

Glucosinolates in Rapeseed : must their contents be further reduced ?

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Oilseeds products, quality and food safety

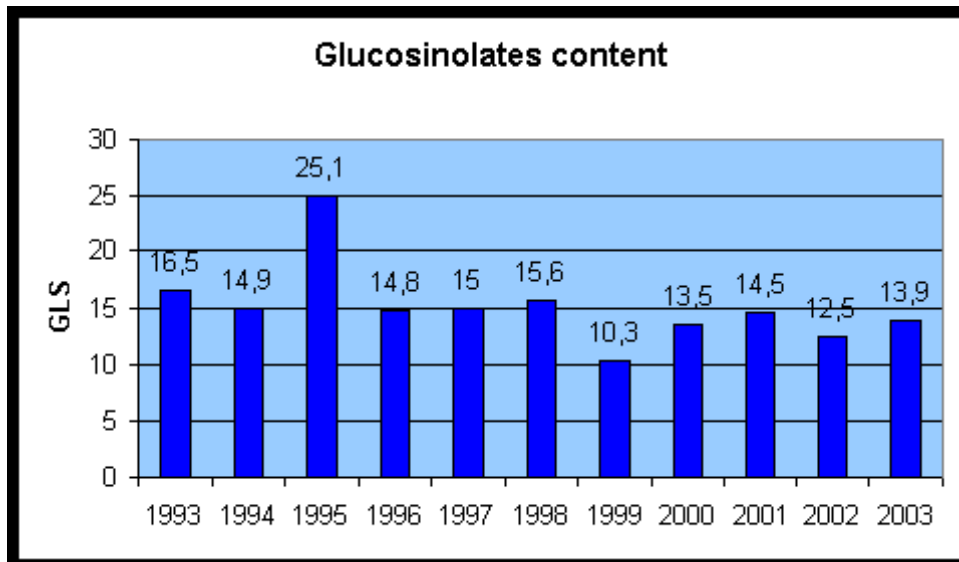
Cetiom, Bordeaux, France

Breeding and fast development in Europe of rapeseed with low glucosinolate content has largely improved quality of meals and increased uses in animal feeding. In France, the actual share of rapeseed in total consumption of meals is reaching approximatively 15% vs 5% in 1981. So, the rapeseed meal is becoming a good competitor to soybean meal, essentially by ruminants but also in pigs production, when the price rate RSM/SBM rises between 80 and 85%.

Nevertheless, the rapeseed utilization doesn't increase so high as expecting and a recent survey realized in 2000 by CEREOPA (a French institute for statistics and economics of feedstuffs and animal production), pointed out low and irregular inclusion levels of rapeseed meal in diets. Several factors have probably to be taken in account for explaining this situation but the main identified cause is probably the too high variability of meal quality. A more regular process in crushing plants associated with lower glucosinolate content in seeds could be a good way of progress.

1. The French crop quality

The average glucosinolate content of rapeseed crop in 2003 is 13,9 $\mu\text{moles/g}$ (9% moisture). These values, determined by HPLC and X-fluorescence method, are resulting from 228 samples for which the minimum level is 9,3 $\mu\text{moles/g}$ and the maximum level is 23,3 $\mu\text{moles/g}$ (standard deviation : 2,3). The five French leader varieties (80% of total market) are included in this survey : Pollen, Aviso, Banjo, Canary, Campalla.



The variation in glucosinolate contents of samples is explained by production conditions. But the crushing parameters of seeds introduce another cause of variation in glucosinolate contents of meals ; a recent survey in French crushing plants indicates values set between 5 and 36 $\mu\text{moles/g}$ (dry matter basis). A strong positive correlation is established between the very low glucosinolate contents of meals and the low solubility of protein due to temperature level applied during cooking before pressing and toasting.

2. Glucosinolates and metabolizable energy by poultry

Several studies realized between 1993 and 1995 have shown (10th International Rapeseed Congress, Canberra) a large variation of metabolizable energy values determined on 12 rapeseed samples, ranging from 4800 to 5200 kcal/kg (dry matter basis) in a first experimentation (1993) and from 4985 to 5460 kcal/kg in a second experimentation (1995). The glucosinolate content of seeds ranged from 9,3 to 17,5 $\mu\text{moles/g}$ (dry matter basis) in the first study and from 6,7 to 22,3 $\mu\text{moles/g}$ in the second study.

Linear regression carried out between metabolizable energy and chemical values indicated a negative effect of total glucosinolates with a specific role played by indolylglucosinolates. The temperature of pelletization had a positive effect on energy.

These results lead to the assumption that the technologies which increase nutrients utilization in seeds also increase secondary effects of glucosinolates.

3. The true inclusion levels of rapeseed in diets

A recent survey has been realized in 2000 by CEREOPA with 11 companies involved in feed advice and 36 feed manufacturers, representing 16 millions tons of compound feed (more than 70% of French production).

The maximum inclusion levels of rapeseed in diets were ranging from 0 to 7% for fattening pigs, from 0 to 18% for broilers and 0 to 10% for dairy cows.

The maximum inclusion levels of rapeseed meal in diets were ranging from 4 to 15% for fattening pigs, from 0 to 10% for broilers and from 0 to 50% for dairy cows.

These large variations of utilizations were essentially explained by a lack of palatability of rapeseed and anti-nutritional factors.

It can be concluded that rapeseed with lower glucosinolate contents could be used to a larger extent.

4. **Recommendations**

Progress in rapeseed utilization by ruminants and monogastric animals could probably be reached by further reduction of glucosinolate content through breeding. It could allow a better control of glucosinolate contents in cropped seeds and the application of a crushing process with lower temperatures preserving quality of protein and a good accessibility of amino acids.

Some optional target levels have been proposed by a workshop held during the 11th International Rapeseed Congress (Gerhard Röbbelen, Göttingen and Martin Frauen, Hohenlieth, Germany).