Grain Cart Pathways and Soil Compaction Reduction

Cody Gradert  
_Iowa State University, crgradert@iastate.edu_

Garett Hagenow  
_Iowa State University, ghagenow@iastate.edu_

Kyle Kent  
_Iowa State University, kmkent@iastate.edu_

Jacob Steinbeck  
_Iowa State University, jstein@iastate.edu_

Follow this and additional works at: [http://lib.dr.iastate.edu/tsm415](http://lib.dr.iastate.edu/tsm415)

Part of the Bioresource and Agricultural Engineering Commons, and the Industrial Technology Commons

Recommended Citation  
Gradert, Cody; Hagenow, Garett; Kent, Kyle; and Steinbeck, Jacob, "Grain Cart Pathways and Soil Compaction Reduction" (2017). _TSM 415 Technology Capstone Posters_. 14.  
[http://lib.dr.iastate.edu/tsm415/14](http://lib.dr.iastate.edu/tsm415/14)
Grain Cart Pathways and Soil Compaction Reduction

Justin Upmeyer: John Deere, Urbandale, IA

Problem Statement
• A typical field is compacted by wheel tracks on 80-90% of its area. This results in reduced yields, reduced soil health, and reduced water infiltration. Creating a plan to limit compaction could provide numerous benefits to farmers everywhere.

Scope
• The scope of this project is to determine the impact of compaction due to large loads and unorganized travel patterns in a field.

Objective(s)
• Collect and analyze field pass data to create a map of traffic patterns
• Determine the cause of greatest compaction
• Develop a SOP to regulate trafficked areas of field
• Estimate economic benefit of proposed traffic patterns

Constraints
• Budget - $200 for penetrometer
• Timeline- Compaction tests done by ground freeze, results by planting to apply it to next growing season
• Materials- Penetrometer, Software to analyze data
• Criteria- correlate all operational passes to economic impact

Methods
• Collect soil compaction levels with penetrometer
• Centralize field traffic data in SMS or “MyJohnDeere” Operation Center
• Correlate compaction levels with amount of traffic and economic loss
• Compare compaction results to previous studies to determine effect of compaction on crops.

Proposed Solutions
• Develop a SOP for grain cart drivers
• Set a plan to reduce area covered in field by aligning tire tracks with each other

Major Outcomes
Projected Outcomes
• Detailed map of compaction done by equipment in fields
• SOP for grain cart traffic patterns
• Economic benefit estimation due to changes in traffic patterns

Measures of success
• Estimated economic benefit by applying recommendations
• Show how soil compaction impacts crop and soil health

Benefit to Client
• Knowledge on how to better inform customers about soil compaction
• Generate higher ROI for customer so customer buys from Client more.

Acknowledgements: Authors are grateful to Justin Upmeyer for the opportunity to work on this project. Project was co-funded by the differential tuition.