CELL-WALL COMPOSITION AND DIGESTIBILITY OF ANNUAL LEGUMES

X. X. LI[A], R. C. KELLAWAY[A], R. L. ISON[B] and G. ANNISON[C]

[A]M.C. Franklin Laboratory, Dept of Animal Science, University of Sydney, Camden, N.S.W. 2570.
*School of Crop Sciences, University of Sydney, N.S.W. 2006.
[C]CSIRO Division of Human Nutrition, Glenthone Laboratory, Majors Road, O'Halloran Hill, S.A. 5 158.

The cell walls of annual legumes are a major source of energy for ruminants in Australia. Composition of plant cell wall polysaccharides can influence their rate and extent of digestion by rumen microbes independent of lignin effects (Hornstein *et al.* 1989). However, little is known about the composition of cell walls in annual legumes. Plant composition primarily varies with rate of growth, which is temperature dependent, and with phenological stage. Our objective was to determine cell wall composition and its relationship to digestibility at 3 phenological stages each grown at 2 temperatures.

Eighteen lines of annual legumes (1 line of *T: subterraneum*, 13 *T. resupinatum* and 4 *T. balansae)* were grown in pots (3 plants/pot, 9 pots/line) in each of 2 glasshouses at temperatures of 10–15°C (low) and 16–21°C (medium). All above ground material from 3 pots/line was harvested in each glasshouse at each of 3 times on the basis of phenological stage (6 node, first flower appearance, maturity). Stem, leaf and petiole were separated and the *in vitro* digestibility of organic matter (DOMD), crude protein (CP), lignin, arabinose, xylose, mannose and galactose in dry matter (DM) determined for each fraction.

There were significant differences in DOMD, arabinose, xylose, mannose, galactose and lignin contents between temperatures. The DOMD, arabinose and galactose were higher at the low temperature ($P<0.01$), while xylose, mannose and lignin were higher at the medium temperature ($P<0.01$). Xylose, mannose and lignin contents increased, whereas DOMD and arabinose decreased with maturity at both temperatures. Leaf was higher in CP, lower in xylose, mannose and lignin than stem and petiole at all harvests and both temperatures. There was a negative relationship between DOMD and xylose ($r = -0.73$; $P<0.001$), mannose ($r = -0.87$; $P<0.001$) and lignin ($r = -0.80$; $P<0.001$).

Results obtained here with legumes are similar to those found with grasses (Burritt *et al.* 1984; Buxton *et al.* 1987). Further studies are in progress to determine chemical and physical relationships between cell wall polysaccharides and digestibility, and to understand the nutritional significance of these relationships.

BURRITT, R .A., BITTNER, A. S., STREET, J. C. and ANDERSON, M .J. (1984). *J. Dairy Sci. 67:* 1209-13.
BUXTON, D. R., RUSSELL, J. R. and WEDIN, W. F. (1987). *Crop Sci. 27:* 1279-85.
HORNSTEIN, J. S., BUXTON, D. R. and WEDIN, W. F. (1989). *Crop Sci. 29:* 13 19-24.