Prairie Agricultural Machinery Institute

DETERMINING OPTIONS TO LOWER MECHANICAL OVERLAP IN SINUOUS RIPARIAN AREAS

Irregular Shaped Production Area with Obstacles

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Introduction

Riparian areas and wetlands provide many benefits that work towards a balanced and healthy landscape, including water quality, biodiversity, reduced erosion, and wildlife habitat. Efficient agricultural crop production means effective use of time and resources to minimize overapplication of seed, pesticides, and fertilizers while also reducing fuel use. Environmental stewardship retains and properly manages riparian areas and wetlands in order to maintain their natural function.

Irregular shapes of a farmable area increase overlap (the amount of turning required during field operations) and can result in overapplication of seed, pesticides and fertilizers, increased fuel consumption (and thus emissions), and increased work time.

To aid professional staff and producers in selecting ways to minimize overlap without removing or reconfiguring critical natural elements, fact sheets were developed. This is the one of a series of five fact sheets pertaining to unique riparian features. In this fact sheet, a production area that is irregular in shape and has internal and perimeter obstacles is discussed and, to aid in overlap illustrations, a specific example is used.

Glossary of Terms

PERIMETER OVERLAP – Mechanical overlap experienced on the headlands of cropland.

OBSTACLE OVERLAP – Mechanical overlap experienced as an implement traverses around an obstacle in its pass of travel.

THEORETICAL OVERLAP – The best case scenario for mechanical overlap on a parcel of land by assuming "**no**" overlap is seen per pass traveled on the land, and all overlap is associated with perimeter (headland) overlap.

Site Description

The agricultural cropland was an irregular shape with multiple obstacles contained within. The cropland is represented in **Figure 1**.

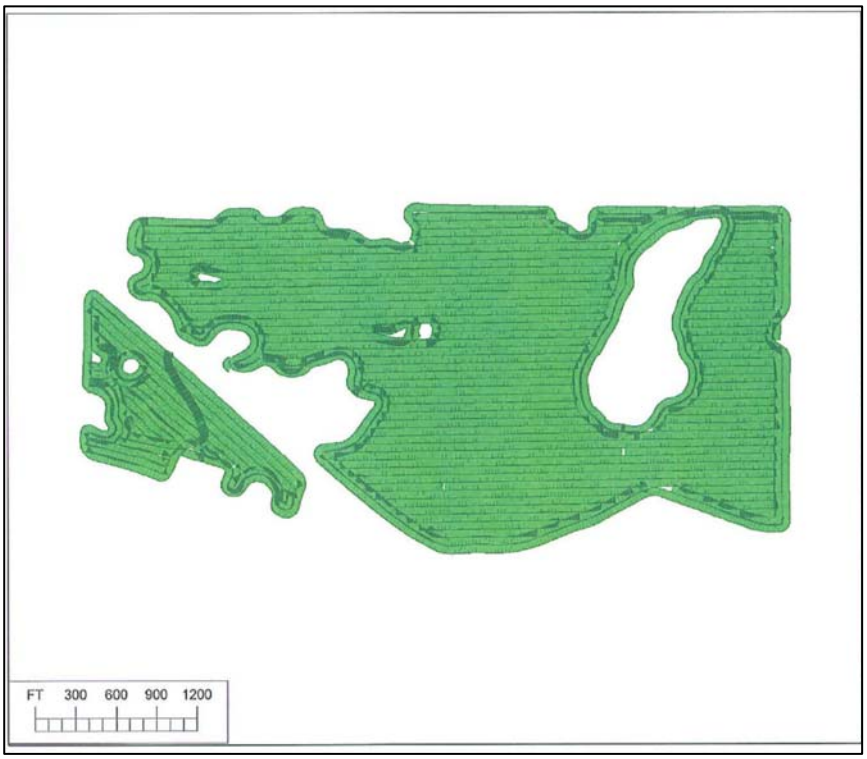

Figure 1. May 15, 2006, Fertilizer Application Data.

Factors to note when calculating overlap and respective information regarding this study:

Farmable acres — 258.1

Equipment — 60 foot floater unit

Operation — assisted tracking capability (no auto steer)

Recorded acres traveled — 267.15

Overlap acres — 9.05 (3.51%)

Data for this same piece of land was available for the previous year's application. **Figure 2** is the productive cropland in discussion for this case study as represented in 2005.

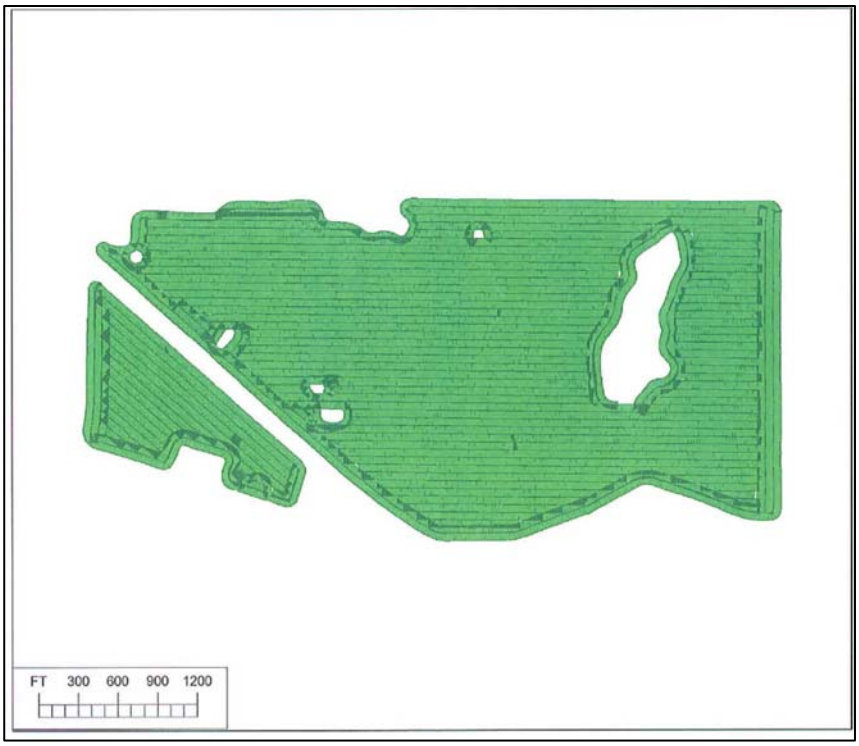

Figure 2. April 27, 2005 Fertilizer Application Data.

Factors to note when calculating overlap, and respective information regarding this study:

Farmable acres — 241.3

Equipment — 60 foot floater unit

Operation — assisted tracking capability (no auto steer)

Recorded acres traveled — 250.43

Overlap acres — 9.13 (3.78%)

Overlap-Reduction Options

1. Boom Control

The difference seen in the figures of this parcel of land over a one year time frame illustrate the impact excessive water has on the farmable acres available. Relatively minor water obstacles swell in size until they significantly impact the land.

The theoretical overlap calculated for the two situations on the cropland in question are 13.01% and 9.92% respectively. The theoretical calculation assumes the use of an implement without boom control (i.e. applying full width).

Therefore, with the ability to control the width of application via the boom there will be a significant improvement in overlap numbers. Comparing the theoretical versus the actual numbers illustrates an application overlap improvement of 60% to 70% because of the boom controlability of this piece of equipment.

2. Isolation of Obstacles

Further reduction of the approximate 25 acres that are separate from the main body of the field may impact the overlap performance. Due to the shape of this separate section, it is assumed to have a higher overlap number than the average overlap over the entire land area; thus, utilizing this area for alternatives to cropping may result in an overall improvement in overlap and result in potential savings that would offset any production losses associated with not cropping 25 acres. Using an average production cost of $95/acre, then an acreage reduction of 25 acres would result in a savings of $2,375 to go towards the production losses associated with the 25 acres.

Conclusion

Each producer will need to tailor these options to reduce overlap in his/her particular situation. However, in this example it is recommended that the producer investigates the overlap calculated on an irregular-shaped parcel of land across a range of implements to assess the potential of using areas of the land for alternatives to cropping. Consistent is the recommendation to utilize GPS technology with an auto steer option for the following reasons:

- It allows for integration seamlessly into the existing business unit.
- It requires no investment into new cropping equipment by implementing a smaller equipment strategy.
- It is a technology investment that can be used on equipment at each stage of the cropping process so there is an option to compound its impact.
- It has the ability to assist in time management during each stage of the cropping process because field time can be extended if field conditions are favourable.
- It is a relatively low cost investment as compared to alternatives.

Alternative to cropping on areas isolated to square off the irregular shape are:

- Forage harvesting.
- Tree production.
- Native fruit production.

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Saskatchewan Watershed Authority

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