

## Supplemental Material

Article

# Evaluating the Feasibility of a Low-Field Nuclear Magnetic Resonance (NMR) Sensor for Manure Nutrient Prediction

Xiaoyu Feng \*, Rebecca A. Larson and Matthew F. Digman

Department of Biological Systems Engineering, University of Wisconsin-Madison, 460 Henry Mall, Madison, WI 53706, USA; rebecca.larson@wisc.edu (R.A.L.); digman@wisc.edu (M.F.D.)

\* Correspondence: xfeng43@wisc.edu; Tel.: +1-864-986-2404

**Citation:** Feng, X.; Larson, R.A.; Digman, M.F. Evaluating the Feasibility of a Low-Field Nuclear Magnetic Resonance (NMR) Sensor for Manure Nutrient Prediction. *Sensors* **2022**, *22*, 2438. <https://doi.org/10.3390/s22072438>

Academic Editor: Rebecca Re

Received: 12 February 2022

Accepted: 19 March 2022

Published: 22 March 2022

**Publisher's Note:** MDPI stays neutral with regard to jurisdictional claims in published maps and institutional affiliations.

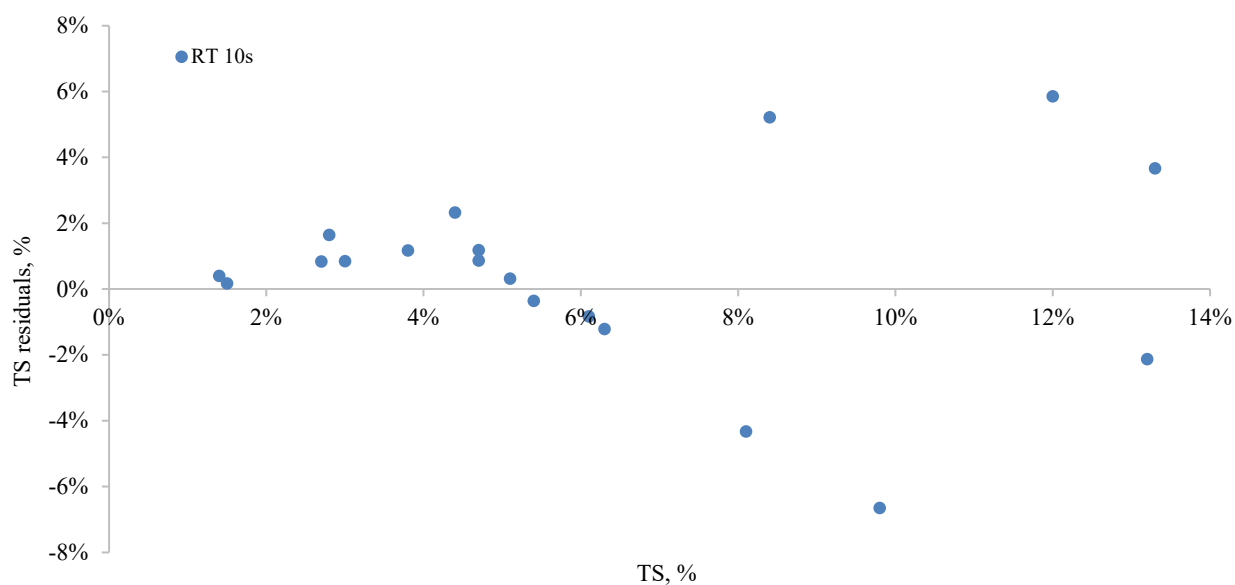


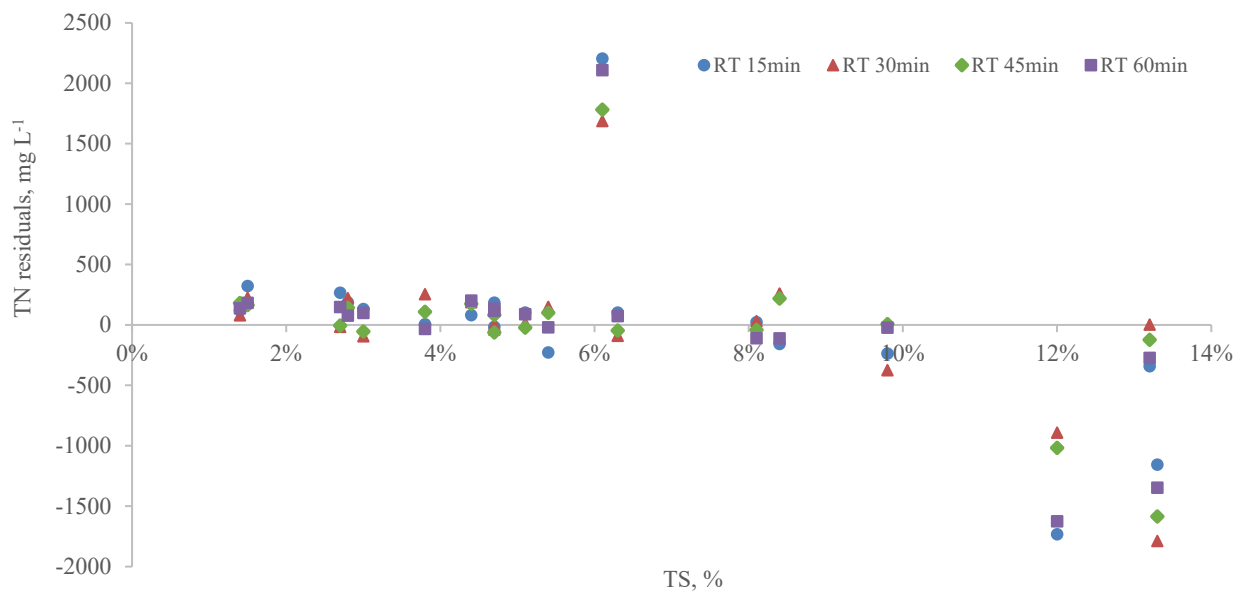
**Copyright:** © 2022 by the authors. Submitted for possible open access publication under the terms and conditions of the Creative Commons Attribution (CC BY) license (<https://creativecommons.org/licenses/by/4.0/>).

**Table S1.** The precision of licensed parameters of NMR sensor provided by the manufacturer.

Parameter	RTs (min)	NMR SD (mg L <sup>-1</sup> )
TN	15	140
	30	99
	45	81
	60	70
NH <sub>4</sub> -N	15	140
	30	99
	45	81
	60	70
TP	30	64
	45	52
	60	45
	90	37

NMR SD = standard deviation of NMR corresponding to 1 hr measurement time.

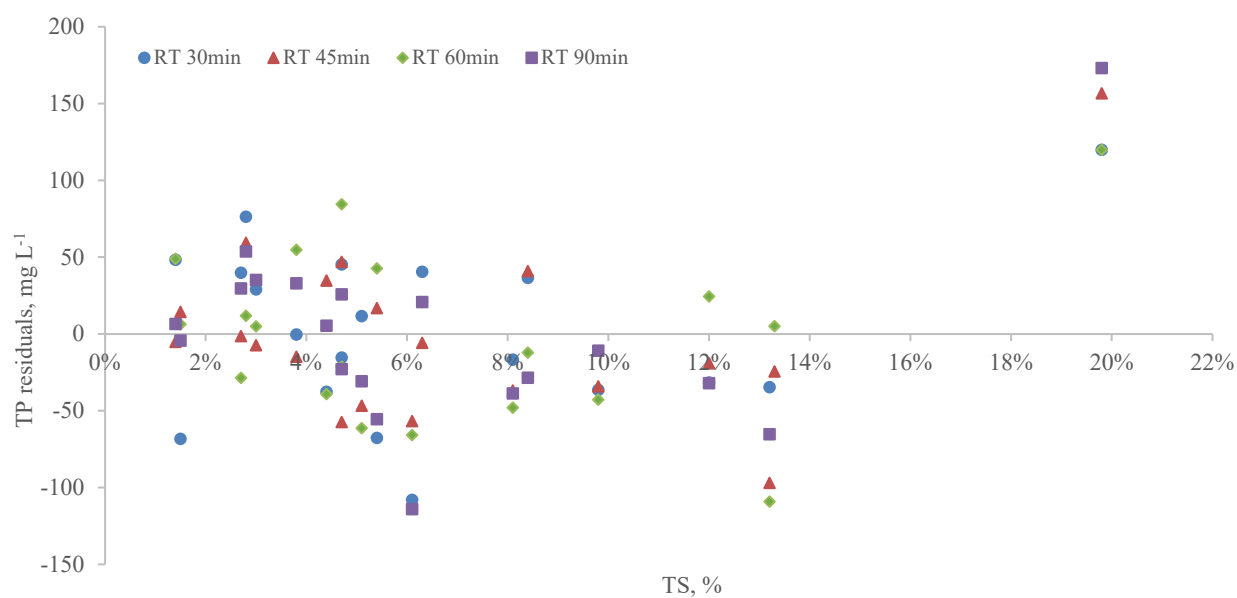
**Figure S1.** Residuals of TS between NMR predicted and lab measured versus the actual TS of samples (lab measurement) at 10s RT.



**Figure S2.** Residuals of TN between NMR predicted and lab measured versus the actual TS of samples (lab measurement) at 15 min, 30 min, 45 min, and 60 min RTs. .



**Figure S3.** Residuals of  $\text{NH}_4\text{-N}$  between NMR predicted and lab measured versus the actual TS of samples (lab measurement) at 15 min, 30 min, 45 min, and 60 min RTs.



**Figure S4.** Residuals of TP between NMR predicted and lab measured versus the actual TS of samples (lab measurement) at 30 min, 45 min, 60 min, and 90 min RTs.