

# TRIMETHYLAMINE IN PLASMA OF LAMBS FED WITH RAPESEED MEAL

**Jean-Paul WATHELET.\*, Nicolas MABON.\*, Raymond PAQUAY.\*\* and  
Michel MARLIER\***

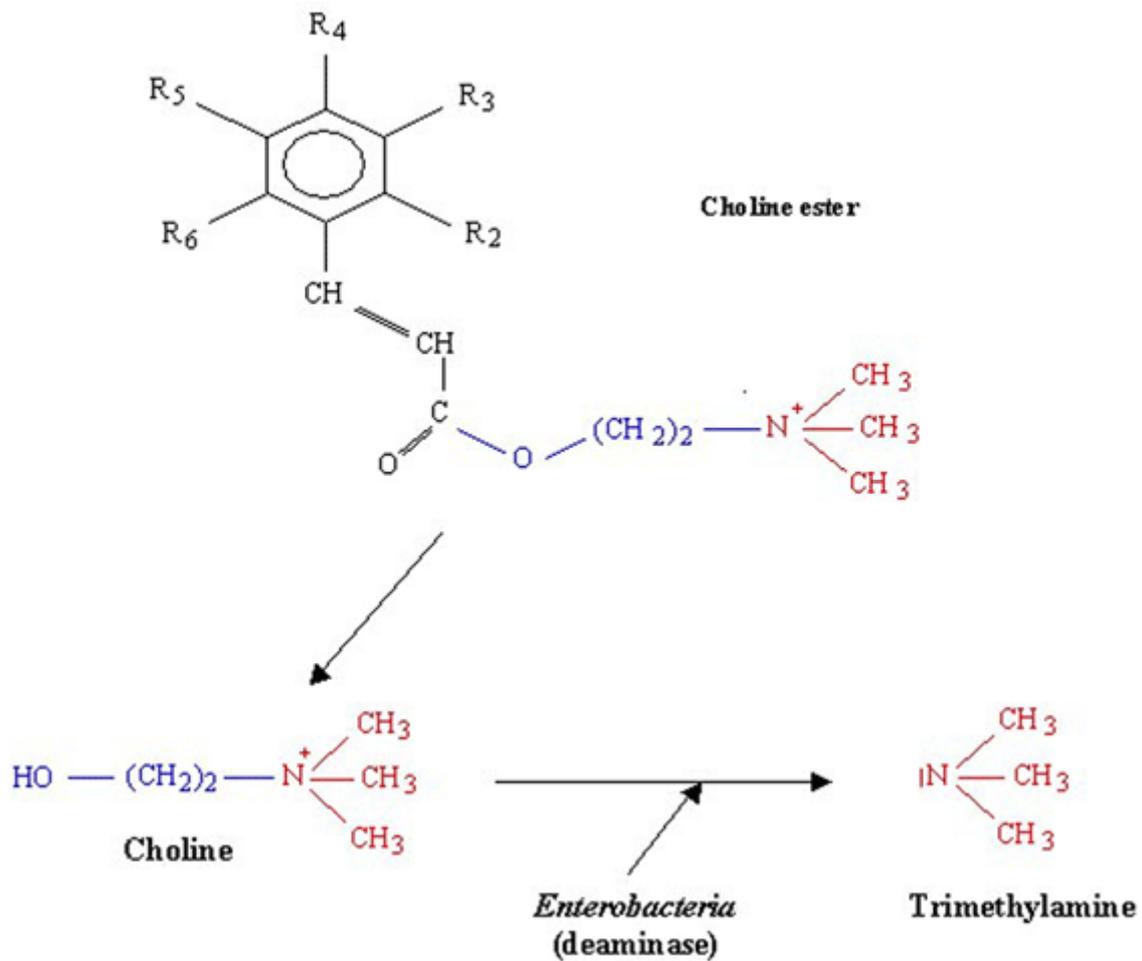
\* Faculté universitaire des Sciences agronomiques de Gembloux,  
Unité de Chimie générale et organique,  
Passage des Déportés, 2, B-5030, Gembloux Belgium

\*\* Faculté universitaire Notre-Dame de la Paix,  
Laboratoire de Physiologie animale, Rue de Bruxelles, 61  
B-5000 Namur, Belgium

wathelet.jp@fsagx.ac.be, mabon.n@fsagx.ac.be, raymond.paquay@fundp.ac.be, marlier.m@fsagx.ac.be

## **Introduction**

Aromatic choline esters are natural compounds occurring in *Brassicaceae* especially in rapeseed among whom the most important is called sinapine (choline ester of the 3,5-dimethoxy-4-hydroxycinnamic acid). Choline esters are easily hydrolysed by entero bacteria in digestive tractus giving the correspondent acid and a choline molecule. Choline can then be broken down, by a deaminase, into trimethylamine. Trimethylamine restricts utilisation of high quality rapeseed protein as food and feed. This compound produce a "fishy" odour in eggs (Fenwick *et al.*, 1981), a disagreeable taste in the meat of calves (Anderson *et al.*, 1984) and in the milk of cows (Andersen and Andersen, 1982).



### Choline esters content in Samourai and Honk seeds

Choline esters present in Samourai or Honk seeds (00 rapeseed varieties) are first determined. They are extracted with a boiling methanol/acetic acid (0.05M) mixture (70/30), purified with a cation exchange column (CM Sephadex C25-120), separated and quantified by HPLC with an Inertsil 5 ODS-2 (3 x 250mm, 5µm) column using a ternary solvent gradient (water-acetonitrile-phosphate buffer: NaH<sub>2</sub>PO<sub>4</sub>, 20mM at pH 2 with o-phosphoric acid). The choline esters contents in seeds are respectively 6.1µmol/g (Samourai) and 9.7µmol/g (Honk).

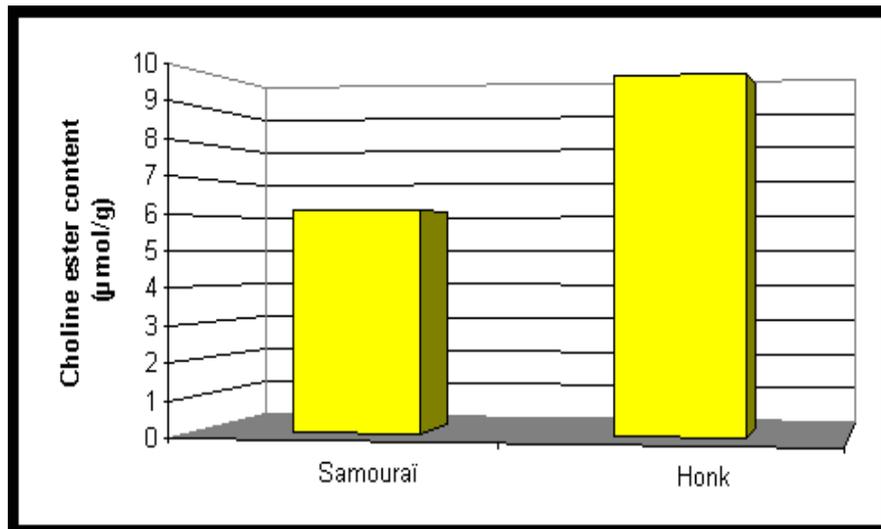


Figure 1: Choline esters level in seeds of Samourai and Honk

### Animals and management

In order to study the effects of aromatic choline esters, thirty Texel, Suffolk or crossbred lambs allocated to three groups are fed *ad libitum* with pasture hay and diets containing 0 % (control) or 25% of each rapeseed meal.

Table 1: Composition of the Control, Samourai or Honk concentrates ( %)

	Control	Samourai or Honk
Wheat	4,0	4,0
Barley	16,3	28,7
Coconut palm meal	16,3	1,9
Soyabean meal (44/7)	0,6	3,7
Dried lucerne (17/100)	11,9	6,9
Sugar beet pulp	10,0	20,0
Molasses	6,0	5,0
Calcium chloride	0,7	0,7
Ammonium chloride	0,5	0,5
Feed chalk	1,0	1,6
Salt	1,0	1,0

Ovine minerals and vitamins mixture	1,0	1,0
Peas	5,9	-
Maize gluten feed	15,0	-
Full fat toasted soyabean	9,8	-
Samourai or Honk meal	-	25,0

**Table 2: Chemical composition of diet (DM)**

	Control	Samourai	Honk
Net energy (VEM) <sup>(1)</sup>	1173	1214	1251
Crude protein (%)	16,1	14,0	13,8
Ether extract (%)	5,3	6,2	6,9
Cellulose (Weende) (%)	12,0	11,6	11,0
Starch (%)	17,2	22,7	22,5
Minerals (%)	10,0	9,2	8,7
Digestibility of organic matter (%)	90,9	90,8	91,2
Glucosinolates ( $\mu$ moles/g DM)	-	2,23	4,28

Blood samples are taken by venipuncture and samples are immediately centrifuged before trimethylamine determination in plasma of animals.

### **Trimethylamine content in plasma of lambs**

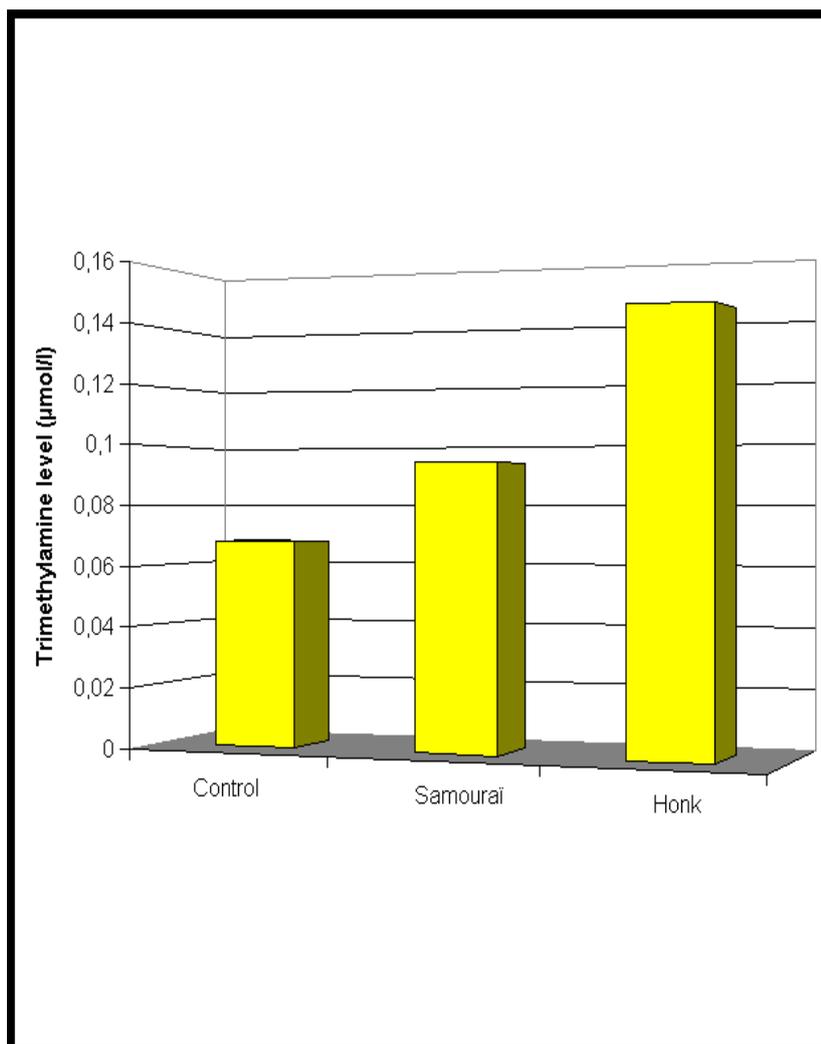


Figure 2: Trimethylamine level in plasma of lambs

A specific technique is developed for trimethylamine determination in plasma. The plasma is first acidified with HCl 1N. After centrifugation, 4 ml of the supernatant and 1 ml KOH 45% are placed in a special 10 ml bottle closed with a septum. Volatile compounds are extracted by Head-Space (85°C during 5 min) and injected, via a splitless injector (250°C), in the GC column (CP-poraplot 25m x 0.32mm 10µm, He flow: 1.5ml/min). The detection limit is 0,005µmol of trimethylamine per liter and the repeatability: 98,1%. GC-MS is used for identification of the amine. The results are collected in Figure 2.

Average of trimethylamine level in plasma of lambs fed with 0% or 25% of rapeseed meal are the following: 0.068µmol/l (control), 0.094 µmol/l (Samourai) and 0.143 µmol/l (Honk).

### Conclusion

The plasma of lambs from lot "control" is containing trimethylamine coming probably from choline included in diet phospholipids. Trimethylamine in "Honk

plasma" is higher than in "Samourai plasma". This is in right correlation with the initial choline esters contained in the seeds and the diets.

### **Acknowledgments**

This work was supported by the General Office of Research and Development of the Belgian Agricultural Ministry and by the General Direction of Technologies, Research and Energy of Ministry of "Region Wallonne" in Belgium.

### **References**

Andersen H. and Andersen P. (1982): Anvendelse af raps i foderblandinger til kvaeg. *Production*, **22**, 23-26, in Danish.

Andersen H., Varnum P., Andersen P., Klastrup S., Sørensen S., Sørensen H. and Olsen O. (1984): Dobbeltlav rapsskra i kraftfoderblander til kalve og ungtyre. *Meddelelse Statens husdyrbrugsforsog*. 4 pp, in Danish.

Fenwick G. (1981): Trimethylamine taint in eggs. In: Quality of eggs. Proc. Eur. Symp. 1<sup>st</sup> Apeldoorn, 18-23 May, 144-152.