

the ratings of flavour intensity and energy content increased or diminished after tasting as compared to before tasting. These changes in rating were more pronounced for unfamiliar biscuits than for familiar ones.

Sweetness was positively correlated with the actual content of sugar up to the level of 30% (g/g) and thereafter remained constant. Perceived fatness was weakly related to the actual value. Estimated energy content appeared to be independent of the actual energy value of the biscuits.

Palatability increased with the intensity of flavour but reached a limit for the most intense flavours. Prospective consumption of the biscuits for a 4:00 pm snack was positively associated with palatability and estimated energy content.

Principal component analysis yielded three main axes. The first axis (50% of total variance), called the *intensity axis*, distinguished the flavourless, simply structured and high-starch biscuits from the strongly flavoured, complex structured and high-sugar biscuits. The second axis (27% of total variance) distinguished the high-fat and high-energy biscuits from the high-sugar ones. The third axis (10% of total variance) was determined by the actual moisture of biscuits.

In conclusion, the more sensory stimuli the subjects received and the more intense the stimuli were, the more the subjects rated the biscuits as being high in energy.

Most biscuits are high-fat foods. Fat flavour and texture are not accurate sensory cues for the assessment of fat content and therefore of energy content. The energy potential from sugar was better assessed than the energy from fat.

Influence of the length of feeding duration with an unappetizing sweet white lupin-based diet on food intake in young and adult rats. R Lamghari, C Villaume,

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Sweet white lupin proteins precipitated with a mixture of alginate acid and calcium chloride differently affect rat food intake according to whether the seeds are peeled or not.

To better understand this observation, 21- or 63-day-old male Wistar rats were fed over different periods of time with concentrates of sweet white lupin (var Ares) proteins obtained from peeled (PL) or whole (WL) lupin seeds. The concentrates were made by grinding whole seeds or peeled seeds in water, followed by centrifugation

Protein intake of whole sweet white lupin (WL) or peeled sweet white lupin-based diets (PL).

Days	Diets	Young rats	
		Group 1	Group 2
6	WL	0.24 ± 0.02	–
14	(g/day)	–	0.28 ± 0.03
8	PL	0.61 ± 0.03	–
10	(g/day)	–	0.65 ± 0.03
20	WL	0.28 ± 0.06	–
10	(g/day)	–	0.22 ± 0.08
Days	Diets	Adult rats	
		Group 1	Group 2
6	WL	0.46 ± 0.05	–
14	(g/day)	–	0.37 ± 0.06
8	PL	0.94 ± 0.07	–
10	(g/day)	–	1.09 ± 0.06
20	WL	0.37 ± 0.09	–
10	(g/day)	–	0.28 ± 0.07

Mean ± SD; *n* = 10.

and precipitation of the supernatant with a mixture of alginic acid and calcium chloride.

All diets contained 10% protein. One group was fed with the WL diet for 6 days, then with the PL diet for 8 days and finally with the WL diet for 20 days. Another group was fed with the WL diet for 14 days, then with the PL diet for 10 days and finally the WL diet for 10 days. Food intake level was measured every 2 days.

In all cases, the substitution of one diet by the other (WL → PL and PL → WL) led to a great modification of food intake. With the young rats, the duration of the feeding period did not influence the mean food intake, while with the adult rats the duration of feeding modified the mean food intake during a given phase and also seemed to modify the food intake during the following phase.

In the tegument of sweet white lupin seeds exist one or several factors formed by the precipitation of their proteins by alginate. These caused an immediate food intake decrease in young and adult rats. The adult rat is more sensitive than young rats to variations in feeding duration with the unappetizing diet.

Food intake and nutritional quality of sweet white lupin protein precipitated by alginates—Effect of peeling. R Lamghari, C Villaume, HM Bau, A Schwertz, L Mejean, JP Nicolas (*Inserm U 308, 38, rue Lionnois, 54000 Nancy, France*)

Sweet white lupin could be a significant resource of dietary proteins. The precipitation of these proteins by alginic acid and calcium chloride increases their concentration (70–80%) and eliminates the last traces of antinutritional substances. The aim of this work was to measure the nutritional quality of these protein concentrates. The seeds

	<i>Protein intake (g/day)</i>	<i>PER</i>
C	0.89 ± 0.06	2.49 ± 0.16
L	0.67 ± 0.06	0.64 ± 0.20
WLH	0.20 ± 0.03	0 ± 0.16
PLH	0.94 ± 0.06	1.71 ± 0.08
PLL	1.37 ± 0.08	2.09 ± 0.22

were ground in water. The mixture was centrifuged and the soluble proteins were precipitated by alginic acid and calcium chloride. Five groups of ten 21-day-old Wistar rats received diets containing i) 10% casein protein (C); ii) untreated whole lupin meal (L), which was heated at moderate temperature; iii) concentrates of whole lupin heated at moderate temperature (WLH); iv) concentrates of peeled lyophilized lupin (PLL) and v) concentrates of peeled lupin heated at moderate temperature (PLH). Food intake was determined every other day and body weight was measured each week for 4 weeks. Protein efficiency ratio (PER) was determined at the end of the experiment.

The lowest food intake and PER were observed for the WLH group. Peeling of the seeds resulted in an increased food intake and PER. Lyophilization instead of moderate heating produced the highest levels of food intake. The untreated whole lupin-based diet showed intermediary results compared to the WLH group on the one hand and the PLH and PLL groups on the other.

The protein precipitation by alginic acid and calcium chloride made the proteins unappetizing compared to untreated meal. This food intake decrease was suppressed by peeling. This process concentrated a factor present in lupin tegument which was responsible for the food intake decrease. Lyophilization improved the nutritional quality of the concentrate.