The Value of Big Data in Agriculture: Inputs, Farming and Processing

EDITOR INTRODUCTION

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The promise of *big data in agriculture* is very alluring. After all, agriculture is one of the last great enterprises on the planet that hasn't been fully digitized and analyzed. It is a biological manufacturing system, wrought with all the complexities one might expect from jamming humans, machines, natural systems, chemistry, biology, weather and climate into a single box. As Donald Rumsfeld famously quipped "As we know, there are known knowns; there are things we know we know. We also know there are known unknowns; that is to say we know there are some things we do not know. But there are also unknown unknowns—the ones we don't know we don't know."

As I travel the world and discuss the opportunities and challenges of big data in agriculture with other global agriculturalists, several recurring themes are becoming prevalent.

First, agriculture is a very location-specific enterprise. Soil, water and land characteristics— arguably three of the strongest determinates of outcomes—are hyper-local in their variability. No two fields or paddocks or plots are exactly the same.

Second, weather and climate are highly localized. No two growing seasons are the same and the local variability within a season can be very stark.

Third, the proximity of a given farming operation to the marketplace and the transportation infrastructure which enables the handling, movement and storage of crops varies dramatically from location to location.

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And last but not least, farming methods and practices are as individualized as the humans performing them. There are deep, local, and cultural roots that can drive behavior and decisions made on the farm.

So as we discuss the value of *big data in agriculture,* one has to wonder if small data, i.e. local field-specific data, isn't the key that might unlock the value in the big data vault. Put another way, there are things that we do know that might help uncover that which we don't know. And it's very important that we use all the data tools at our disposal to address the core challenge; the Food and Agricultural Organization of the United Nations has forecasted the need for a 70% increase in global food production by mid-century.

This Special Edition has two primary sections. The first two papers were invited from two of the co-editors on this project. Dr. Steven Sonka starts by framing the characteristics of big data. Then, Dr. Michael Boehlje offers perspectives on how big data might impact industry structure and enhance business margins, particularly in developed agricultural economies.

The next section contains ten peer-reviewed submissions with topics ranging from cattle production; to data privacy; wireless broadband; and food safety, with authors spanning every continent from India, Africa, North and South America and Europe. Each offers us a birds-eye view of big data from both developed and developing economies.

But even with these contributions, and the 20+ other papers that were reviewed in the process of putting this issue together, the fact remains that we can only imagine more than we can know about the value of big data in agriculture. It will be an exciting journey for those of us who choose to climb onboard!

A special thanks to our co-editors: Steven Sonka, Michael Boehlje, Charlie Linville and Kenneth Zuckerberg for their contributions in helping to bring this issue into fruition.