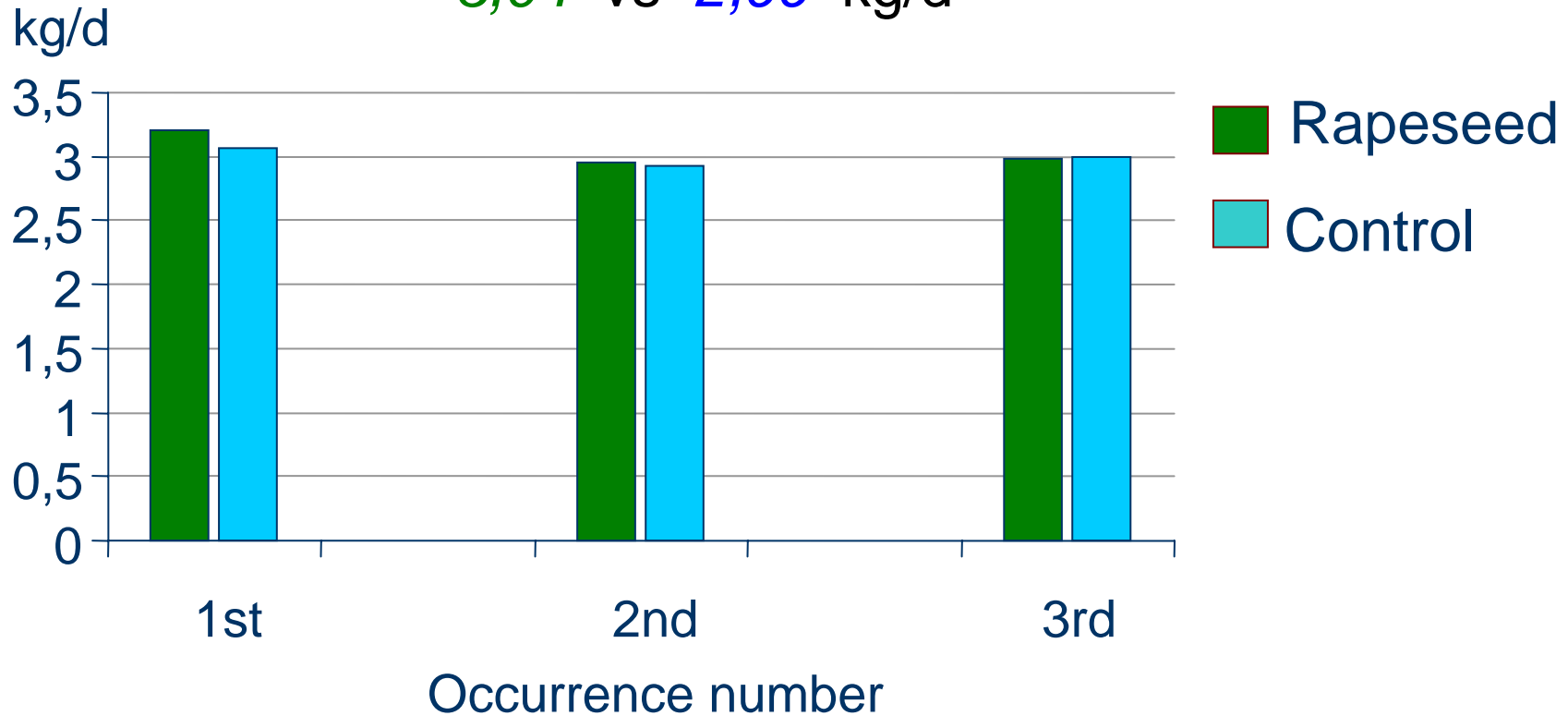
32.1

ns

Daily Average Gain of litter

Treatment effect : ns

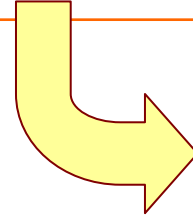
3,04 vs 2,99 kg/d



Weaning – Oestrus Interval, d



Treatment	Rapeseed	Control	
Occurrence 1	4.2	4.0	} T x P*
Occurrence 2	4.0	4.1	
Occurrence 3	4.0	5.4	



 1 sow : 14 d
 1 sow : 15 d
 1 sow : 20 d

Conclusions

- **Initial conditions :**
 - maxi 5 mmol GSL/d during gestation**

- **For the herd...**
 - Frequency of return in oestrus after artif. insemin. : **no ≠**
 - Frequency of abortions : **no ≠**
 - Frequency and cause of culling : **no ≠**

- **Weight of litter and piglets :** **no ≠**

- **Prolificacy after several [G°+L°] in trial** **no ≠**

- **No impact of 7- 8 mmol GSL ingested during lactation on the prolificacy at the next farrowing**



Conclusions (2)

- Experiment carried out with RSM the richest in GSL produced in France
- Results showed no effect due to this type of RSM
- Any RSM produced in France will show no effect on the performances of the sows

Acknowledgements

to all persons involved in this work:

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