Evaluation of different ensiling methods of the residual material from edamame soybean processing

E. M. Herring*, E. B. Kegley*, K. P. Coffey*, M. S. Gadberry*, J. G. Powell*, and K. S. Anschutz*

*Department of Animal Science, University of Arkansas System Division of Agriculture, Fayetteville, AR 72701

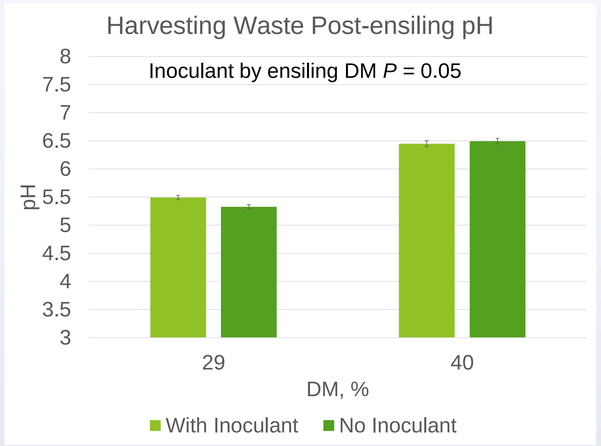
Introduction

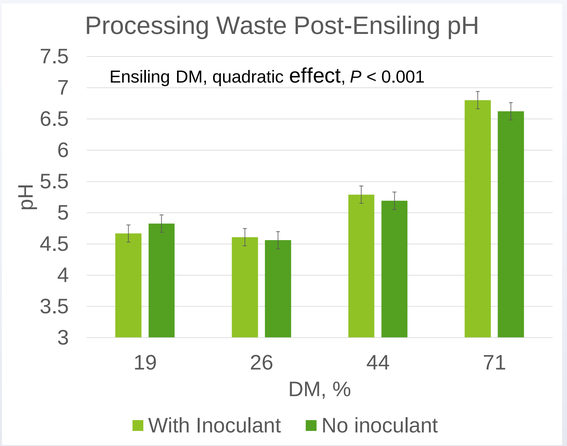
- Livestock producers often rely on the weather to offer available forage.
- In years where forage availability is low, producers may use waste products from other industries as a form of supplemental feed.
- A waste product that is produced in Arkansas and has potential as a co-product for supplemental feed is edamame.
- The objective of this research was to evaluate the storage and feeding value of residual from edamame soybean production on a laboratory scale.

Methods

- Two types of residual or waste material were ensiled in 500 g silos (≥ 3 silos per treatment):
  - Waste from harvesting
  - Waste from processing stored material
- Harvest material (a single trip):
  - Ensiled either without wilting (fresh, 71% moisture) or after wilting to a target of 60% moisture
  - Material at each targeted moisture level was ensiled with and without a commercial lactic acid bacterial inoculant (*Lactobacillus buchneri*)
- Material from processing (4 replicate trips):
  - Ensiled at 80 (fresh), and targets of 65, 50, and 35% moisture
  - Material at each targeted moisture level was ensiled with and without a commercial lactic acid bacterial inoculant (*Lactobacillus buchneri*)
- Silos opened after:
  - 42 days (harvest waste) of ensiling
  - 50 days (processing waste) of ensiling
- Proc GLM was used to analyze data:
  - DM at ensiling, inoculant treatment, and DM x inoculant treatment were the fixed effects
- Harvest waste data were analyzed using Proc GLM
- Processing waste data analyzed using Proc Mixed
  - Trip was a random effect

Results





	Fresh		Ensiled	
	28% DM	39% DM	26% DM	36% DM
CP, %	14.85	16.34	14.16	14.28
NDF, %	50.58	52.98	50.8	43.55
ADF, %	38.92	40.86	40.02	33.27
Ash, %	22.96	30.41	24.44	30.79

Figure 3: For harvest waste, there were no effects of inoculant or a treatment DM by inoculant interaction for nutrient content.

Processing Waste Fermentation Profiles

	n	19% DM	26% DM	44% DM	P - value
Total VFA, % DM	39	7.9 ± 0.7	9.3 ± 0.7	7.7 ± 1.6	0.36
Lactic Acid, % Total VFA	39	0.8 ± 2.2	31.2 ± 2.2	17.8 ± 5.3	< 0.0001
Lactic Acid, % DM	39	0.07 ± 0.1	2.5 ± 0.1	1.3 ± 0.3	< 0.0001
Acetic Acid, % DM	39	1.5 ± 0.47	4.9 ± 0.5	3.8 ± 1.1	< 0.0001
Propionic Acid, % DM	39	0.8 ± 0.1	0.5 ± 0.08	0.4 ± 0.2	0.04
Butyric Acid, % DM	39	5.6 ± 0.3	1.4 ± 0.3	1.9 ± 0.7	< 0.0001
Ammonia (CPE), %DM	39	1.8 ± 0.2	1.5 ± 0.2	2.2 ± 0.5	0.2657

Samples from silos that were ≤ 4.8 pH.

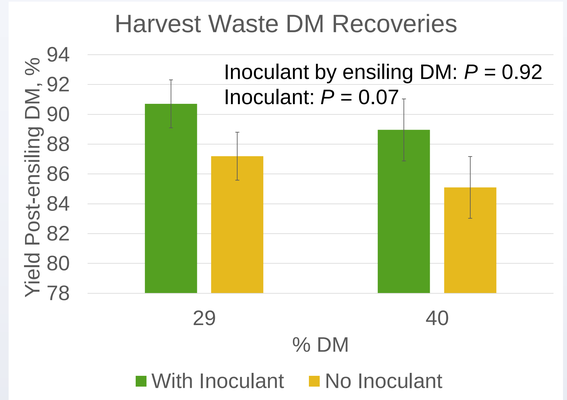
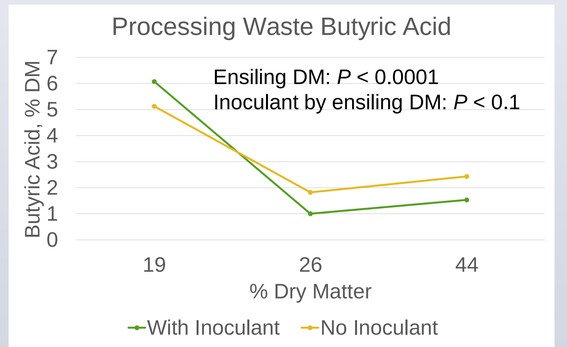


Figure 2: For harvest waste, recoveries of DM after ensiling tended to be greater with the inoculant (89.8 vs. 86.2%).



Conclusion

- As expected, ensiling wetter material resulted in a lower post-ensiling pH for both residual materials.
- Adding a silage inoculant had minimal effects on pH but tended to increase the recoveries of DM from the harvest waste.

Acknowledgements

- Southern Region USDA SARE Graduate Student Grant in Sustainable Agriculture
- Land O' Lakes for donating the silage inoculant.