# Oil supplementation of broiler diets containing Australian sweet lupin (*Lupinus angustifolius* cv gungurru) did not improve performance or AME

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The nutritive values of Australian sweet lupin (*Lupinus angustifolius* cv gungurru) and Australian white lupin (*Lupinus albus* cv kiev mutant) are currently being evaluated as feed ingredients for poultry. The chemical composition of whole seeds is similar for both lupin species with the exception of a higher oil level in *L. albus* (Petterson and Mackintosh, 1994).

A comparison of growth performance and apparent metabolisable energy (AME) for these two species showed significantly better performance and higher AME for *L. albus* (Hughes, unpublished data). It was the objective of this study to determine whether the higher oil content of *L. albus (9.3% vs 5.3%)* is the main reason for the difference in AME.

Six sorghum/casein–based experimental diets were prepared with whole seed lupins (S) and lupin kernels (K). Lupins (300g/kg) replaced sorghum and casein. Two diets containing gungurru lupins (as ground whole seed or kernel) were supplemented with soya bean oil to raise total oil content to the same level as diets containing kiev lupins. AME of the diet was determined and the contribution of the lupins was calculated assuming an additive model.

The results in Table 1 show that significant differences in performance and AME between gungurru and kiev lupins persisted regardless of whether or not oil was added to the diet. The fat digestibility in gungurru diets (S and K) was significantly lower than in kiev diets. In contrast, Kan *et al.* (1988) showed that addition of soya bean oil to soya bean meal increased AME to that of full-fat soya beans.

The reason for reduced fat digestibility is not apparent. It is known that soluble non-starch polysaccharides (NSP) in cereals depress digestion of starch, protein and fat by inhibiting the diffusion of digestive enzymes and bile acid as a result of increased digesta viscosity (Choct and Annison, 1992). The higher NSP content of gungurru might be one reason for the reduced fat digestibility. It has been demonstrated that the digestibility of saturated long-chain fatty acid is significantly depressed by non-starch polysaccharides of cereals (Choct and Annison, 1992). The oil in gungurru has a higher percentage of saturated fatty acids than in kiev (Petterson and Mackintosh, 1994). Hence, differences in digestibility between saturated and unsaturated fatty acids might be another reason for the overall reduction in fat digestibility.

The calculated AME of gungurru is lower in diets supplemented with soya bean oil. This difference cannot be explained by reduced fat digestibility in these diets. It is suggested that the additive model to calculate AME of lupin may not be valid for high energy feed ingredients such as oil.

The results of this study demonstrate that the difference in AME of *L. angustifolius* and *L. albus* were not explained simply by the difference in oil content. Further studies are required to investigate factors influencing fat digestibility in diets containing lupins.

**Table 1** Effect of lupin species and oil addition on feed conversion ratio, AME of lupins (MJ/kg DM) and faecal fat digestibility.

| Lupin | Form | Oil | FCR | AME lupin | Fat digest |
|---|---|---|---|---|---|
| Gungurru | S | – | 2.327[a] | 6.33 [d] | 0.58 [d] |
| | | + | 2.330[a] | 5.30 [d] | 0.60 [cd] |
| | K | – | 2.060[a] | 8.29 [c] | 0.66 [bc] |
| | | + | 2.091[ab] | 6.50 [d] | 0.63 [bcd] |
| Kiev | S | – | 1.889[b] | 10.71 [b] | 0.69 [ab] |
| | K | – | 1.919[b] | 12.55 [a] | 0.75 [a] |

[a,b,c,d]Values with unlike superscripts are significantly different (P<0.05).

## References

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