Can body composition measurements strengthen the relationship between feed conversion efficiency (FCE) and nitrogen isotopic fractionation in sheep?

L Cheng[A,B], G Edwards[C] and R Dewhurst[D]

[A]Faculty of Veterinary and Agricultural Sciences, The University of Melbourne, Australia
[C]Faculty of Agriculture and Life Sciences, Lincoln University, P.O. Box 85084, Lincoln, New Zealand
[D]SRUC, Roslin Institute Building, Easter Bush, Midlothian EH25 9RG, UK
[B]Email: long.cheng@unimelb.edu.au

Plasma nitrogen isotopic fractionation (plasma 15N) was identified as a biomarker for feed conversion efficiency (FCE; i.e. live weight gain/dry matter intake) in cattle and sheep (Wheadon et al., 2014; Cheng et al., 2015). Recent work indicated that fat measurements strengthen the relationship between cattle FCE and plasma 15N (Meale et al., 2018). This study aimed to determine whether sheep body composition measurements can strengthen the relationship between FCE and plasma 15N.

Experiment details can be found in Cheng et al. (2015). Coopworth rams of two levels of genetic merit (G; dual purpose for growth) and two levels of feed intake (F) were evaluated using a 2×2 factorial design. The four treatments were high G + high F (HGHF; average live weight = 53 kg); high G + low F (HGLF; average live weight = 52 kg); low G + high F (LGHF; average live weight = 43 kg); and low G + low F (LGLF; average live weight = 42 kg). The HG and LG groups were offered lucerne pellets with 110% vs. 170% of metabolisable energy for maintenance. Five weeks intake and live weight measurement were taken from six rams per treatment. Weekly plasma sample per sheep and weekly feed samples per group were collected for 15N analysis. Each sheep was CT scanned to determine body composition at the end of 5-week measurement period. Week 2 to 5 plasma 15N (plasma 15N – feed 15N), FCE and body composition data were used for multiple linear regression analysis with group.

Approximately 39% of the variation in FCE was explained by plasma 15N (Table 1). Adding fat % to plasma 15N explained 3% more variation in FCE. Inclusion of bone % and lean % did not explain more variation in FCE than using plasma 15N alone (Table 1). The current analysis showed that adding body fat % to plasma 15N can improve the accuracy of predicting sheep FCE.

Equation	R^2	SE	P-value
FCE (g/kg) = 512 – 74.8 × plasma 15N (‰)	38.6	28.3	<0.001
FCE (g/kg) = 493 – 75.2 × plasma 15N (‰) + 6.58 × fat (%)	41.7	27.5	<0.001
FCE (g/kg) = 542 – 75.6 × plasma 15N (‰) – 1.86 × lean (%)	36.9	28.6	0.003
FCE (g/kg) = 518 – 71.9 × plasma 15N (‰) – 7.9 × bone (%)	37.0	28.6	0.003

Table 1. Equations describing prediction of FCE using plasma 15N and body composition in sheep

References

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