

## Effect of roughage quality and fermentable energy/protein on intake, performance and nitrogen excretion in cattle fed export diets

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High levels of ammonia emissions have been recorded on board vessels carrying live cattle for export from Australia to the Middle East (1). Ammonia emission can be decreased by manipulating N intake (2). The objective of this study was to investigate the best combination of roughage source (straw vs hay), barley, level of protein inclusion (18% vs 30%) and type of protein supplement (lupins vs canola meal) to provide an alternative low-N residue diet to the diets currently used in the trade, while preserving feed intake and liveweight gain.

Ninety-eight Angus cross heifers, about 18 months of age, were randomly allocated to individual pens (5m x 20m). The pens were grouped in 14 blocks with seven pens each. After one-week of adaptation during which they were fed pasture hay *ad libitum*, one animal from each block was randomly allocated to one of the seven experimental pelleted diets. These heifers had not been previously exposed to pelleted diets. The animals were fed the diets (at a rate 2.5% of body weight) for 21 days. At the end of this period a single blood sample was taken approximately 11 hours post feeding and used to estimate 24h urinary urea excretion (eTUN) using a method developed and validated in a previous experiment (3). Daily feed intake and weekly live weight were also recorded. Diet compositions, metabolisable energy (ME), crude protein (CP), daily gain, daily estimated urea excretion, cost of diets and cost of gain are shown in the table below. Lime (CaO) was added at 2% to all diets except 7 which used 2% Bentonite.

Diet	Straw %	Hay %	Lupins %	Barley %	Canola meal %	Lucerne %	ME MJ/Kg DM	CP %	Gain kg/day	eTUN mg/d	Costs \$/ton of diet	Costs \$/kg of LW gain
1	50		18	30			8.61	9.72	1.534	56.94	164	0.74
2	50		30	18			8.61	12.54	1.679	81.27	170	0.71
3	50			18	30		8.48	12.44	1.368	61.39	215	1.11
4		50	18	30			8.61	12.85	1.766	55.72	194	0.77
5		50	30	18			10.44	15.67	2.056	75.51	200	0.70
6		50		18	30		10.30	15.53	2.218	58.85	245	0.80
7						98	9.80	18.8	1.601	99.92	390	1.77

Six animals were removed from the trial for not eating the experimental diet (with no bias toward any one diet). Voluntary feed intake was not significantly different among diets. Animals fed diets combining hay and high protein inclusion showed a significantly better performance ( $P < 0.05$ ). There was a highly significant ( $P < 0.001$ ) effect of diet on eTUN. The results show that the traditional diets used by the live export trade (diets 2 and 7) can be replaced by alternative diets that provide the same intake, similar or better liveweight gain and most importantly lower urinary N. Roughage quality seems to be the key for designing such diets. Consequently, the cost of diet should not be the only criterion to be considered when choosing a diet for long haul voyages, other criteria such as liveweight gain and particularly urinary N excretion must also be considered.

### References

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