

# Multi-year survey on chemical composition of de-oiled regular rapeseed meal produced in France. Evaluation for long-term feeding of sows in reproduction

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## Introduction

**Bio diesel production context.** Due to the increase of bio-diesel production, the amount of rapeseed meal (RSM) available as feedstuffs for animal production is expected to double between 2006 and 2010 to reach 3 millions tons in France. RSM is mainly used for dairy cow feeding because of the ability of ruminants to valorise the relatively high fibre content. However, the protein quality and the well balanced amino-acid composition of the RSM could also increase the use for swine feeding. Despite the genetic improvement of glucosinolates (GSL) reduction in double low varieties

(content < 18  $\mu\text{mol/g}$  seed), the incorporation rate is still limited in swine feeding and particularly in sows and piglets.

**Multi-year quality survey.** At the same time and for accompanying this development, the French organisation (ONIDOL) and technical institute (CETIOM) for oilseeds organised a multi-year survey involving the crushers companies. The main objective was to evaluate the quality of the RSM produced every month in every plant.

**Sow feeding experiment** In the early 90s, an experiment showed that double low RSM could be incorporated to feed primiparous sows at 20 %, leading to a level of 5 mmol GSL per day. In this experiment, the RSM was prepared from a pilot plant (CETIOM) with a mild process, and contained 9.3  $\mu\text{mol GSL/g DM}$ .

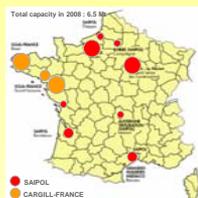
Compared to this experimental RSM, the GSL content of the current regular RSM is similar on average (~10  $\mu\text{mol/g}$ ) but can be significantly different in some crushing plants depending on the process used.

**Updating** This work consisted in evaluating the quality of the regular RSM available in France and updating the previous experiment conducted on sows in reproduction (Etienne et al., 1993), taking into account the current RSM characteristics. The objective was to show that the regular RSM produced in France and incorporated at 10% is appropriate for sow feeding and that there is no long-term negative effect on the reproduction performances.

## Material and Methods

### Multi-year survey in crushing plants

The multi year survey was organized in 2003 and the crushing companies SAIPOL and CARGILL-France were partners of ONIDOL and CETIOM. Around ten crushing plants among the biggest in France the capacity of which represented 90 % of the total crushing capacity in France, participated to the multiyear survey. Each month, samples of rapeseed and sunflower meals were collected in each plant according to a protocol. The samples were sent to the CETIOM laboratory (Ardon) and analysed according to standard reference methods for the determination of dry matter, cellulose, residual oil, protein and solubility of proteins in soda. Rapeseed meal samples were also analysed for glucosinolates.



### Experiment on sows on 3 reproduction cycles

#### Choice of the plant providing the RSM

The RSM lots were chosen among the highest in GSL content (~14.5  $\pm$  1.2  $\mu\text{mol/g}$  dry matter) in order to be the least favorable to the performances of the herd and thereby confirm that the whole production of the regular RSM in France will lead at least to the same performances.

#### Feed

The feed was pelleted, iso-energetic, iso digestible amino-acids and ideal protein pattern. The net energy was 9,1 and 9,6 MJ/kg for gestation and lactation feeds, respectively.

#### Experimental design

- 4 batches of sows LW x LD

24 sows per batch entered the farrowing room (total of 96 sows)

- 2 treatments groups

- Control: feed without RSM
- Rapeseed: feed with 10 % RSM

Total of 192 of feed

- 3 reproductive cycles

**Animal management :** Sows by groups of 12-13 or 6,

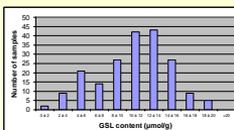
**Rations** during gestation adapted to the body condition at the artificial insemination (litter parity, weight, back fat thickness).

**Feeding** ad libitum during lactation, from the 5th day post-partum

Measurements	Ultrasonography	Litter size	Weight	Back Fat Thickness	Blood samples	Daily feed intake
Sows	Wearing	Daily	Day 0	D + 1	Day 0	
	Gestation	D + 28	D + 1	D + 1	D + 1	Average
	Farrowing		D + 1	D + 1		
Piglets	Lactation					Average
	Wearing	Daily	Day 0	D + 1	Day 0	
	Birth		Total & alive Day 0 + 1	Day 0	Day 0	(2 piglets per litter)
	Death		Day 0			
		Eventual				

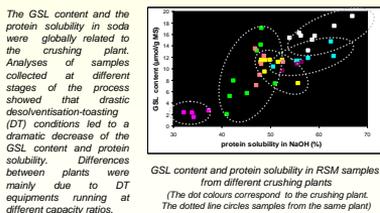
## Results and conclusion

### Multi year survey



GSL content in RSM : distribution of samples collected in crushing plants (2003-2006)

The GSL content in the different RSM samples varied from 2 to 20  $\mu\text{mol/g}$ . As the theoretical content in RSM, if no GSL degradation would occur, would be ~29  $\mu\text{mol/g}$  on average, these lower values indicated that 30 to more than 90 % of the GSL were broken down during the process.



GSL content and protein solubility in RSM samples from different crushing plants (The dot colours correspond to the crushing plant. The dotted line circles samples from the same plant)

The survey showed that the GSL content of the RSM varied from 1-2 to 20  $\mu\text{mol/g}$  and was related to the protein solubility. This result demonstrated the effect of the hydrothermal treatment applied at the desolventisation-toasting stage.

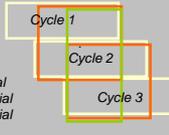
A large part of the GSL content (50 to 90 %) was broken down and the products released were not analysed in this survey.

### Experiment on sows

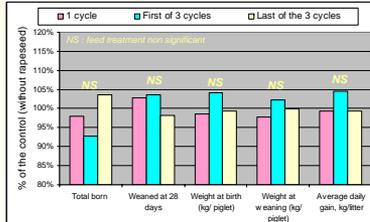
#### Statistical analysis

Carried out on every sow after 1, 2 and 3 occurrences in the trial.

- 1 occurrence in trial
- 2 occurrences in trial
- 3 occurrences in trial



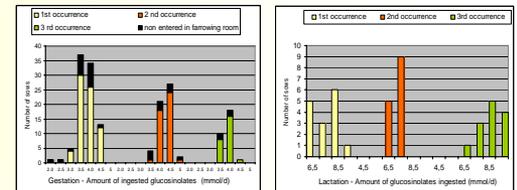
#### Prolificacy and performances during lactation



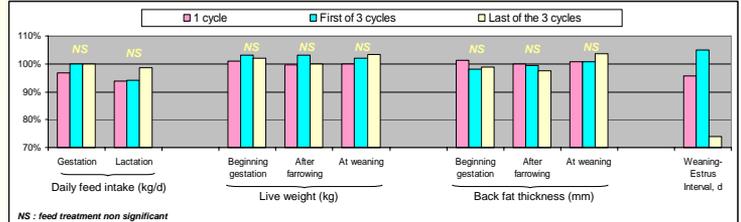
#### IFIP Station - Romillé



#### Amount of glucosinolates ingested during gestation and lactation



#### Post weaning reproduction performances



## Conclusion

This study confirms over a long-term period the results previously reported by Etienne et al. (1993), that the distribution of diets containing rapeseed meal does not influence the level of reproductive performance of the herd as long as the glucosinolate intake does not

exceed 5 mmol per day during gestation. The results also indicate also that the ingestion of a large quantity of glucosinolates during lactation, up to 10 mmol per day, does not affect reproductive performances after weaning or prolificacy at the next farrowing. Since the glucosinolates content

of this rapeseed meal (14.5 mol/g DM) is much above the average content observed in the industrial rapeseed meal produced in France (~10 mol GSL/g DM), the results of this trial suggest that any batch of rapeseed meal from the French industry will have no effect at a 10% incorporation rate in sow diets.

#### References :

Etienne M., Dourmad J.-Y., Evrard J. 1993. Effets de l'utilisation de tourteau de colza à très basse teneur en glucosinolates pendant la croissance et la gestation chez la truie. *Journées Rech. Porcine Fr.* 28, 193-202. Quiniou N., Crépon K., Quinsac A., Evrard J., Peyronnet C., Bourdillon A., Royer E., Etienne M. 2008. Performances à long terme d'un troupeau de truies alimentées avec du tourteau de colza industriel pendant la gestation et la lactation. *Journées Rech. Porcine Fr.* 40, 167-174.