***In vitro* effects of glanded and glandless cottonseed flours on pancreatic digestive hydrolase activity.** V Bertrand, J Prost, J Belleville *(Université de Bourgogne, Faculté des Sciences Mirande, Unité de Recherche de Nutrition Cellulaire et Métabolique, BP 138, 21004 Dijon Cedex, France)*

A previous study (Bertrand and Belleville, 1989) has shown an increase in faecal lipid and nitrogen losses when soya flour was replaced with cottonseed flour. The aim of this study was to assess *in vitro* the activities of pancreatic digestive hydrolases and shown whether they were modified by addition to medium of cottonseed flours.

In this *in vitro* experiment, raw or heated (130°, 10 min, 1.5 bars) glandless and glanded cottonseed flours were used. Glanded cottonseed flour contains gossypol (a toxic pigment). The inhibitory or activatory ability of raw or heated glanded or glandless cottonseed flour was studied on pancreatic juice hydrolases. Lipase, apparent lipase, colipase, phospholipase $A_2$, trypsin and chymotrypsin activities were investigated using pH stat techniques (Figarella, 1966; Belleville and Clément, 1971; Rathelot *et al*, 1975; Ouagued *et al*, 1980) and amylase activity was investigated using colorimetric method (Dahlquist, 1962). Hydrolase activities were assayed without flour, or with raw or heated glanded or glandless cottonseed flours. Values were compared with those obtained with raw or heated control mixtures containing casein as protein source (fig 1).

In incubation medium the presence of flours and casein decreased lipase and protease activities and increased those of phospholipase $A_2$ and amylase. Casein proved more inhibitory than cottonseed flour. Lipase activities were decreased with glanded cottonseed flour, whereas those of trypsin were increased. Heating enhanced apparent lipase, colipase, trypsin and chymotrypsin activities but decreased those of potential lipase, phospholipase $A_2$ and amylase.

Potential lipase, amylase, trypsin and phospholipase $A_2$ activites were not inhibited by glandless cottonseed flours. Activities of colipase and trypsine were inhibited with raw glanded cottonseed flour. Heat treatment stimulated colipase, protease and amylase activities with cottonseed flour, but not with casein. Heated glandless cottonseed flour had a higher stimulatory effect than casein, which inhibited hydrolase activity to a lesser extent than heated glanded cottonseed flour.

## References

Belleville J, Clément J (1971) *J Arch Sci Physiol* 25, 59-83

Bertand V, Belleville J (1989) *J Nutr Clin Metab* 3, 17-25

Dahlquist A (1962) *Scand J Clin Lab Invest* 14, 145-151

Figarella C (1966) *Bull Soc Chim Biol* 48, 97-113

Ouagued M, Saraux B, Girard-Globa A, Bourdel G (1980) *J Nutr* 110, 2302-2309

Rathelot J, Julien R, Canioni P, Coeroli C, Sarda L (1975) *Biochimie* 57, 1117-1122

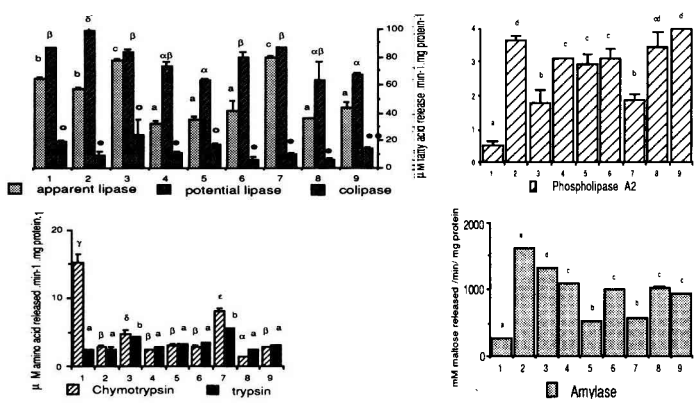


**Fig 1. 1)** Pure pancreatic juice; 2) raw glandless cottonseed flour; 3) heated glandless cottonseed flour; 4) raw control glandless cottonseed flour; 5) heated raw control glandless cottonseed flour; 6) raw glanded cottonseed flour; 7) heated glanded cottonseed flour; 8) raw control of glanded cottonseed flour; 9) heated control cottonseed flour. Values are m ± SEM for 3 assays. Classification of the means were performed using Duncan's new multiple range test. Means differ significantly if letters are different ($P < 0.05$).