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Behavioural factors affecting the adoption of biochar among Huron County farmers

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WATERLOO

INTRODUCTION

▶ Biochar research: science

- ▶ Large focus on science: eg. biochar as a soil amendment
- ▶ Large focus on technology: eg. pyrolysis

▶ Biochar research: social

- ▶ Few studies available on how the end-users (eg. farmers) think about using biochar (eg. Joseph, 2009 in Lehmann's book)
 - ▶ Soil amendment
 - ▶ Livestock feed supplement

▶ Biochar research: economics

- ▶ Several studies on life cycle assessment
- ▶ Little information on economics of biochar for the end-user (eg. Joseph, 2009)
- ▶ How does the cost of biochar and its effect on agricultural soil influence the economics of producing crops?

Objectives

Determine the social and economic factors affecting farmer adoption of biochar

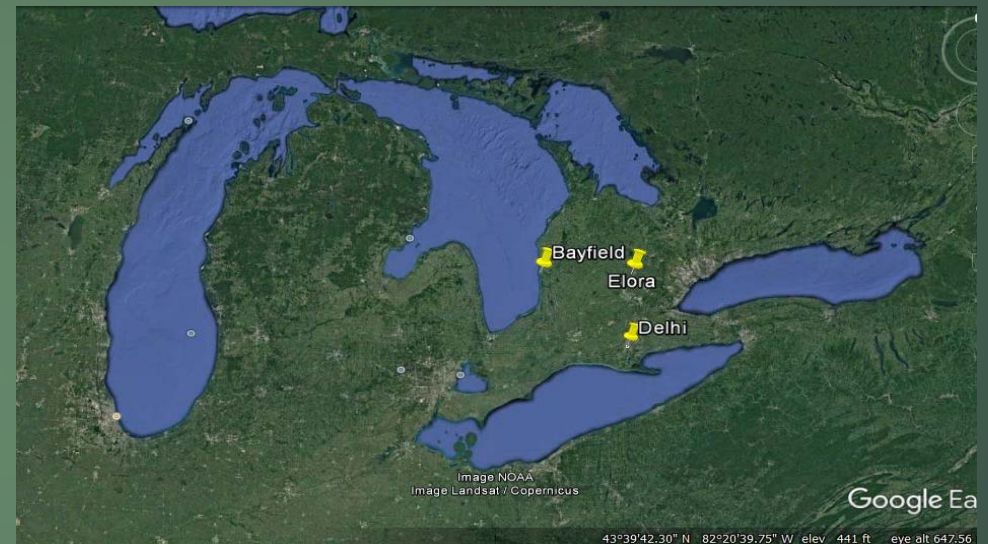
Methodology

Semi-structured interviews

- ▶ 21 agricultural producers in Huron Country
- ▶ QSR Nvivo was used to analyze the data

Documentation of:

- ▶ Trends in farmers' openness to consider using biochar as an amendment
- ▶ Demographics
 - ▶ acreage
 - ▶ time spent farming,
 - ▶ Sustainability of farming and the industry
 - ▶ Role of biochar on the farm



Limitations of this Study

Number of people interviewed

- ▶ Initial aim to interview 50 farmers (final number was 21)
- ▶ Lack of contact and willingness/time to participate in interviews

General lack of knowledge on biochar

- ▶ Impacted the number of participants
- ▶ Impacted interviews

Lack of other studies

- ▶ Few other studies on socio-economic impact of using biochar globally and in North America
- ▶ Greater risk of failure to use biochar due to lack of historical guidance

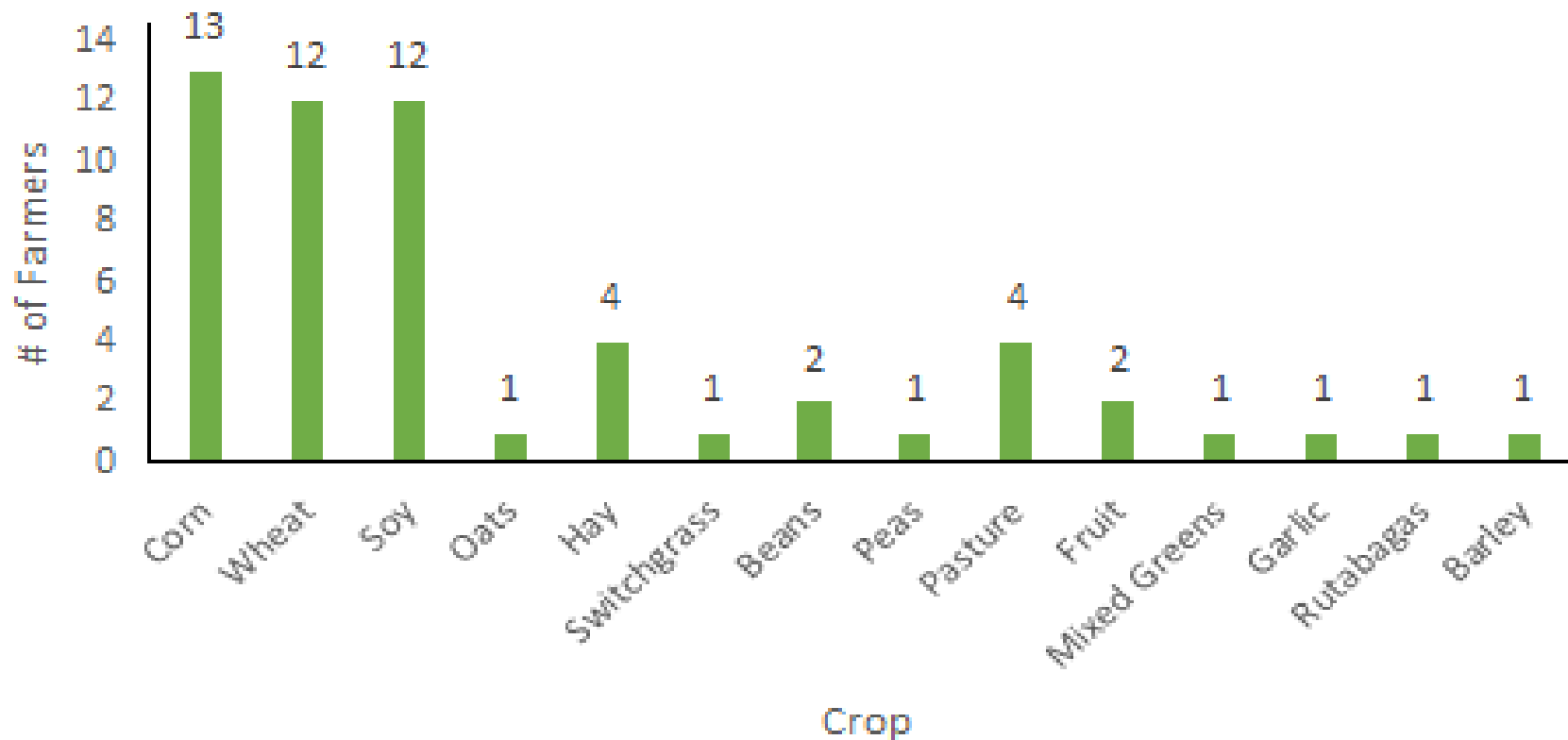
Results: Agricultural Demographics

Size of farm

- ▶ 14 to 728 ha (average = 241 ha)

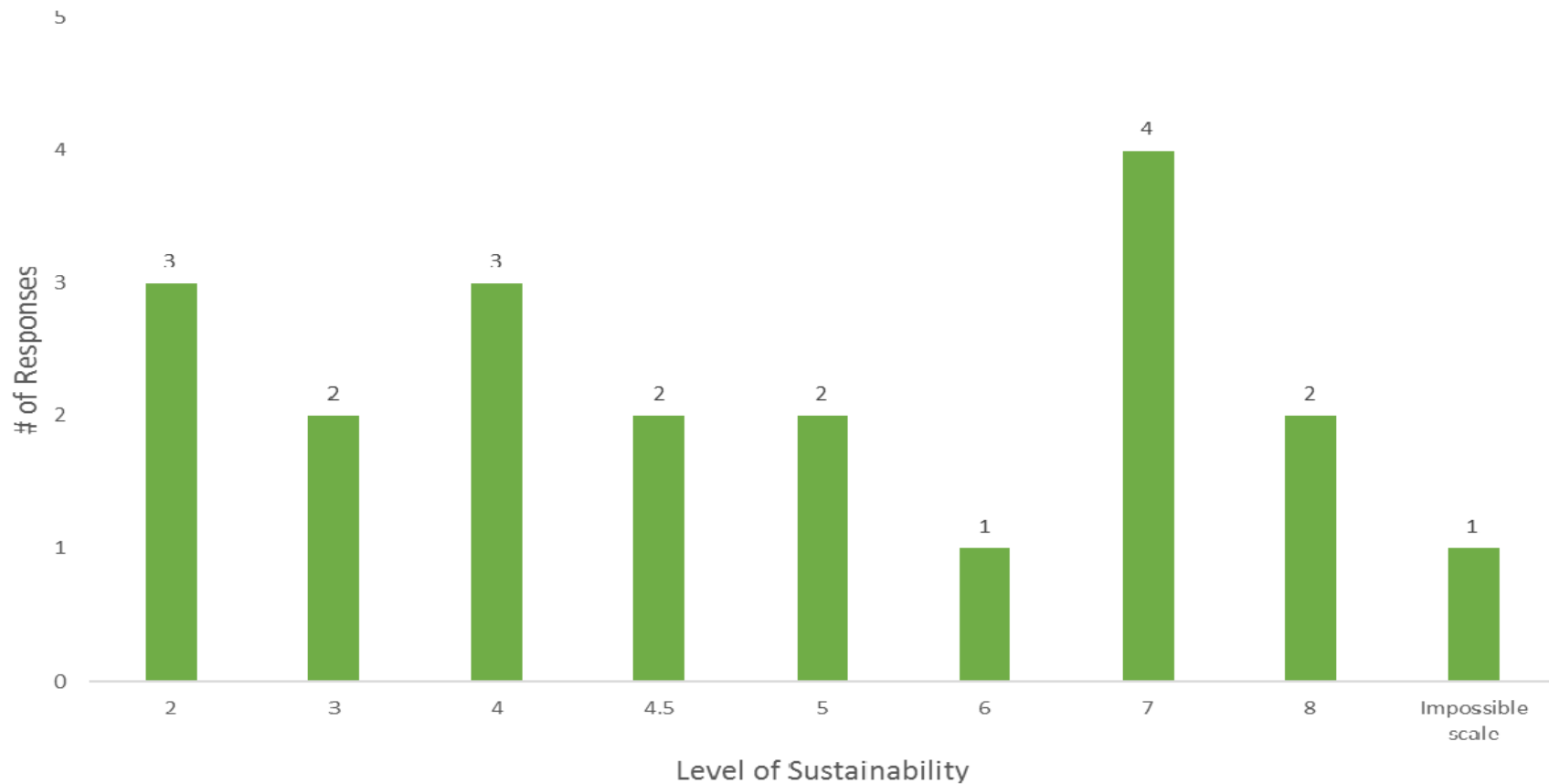
All participants agreed that soil health was an important aspect in their farming operation

What crops do you have in your rotation?



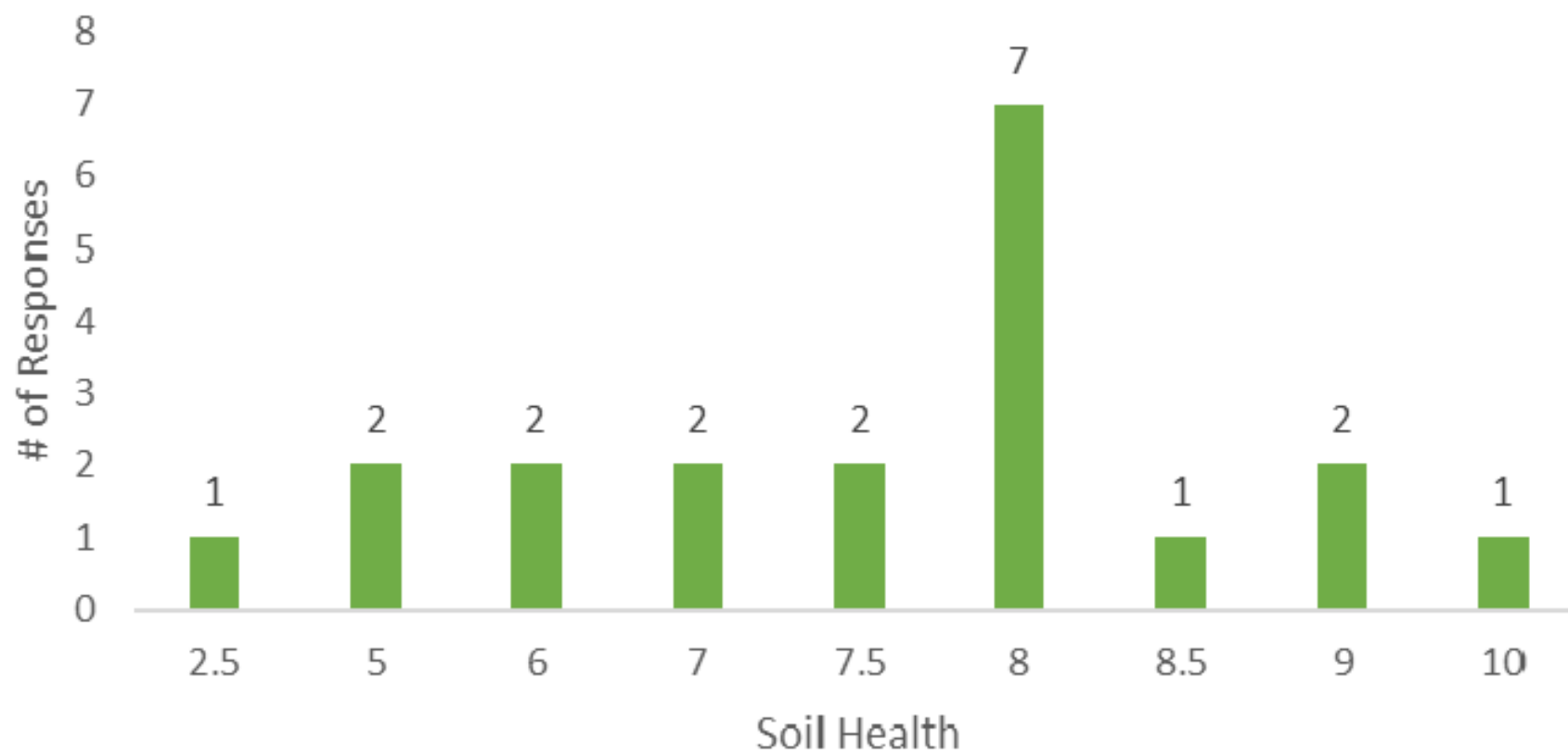
Results: Sustainability of Canadian Agriculture

On a scale from 1 to 10, how environmentally sustainable do you feel Canadian agriculture is?

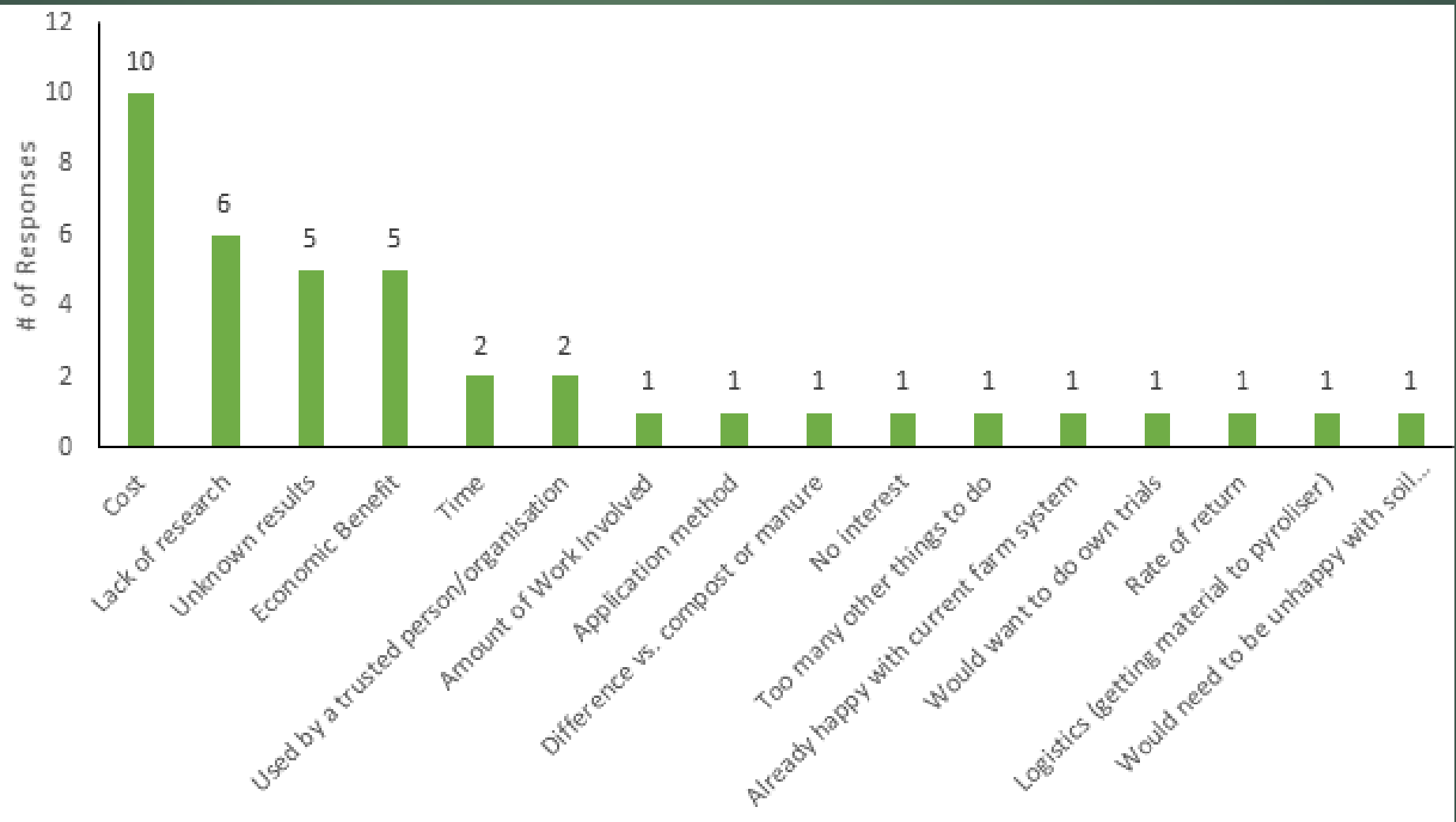


Results: Importance of Soil Health

On a scale from 1 to 10, how would you rate the health of the soil on your farms?



Results: Willingness to use Biochar



Results: Economic Analysis

Current Research

- ▶ Biochar is not yet a profitable way to increase crop yields
- ▶ Only viable with
 - ▶ a reduction in biochar costs
 - ▶ Potential introduction of carbon credits

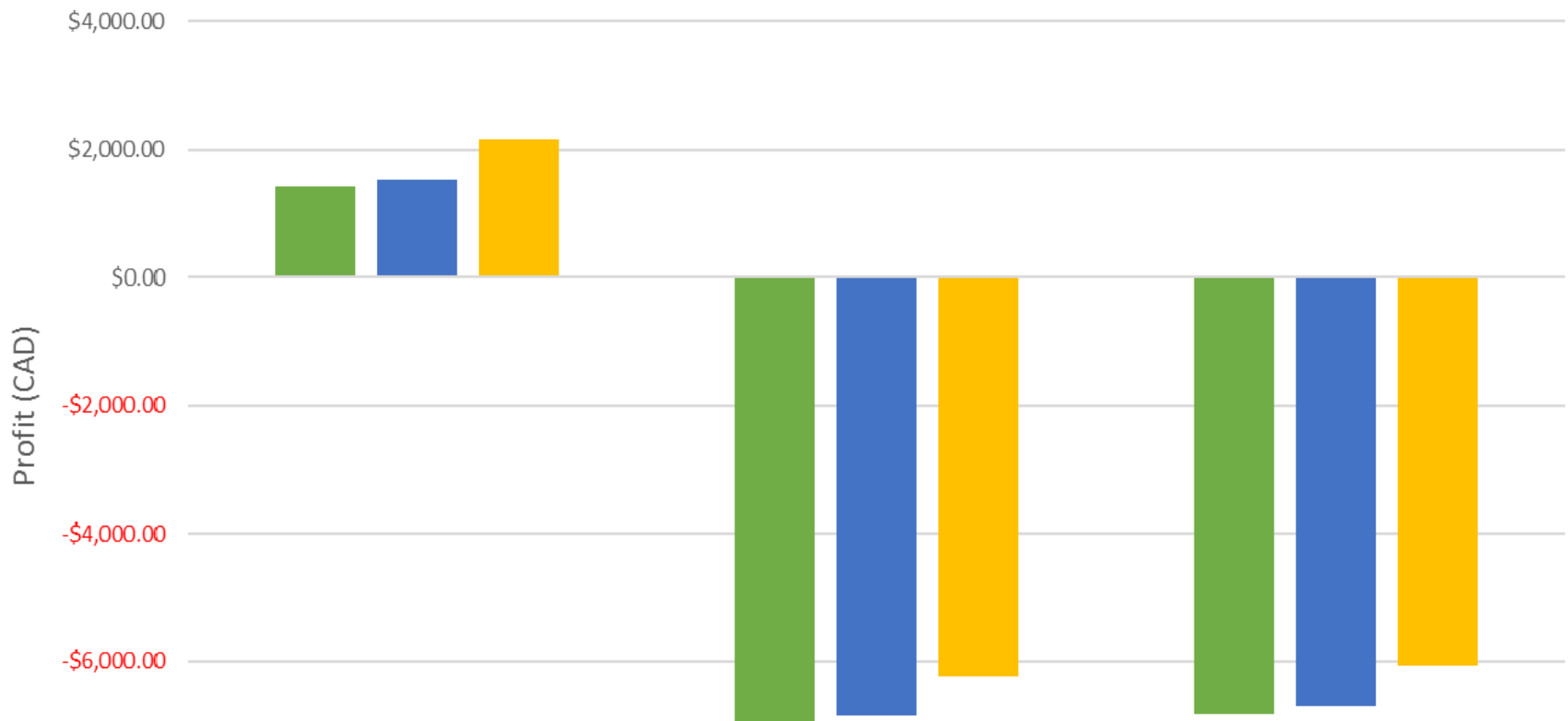
In our Study: Socioeconomic

- ▶ 63% of farmers harvesting crop residue for some purpose
- ▶ Livestock bedding
- ▶ Trading it for manure
- ▶ Selling crop residue at \$38/ha to feedlots

In our Study: Biophysical

- ▶ Not conclusive if biochar will increase grain yield after first year of study

Economic Analysis of Biochar (\$2,800CAD/t) application at 3t/ha

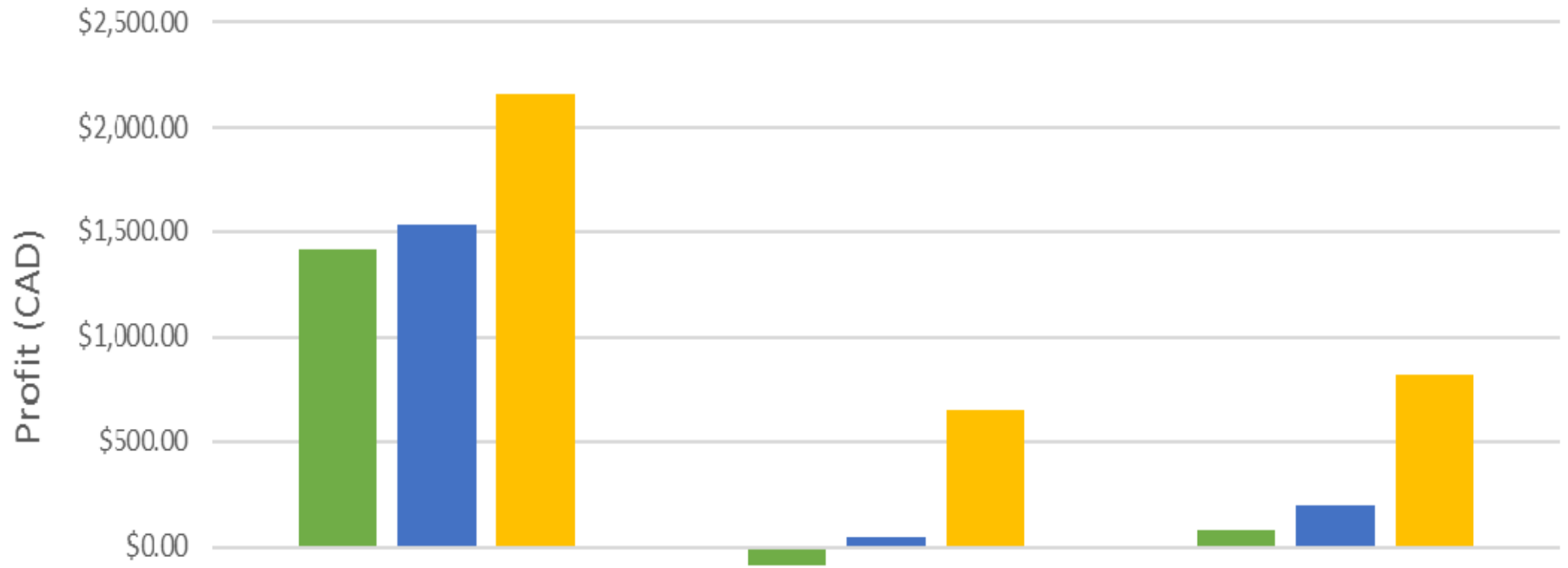


	Profit(CAD)/ha	Profit/ha with Biochar	Profit/ha with Biochar, Carbon Credit & N fertilizer elimination
■ Winter Wheat	\$1,412.56	-\$6,987.44	-\$6,825.77
■ Soybeans	\$1,536.16	-\$6,863.84	-\$6,702.17
■ Grain Corn	\$2,155.81	-\$6,244.19	-\$6,082.52

Application Scenarios

■ Winter Wheat ■ Soybeans ■ Grain Corn

Economic Analysis of Biochar (\$500CAD/t) application at 3t/ha



	Profit(CAD)/ha	Profit/ha with Biochar	Profit/ha with Biochar, Carbon Credit & N fertilizer elimination
■ Winter Wheat	\$1,412.56	-\$87.44	\$74.23
■ Soybeans	\$1,536.16	\$36.16	\$197.83
■ Grain Crops	\$2,155.81	\$655.81	\$817.48

Application Scenarios

■ Winter Wheat ■ Soybeans ■ Grain Crops

Conclusions

- ▶ Lack of awareness of biochar by farmers in Huron County
- ▶ ~70% of farmers think that Canadian agriculture is currently sustainable
- ▶ ~80% of farmers are concerned/aware of soil health
- ▶ Majority of farmers are concerned about biochar
 - ▶ Cost
 - ▶ Lack of research on soil
 - ▶ Unknown results/effect on soil

Economics

- ▶ High cost of biochar (eg. \$2,800 t/ha) not profitable
- ▶ Lower cost of biochar is more profitable
 - ▶ may also be a lower biochar quality (how does this affect soil health)
 - ▶ Carbon credits to increase profitability