Determination of energy and protein requirements of sheep in Indonesia using a meta-analytical approach

Anuraga Jayanegara*, Muhammad Ridla, Erika B. Laconi, Nahrowi

Department of Nutrition and Feed Technology, Faculty of Animal Science, Bogor Agricultural University, Bogor 16680, Indonesia
* Corresponding author e-mail: anuraga.jayanegara@gmail.com

Abstract

Presently ration formulation system for sheep in Indonesia is based on energy and protein requirements of other countries which may not be suitable to the local condition. The objective of this study was to determine energy and protein requirements, both maintenance and gain requirements, of sheep in Indonesia by using a meta-analysis method. A database was developed from various *in vivo* experiments involving sheep as the experimental animals in which energy intake, protein intake and average daily weight gain (ADG) were reported. A number of 41 articles (consisted of 179 data points) published in various journals were integrated into the database. Different breeds (Garut, Priangan, Sumatera, fat tailed, thin tailed and local), sex and age of sheep were specified in the database. Energy and protein requirements for maintenance and gain were determined by regressing daily weight gain and energy and protein intake, respectively. Regression was performed according to mixed model methodology in which different experiments were considered as random effects whereas energy and protein intake were considered as fixed effects. Results revealed that most of the expression of energy and protein intake was in the form of total digestible nutrient (TDN) and crude protein (CP), respectively; only few articles reported metabolizable energy and digestible crude protein data, and no article reported net energy and metabolizable protein. Energy maintenance and gain as TDN (TDNm and TDNg) were 142 g/d and 0.207 g/g ADG, respectively, whereas CPm and CPg were 25.7 g/d and 0.275 g/g ADG. Interaction between breed and TDN and CP intake was significant (P<0.05), indicating that different breeds had their specific TDNg and CPg coefficients. These findings may be used as a basis of ration formulation of sheep in Indonesia, but a validation experiment is needed to confirm the results obtained.

Keywords: requirement, energy, protein, sheep, meta-analysis