

Developing equations for converting digestible energy to metabolizable energy for Hanwoo beef cattle

Woo Hyeong Hong¹, Ridha Ibidhi², Bharanidharan Rajaraman³, Youl Chang Baek⁴, Seul Lee⁴

Kyoung Hoon Kim^{1,2}

¹Graduate School of International Agriculture Technology, SNU; ²Institute of Green Bio Science & Technology, SNU; ³Department of Agricultural Biotechnology, SNU; ⁴Animal Nutritional & Physiology TEAM, NIAS
(E-mail: khhkim@snu.ac.kr)



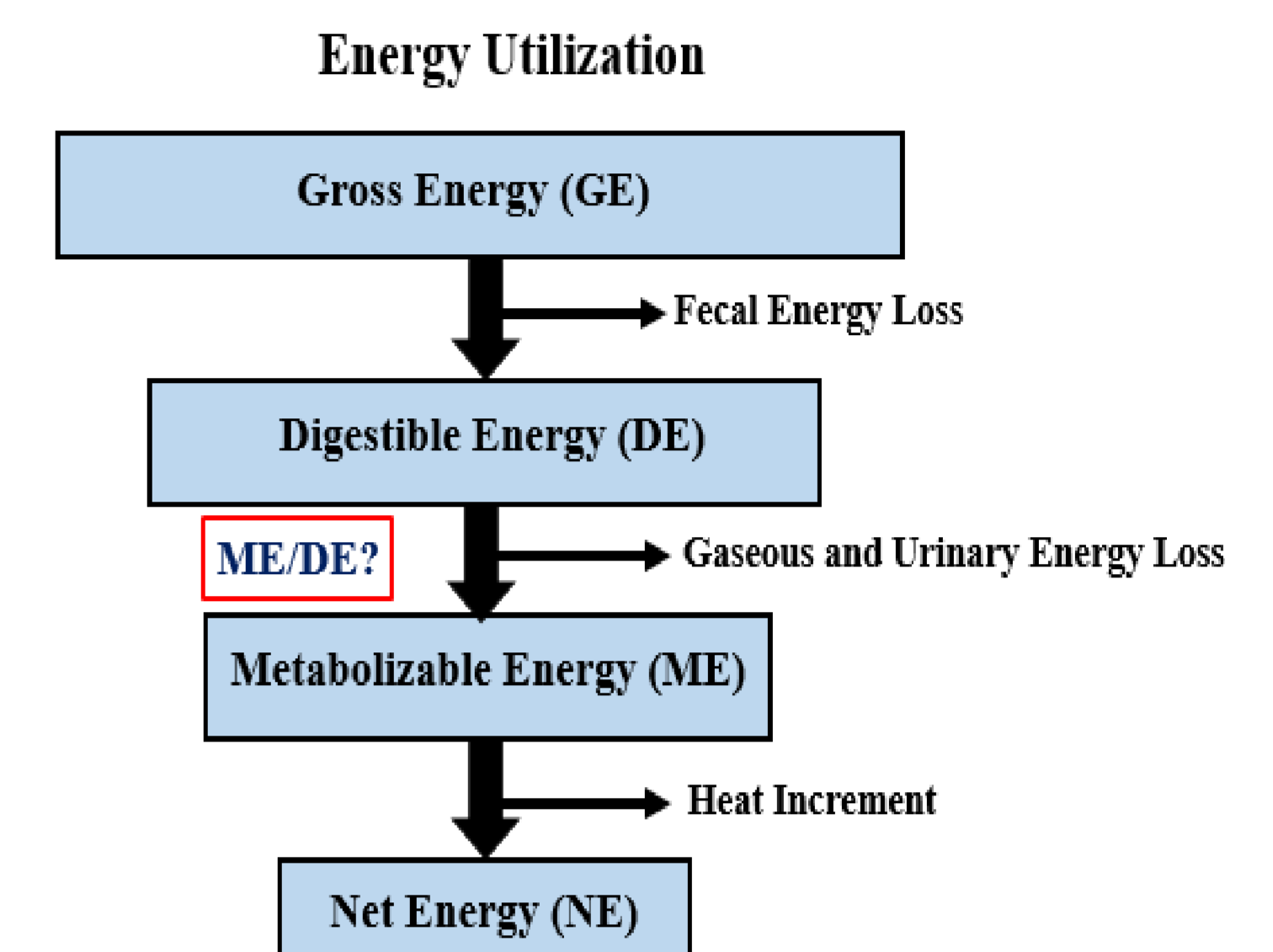
Seoul National University

Background

The nutrient requirement systems for beef cattle in the Republic of Korea follow the NRC recommendation to calculate the dietary metabolizable energy (ME) as dietary Digestible energy (DE) x 0.82. While, many studies suggest updating a variable relationship between DE and ME. This study aimed to generate prediction equations for converting digestible energy (DE) to metabolizable energy (ME) for Hanwoo beef cattle considering the gender (male and female) and the body weight (above and below 300 kg BW) of animals.

Materials and Methods

- Data was assembled in a dataset of 141 measurements from 35 respiration calorimetry experiments with a wide range of diets and energy intake levels.
- Mixed model methods were used to evaluate the relationship between dietary DE and ME concentration.
- Dietary ME concentration was the dependent variable, and it was regressed on dietary DE concentration to evaluate the simple linear regression.
- The citation (i.e., experiment) was included as a random intercept effect in the model to account for variation associated with different intercepts in the cited experiment.
- The coefficient of determination (R^2) and root mean square error (RMSE) were determined.
- PROC MIXED and PROC REG of SAS (SAS Inst. Inc., Cary, NC; version 9.4) were used for statistical analyses.



Results

	Categories	n	Unadjusted	R-square	Citation-adjusted	R-square
Sex	Steer	90	$0.8621 * DE + 0.0809$	0.9600	$0.9696 * DE - 0.2140$	0.9999
	Female	51	$0.7785 * DE + 0.1546$	0.9718	$0.9397 * DE - 0.2951$	1
Body weight	<300kg icon"/> <300kg	63	$0.9834 * DE - 0.2761$	0.9139	$0.9834 * DE - 0.2761$	1
	>300kg icon"/> >300kg	78	$0.7298 * DE + 0.3874$	0.9139	$0.9696 * DE - 0.2140$	0.9999

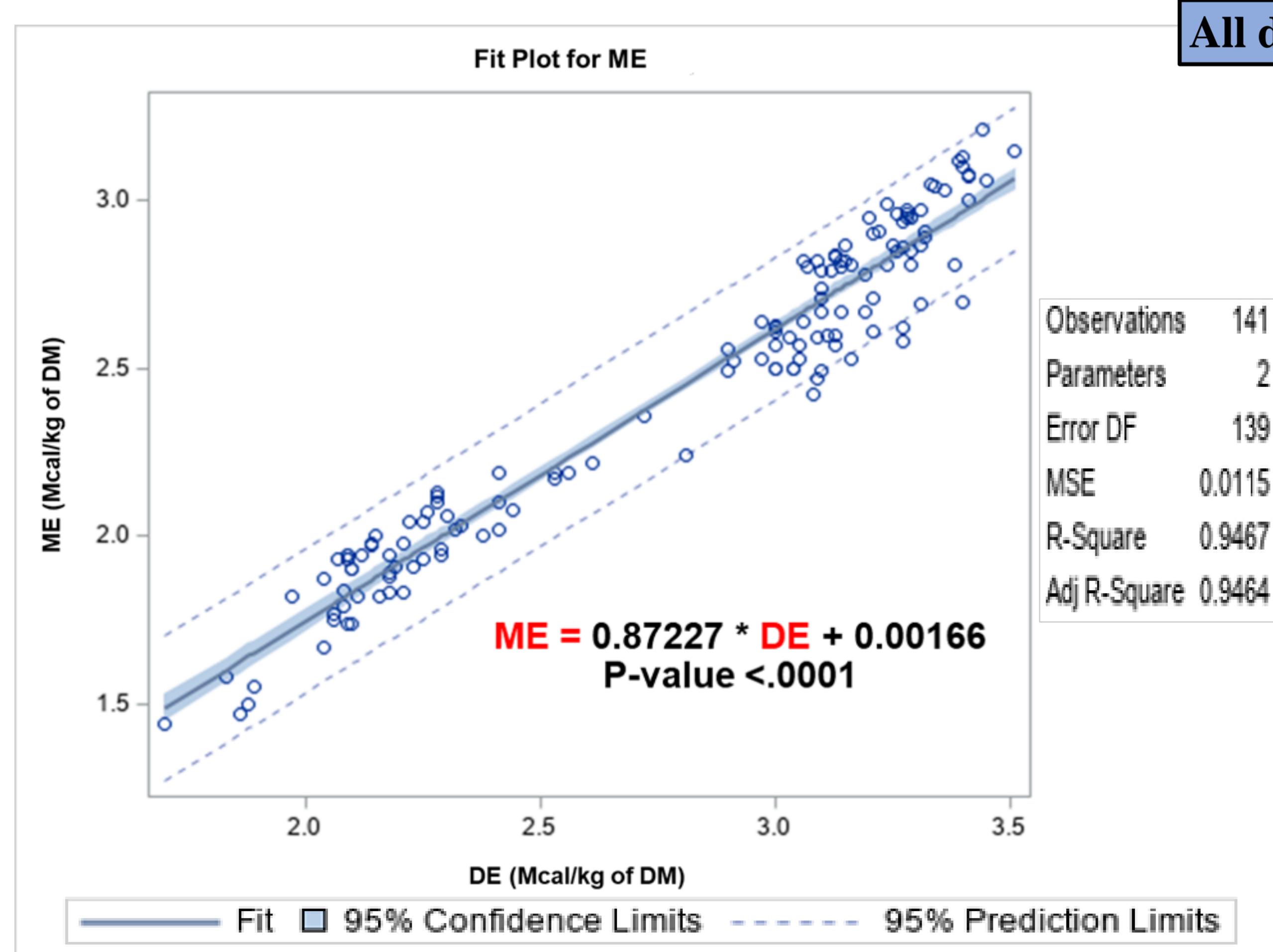


Fig 1. Relationship between DE and ME concentrations (unadjusted citations).

All data (n = 141)

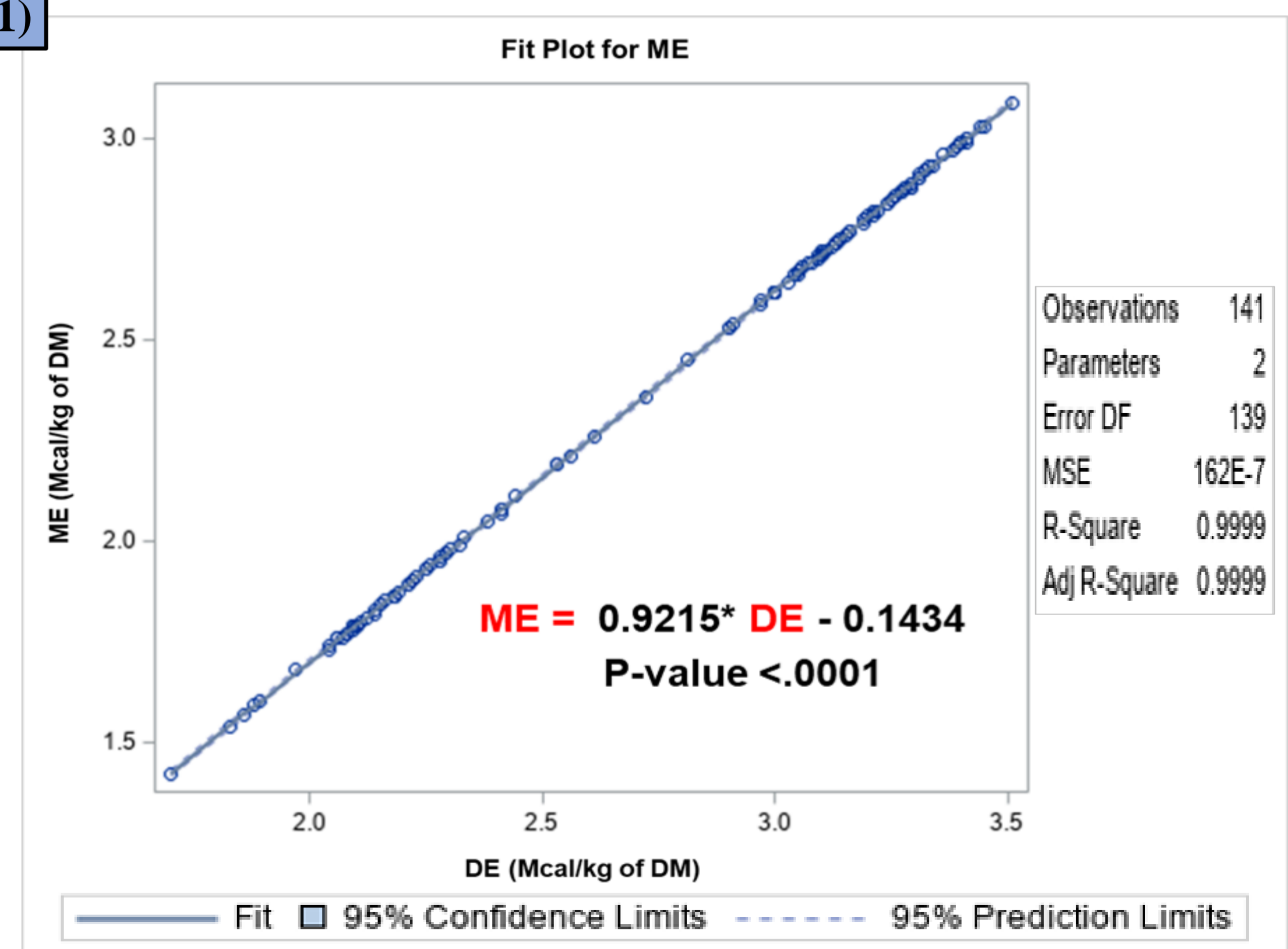


Fig 2. Relationship between DE and ME concentrations (adjusted for random differences in intercepts among citations).

Conclusion

- This study suggest that the previous NRC recommendation to calculate ME from DE using a constant conversion of 0.82 should be changed and updated considering the specificity of the Korean beef cattle.
- Our slope of regression (0.9215) is higher than that recommended by NRC (0.82) but lower than the slope obtained by Galylean et al. (2006) (0.9611).
- Predictive equations are provided to estimate ME, further improvement is highly recommended considering dietary components concentration.