

## NSA Concurrent Oral Session 5: Animal Nutrition & Human Food

### Improving bone health to optimise calcium metabolism in the dairy cow

MS Bhanugopan, A Rankin, ML Hyde, DR Fraser and DM McNeill  
Faculty of Veterinary Science, University of Sydney, Camden, NSW 2570

**Background-** Parturient paresis or milk fever in dairy cows results when the calcium (Ca) homeostatic mechanisms fail to adequately replace the Ca lost from the blood at the onset of lactation. Ca lost from the blood has to be replaced by improved absorption from the diet and also from the degradation of bone tissue. Most of the recent researches on bone with regard to milk fever focus on the use of anionic supplements to alter the dietary cation- anion difference (DCAD) of the diet, which in turn alters the metabolic status in the animal promoting bone loss. **Objective-** The purpose of the following experiment is to examine the possibility that manipulating the diet by addition of potassium (K) in late lactation alters the DCAD of the diet thereby preventing bone loss in the dairy cows which maybe useful in improving bone mineral density in older cows, such that by calving their bone tissue is better able to mobilise calcium in response to hypocalcaemia and subsequently reduce the risk of milk fever. **Design-** Twenty Four Holstein Friesian cows, 6 months pregnant and in their third or more parity were allocated to two groups and fed a diet comprising a low K hay with a pelleted concentrate containing either 1.25% K or 2.55% K as dry matter (DM). The K content of the diet of the treatment group was increased by the addition of potassium carbonate (400g/cow/day) to the concentrate portion of the diet. The cows were fed their respective diets from the beginning of their sixth month of pregnancy until two weeks prior to parturition. Thereafter, all cows will be returned to the commercial herd and fed their normal commercial diet until six weeks after calving. Bone biopsies, blood and urine samples were collected throughout the experiment.

**Outcomes -** The animals were gaining weight satisfactorily from the start to the end of dry period and supplementation of Potassium Carbonate did not affect the overall weight gain. The urine pH was markedly higher in the cows supplemented with K than that of the control group, following supplementation with K the urine pH averaged  $0.25 \pm 0.10$  units higher than that of the control group. The average urine pH at calving for the control and the treatment groups were  $8.21 \pm 0.04$  and  $8.03 \pm 0.20$  respectively. There was no significant difference in the average daily milk yield between the two groups in the first six weeks of calving. **Conclusion -** It is evident from the results on urine pH that the addition of K to the diet has led to a change in the acid - base status of the animal, which may possibly benefit the bone mineral status of the cow. This should be confirmed by the soon to be performed analysis of the bone biopsies.

### The gluconeogenic potential of *Gliricidia sepium* and *Calliandra calothyrsus*

Y Widiawati<sup>1,2</sup>, E Teleni<sup>1</sup>

<sup>1</sup>The Australian Institute of Tropical Veterinary & Animal Science, School of Biomed Science,  
James Cook University, Townsville, QLD 4811

<sup>2</sup>Research Institute for Animal Production, PO BOX 221 Bogor 16002 Indonesia

**Background -** The high susceptibility of *Leucaena leucocephala* (*Leucaena*) to *Heteropsyla cubana* (psyllid) has given some urgency to the examination of *Gliricidia sepium* (*Gliricidia*) and *Calliandra calothyrsus* (*Calliandra*) as potential alternative sources of high quality protein and energy for ruminant animals.

**Objective -** This study was undertaken to examine the gluconeogenic potential of the two legumes.

**Design -** Twenty-four, 6-month-old sheep, divided into four even groups, were fed fresh leaves of *Leucaena*, *Gliricidia* or *Calliandra* or the control diet of Rhodes-grass hay mixed with urea at 1.4 %. Animals were offered feed at a level equivalent of 150g crude protein/head/day. Glucose flux rates were estimated using the classical isotope dilution technique.

Outcomes -	Leucaena	Gliricidia	Calliandra	Rhodes grass	±SE
OM intake (g/d)	693 <sup>a</sup>	690 <sup>a</sup>	709 <sup>a</sup>	520 <sup>b</sup>	55
OM digestibility	62 <sup>a</sup>	62 <sup>a</sup>	50 <sup>c</sup>	63 <sup>a</sup>	2.6
Plasma glucose (mM)	3.7	3.5	3.1	3.2	0.36
Glucose flux (mmole/h)	40 <sup>a</sup>	38 <sup>ab</sup>	27 <sup>c</sup>	32 <sup>bc</sup>	3.7
(mmole/g OM intake)	1.39 <sup>a</sup>	1.31 <sup>a</sup>	0.92 <sup>b</sup>	1.50 <sup>a</sup>	0.14

Means, within a row, with different superscripts differ significantly (P<0.05)

While organic matter (OM) intakes were similar among animals fed legumes, the proportion of OM intake apparently absorbed was lowest (P<0.05) in animals fed *Calliandra*. This difference was not reflected in concentrations of plasma glucose. However, glucose flux rates clearly reflected the differences in the amounts of OM apparently absorbed from the gut. Animals on the *Leucaena* and the *Gliricidia* diets had higher total glucose flux rates, as well as glucose flux/g OM absorbed, than those fed *Calliandra*.

**Conclusion -** Dietary *Gliricidia* might be better than *Calliandra* at promoting an increase in glucose supply in ruminant animals. *Calliandra* appears to be limited not only by a lower rate of absorption of its OM from the gut but also by a lower gluconeogenic potential of its OM.