

# Quantification of MBM Adulteration in Compound Fertilizers and Composts by NIRS

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## ◆ INTRODUCTION

Feed contaminated with meat and bone meal (MBM) is commonly accepted as the main transmission carrier of BSE. Use of compound fertilizers or composts adulterated with banned MBM in livestock grazing systems may cause potential BSE risk through feed chain. The objective of this study was demonstrate the feasibility of using NIRS to determinate MBM content in compound fertilizers and composts.

## ◆ MATERIALS AND METHODS

### ➤ Sample preparation

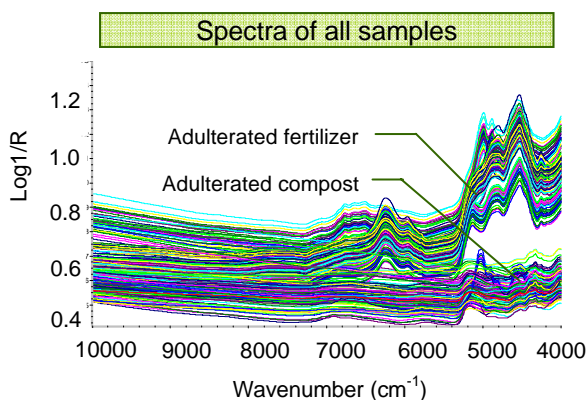
- 140 adulterated fertilizer samples were prepared in laboratory by mixing 4 kinds of compound fertilizers with 3 kinds of MBM randomly at different levels of 0.1%-10.0% (w/w).
- 120 adulterated compost samples were obtained by mixing 41 composts with 28 MBM at different levels of 3%-24% (w/w).
- All samples were divided into a calibration set and a validation set based on concentration grads.

### ➤ NIRS scanning

- All work was performed on a NIRS system SPECTRUM ONE NTS (PerkinElmer, USA).
- Samples were scanned in rotating quartz cell.
- Each of the samples was scanned 3 times as log 1/R over the wavenumber range 10000 cm<sup>-1</sup> to 4000 cm<sup>-1</sup> and the average spectrum was recorded.



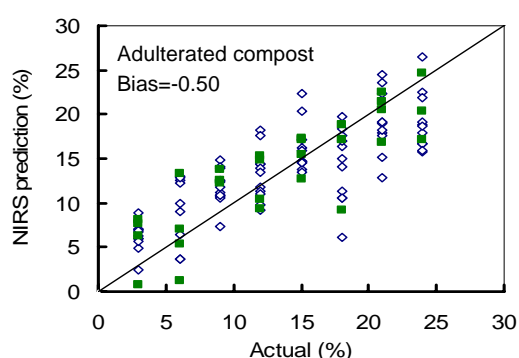
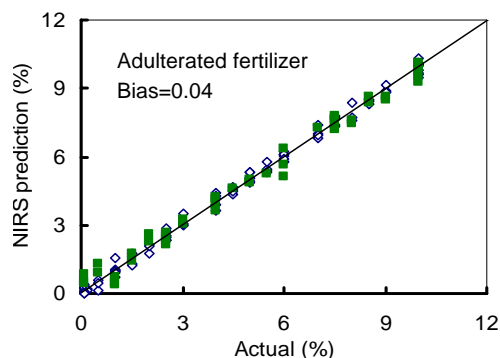
## ◆ RESULTS AND DISCUSSION



NIRS calibrations and validations

Samples	Pre-treatment methods	Calibration set			Validation set		
		F	R <sup>2</sup>	SEC	r <sup>2</sup>	SEP	RPD
Adulterated fertilizer	9 points						
	smoothing +1st derivative +SNV-D	6	0.996	0.20	0.988	0.37	8.84
Adulterated compost	5 points smoothing	8	0.622	4.49	0.722	3.80	1.87

Scatter plots of NIRS calculated vs actual concentrations for the calibration and validation set



## ◆ CONCLUSION

The results indicated that NIRS could be used to quantify the adulteration of banned MBM in compound fertilizers with high prediction accuracy, and be insufficient to determinate the content of MBM in composts for considerably low prediction accuracy.