

Predicting nitrogen intake variations of sheep under heat stress using nitrogen isotopic fractionation

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With the changing climate conditions, heat stress (HS) is a major concern to livestock productivity. Mount (1979) pointed out that feed intake decreased when sheep were exposed to high temperature, which in turn effects nitrogen intake (NI) and N (Nitrogen) partitioning of sheep. Cheng et al. (2013) demonstrated that the N isotopic fractionation (plasma ¹⁵N- feed ¹⁵N) could be used for predicting N partitioning in sheep, but little is known about whether ¹⁵N is an indicator of NI. This study aims to investigate the relationship between NI and ¹⁵N of sheep subjected to HS.

Total of 20 female sheep sourced from four breeds (Merino = 5, Dorper = 5, Southdown = 5 and Wiltshire = 5) were involved in this experiment. They had 14 days for adaptation prior to a 14 days measurement. The same feed offered to all sheep in adaption and measurement period, included oaten chaff, lucerne chaff and cereal based pellet. The temperature of HS and thermoneutral (TN) chambers was between 38 and 40 °C, and at 28 °C, respectively. Feed samples and refusal samples were daily collected from the cages of sheep. Blood plasma samples were collected from each sheep at the 14:00 on measurement day 14. The NI, feed ¹⁵N and plasma ¹⁵N of sheep were quantified. The relationship between NI and plasma ¹⁵N -feed ¹⁵N was analyzed using regression analysis.

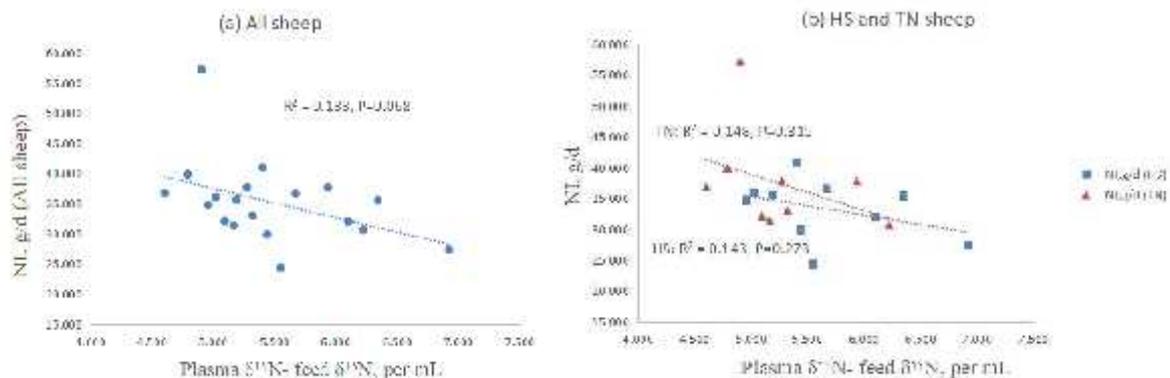


Figure 1. Regression analysis between NI and plasma ¹⁵N -feed ¹⁵N of all sheep (a), HS and TN sheep (b).

The results demonstrated NI had a weak association with plasma ¹⁵N -feed ¹⁵N in sheep under the current experimental condition. Future work is needed to validate this finding.

References

- Cheng, L., Nicol, A. M., Dewhurst, R. J., & Edwards, G. R. (2013). *Animal*. **7**, 1274-1279.
Mount, L. E. (1979). *Man and his productive animals*. Edward Arnold (Publishers) Ltd.