Interpretive Summary for 2017 AFGC Annual Conference

Title: Opportunities for yield monitoring in hay production

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Yield monitors are now decades-old technology on the row crop farm, being commercially available for corn, small grains, and cotton. In fact, many of today's grain combines are equipped with yield monitors as standard equipment. Although some work has been done in evaluation and development of yield monitoring systems for hay production, only one system for yield monitoring hay is commercially available and yield monitors are not broadly utilized in hay production. Among the top ten U.S. crops by acreage and the top six U.S. crops by value, hay is third in rank and the only one of these crops where a yield monitor is not widely implemented. The relative absence of yield monitoring for hay production is due to a combination of factors: economies of scale, relative crop management intensity and crop value per unit area, and grower access to complementary technologies.

Being "late in the game" in adoption and development of yield monitoring technologies offers a number of benefits and opportunities in hay production. Most importantly, many of the lessons learned relative to application of yield data in guiding row crop management decisions are transferrable to hay production. Additionally, if hay yield monitors can be developed and commercialized to be compatible with existing, commercial row crop yield documentation platforms, cost of hay yield monitoring systems will be reduced due to pre-existing sales volumes. Commercialization of a hay yield monitoring system that is suitable for use across all types and manufacturers of balers will be capable of minimizing per unit fixed costs and therefore also minimizing retail prices.

When coupled with a global positioning system, hay yield data can be presented in the form of a map, showing spatial relationships of the low- and high-yielding areas in a field. By itself, a crop yield monitor generates no reduction in production costs, increases in yield, or increases in profit, so determination of a generic return on investment for row crop yield monitors has been challenging. However, data collected from the yield monitor can drive management decisions resulting in increased profitability and generally demonstrating payoff periods of one to two years.

One, universally applicable use of a hay yield monitor is for direction of crop input rates. A Clemson University study, which is the beginning of a long-term study involving multiple crop inputs, used a hay yield monitor to reveal a number of ways in which profit might be increased in hay production. Prior to onset of this study, this was an intensely managed, irrigated Tifton-85 field with application of a fixed rate of 100 lb-N/ac between cuttings. Yield results from this test suggested that if a fixed nitrogen rate was applied across the field, application of 60 lb-N/ac would result in $12/ac more profit per cutting when compared to the 100 lb-N/ac rate. If yield management zones were utilized for assignment of nitrogen rate by zone, the data suggest that profit would have been $4.50/ac greater per cutting than at the 60 lb-N/ac fixed rate. Finally, a the Clemson University Directed Prescriptions system suggested that profit would have been $14.50/ac greater per cutting than at the 60 lb-N/ac fixed rate. Environmental

stewardship is also improved; when practiced properly, zone management and directed prescriptions both optimize nutrient use in the field, reducing over-application.

Value of any yield monitoring system is dependent on how its information is used to improve management. Return on investment must be evaluated on a case-by-case and farm-by-farm basis. With four cuttings per year, the study discussed here conservatively demonstrated in excess of $50/ac/yr potential benefit from implementation of yield data in prescribing nitrogen rates. If a hay yield monitoring system retailed for $7,500, the data collected here suggests that the system could be paid for in only 150 ac of annual hay production—in nitrogen savings alone.