

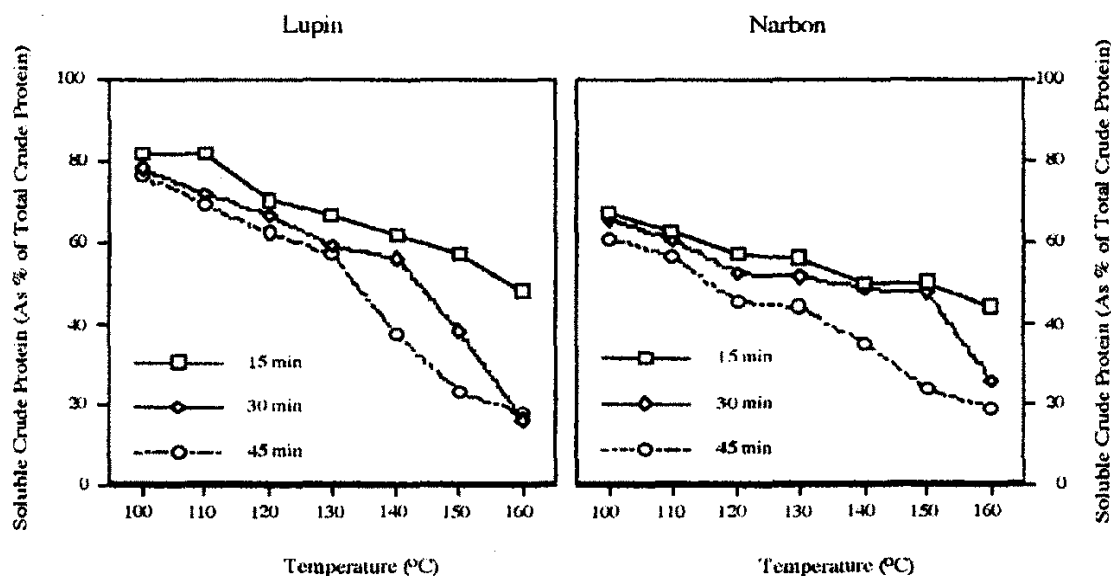
## Roasting lupins and narbon bean lowers protein solubility and fermentation

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A major disadvantage of grain legumes as supplements for ruminants is high solubility and rapid fermentation of proteins to ammonia, with subsequent loss of nitrogen as urinary urea. Dry roasting some oilseeds and grain legumes above 100°C for up to 1 hour results in reduced protein solubility, in vitro and in sacco digestibility and increased amino acid supply to the small intestine (1), but many such studies have not also measured animal performance. In some studies where performance was not improved, the roasting times and temperatures are undefined or not justified (2), thus there is no evidence of increased "bypass" protein.

We examined the effect of roasting lupins (L) and narbon bean (NB) on laboratory indices of "bypass", followed by a growth study with one selected treatment. Commercial L (*L. angustifolius*) and NB (*Vicia narbonensis*) obtained from Walpeup Research Station were roasted in a laboratory oven for 15, 30 or 45 minutes at 100, 110, 120, 130, 140, 150, and 160°C. In sacco DM digestibility after 12 h declined from 90.5% and 92.0% in raw L and NB seed to 74.6% and 80.3% after 45 minutes roasting ( $P < 0.05$ ). In sacco N digestibility declined from 75.5% and 73.2% in raw L and NB to 48.6% and 58.2% ( $P < 0.05$ ): the responses were not rectilinear, with a downward inflexion at about 130-140°C depending on roasting time; protein solubility gave a similar response.



Effect of Temperature and Time of Roasting on Protein Solubility ( $SEM_L = 2.11$ ;  $SEM_{NB} = 1.45$ ).

Protein digestibility and solubility is less for NB than L. Both respond similarly to roasting with apparent "bypass" protein increasing with every increment of temperature or time. The inflexion suggests at least two separate processes occur in high-temperature roasting.

1. Benschaa, C., Moncoulon, R., Bayourthe, C. and Vernay, M. (1994) Effects of a supply of raw or extruded white lupin seeds on protein digestion and amino acid absorption in dairy cows. *J. Anim. Sci.* 72: 492-501.
2. Robinson, P. H. and McNiven, M. A. (1993) Nutritive value of raw and roasted sweet white lupins (*Lupinus albus*) for lactating dairy cows. *Anim. Fd. Sci. Tech.* 43 : 275-290.