Introduction

Beef, it’s what is for dinner and, potentially, disaster. Corporate farms are quickly invading the prairie with row crops and cattle yards, chasing away traditional family farms and practices. As the number of farms continues to decline, the impacts are not only affecting farmers’ pocketbooks and the environment, but the livelihoods and traditions of agriculture. Bison show potential to be a positive replacement for cattle on both an environmental and humanistic level on four basic considerations called the Four Presumptions. This paper is dedicated to examining these Four Presumptions and evaluating potential economic or cultural barriers to implementing large-scale bison ranches.

The Four Presumptions

- **Bison are Better for Human Health**
  - Multiple studies link red meat consumption with cancers of the prostate, breast, and pancreas.
  - Meat consumption is correlated with higher cardiovascular disease, hypertension, diabetes, renal failure, stroke, and early mortality rates.
  - Bison have higher vitamin content, are lower in fat and higher protein than beef. (Table 1)

- **Bison are Easier to Manage**
  - Raising beef is a labor intensive process.
  - Bison farmers do not assist with calving and very rarely treat with a medical regime.
  - Bison tend to need hands-off management.
  - The busiest days for bison are slaughter and sorting, which typically happens 1-2 times a year.

- **Bison are Better for the Environment**
  - Cattle produce 116 kg of methane annually compared to bison which produce 72 kg.
  - If all cattle transitioned to bison, it would remove the impact of 15.5 million cars.
  - Bison wallow to cool themselves instead of 265.86
  - When examined in a study area across SD, ND, MT, WY, and NE, 69% of farmed agriculture decreasing small, family-farmed agriculture.
  - The high costs and low profits make it difficult to fund new ideas.

- **Bison are Similar in Land Needs**
  - Cattle and bison are equal in carcass weights and calving frequency (death rates + bred frequency).
  - When examined in a study area across SD, ND, MT, WY, and NE, 69% of farmed agriculture decreasing small, family-farmed agriculture.
  - The high costs and low profits make it difficult to fund new ideas.

Culture

The thoughts and beliefs an individual holds affects more than their outlook. Culture can affect decisions large and small, including the choice of what to raise. In order to study the culture surrounding farmers, three main sources were used:

- Four site interviews (2 bison and 2 beef) from locations shown in Figure 1
- 13 phone interviews
- Literature review

This information shed light on current agricultural context and rationale of why farmers are not choosing bison.

Key Findings

The beef industry is under major change and there are multiple factors that reduce potential to change, five factors were discovered:

- Declining population and increased industrialization
- High financial, industrial, and profit risks
- Specificity in management style
- Roots in tradition and family values
- Distrust of outsiders and disconnection from consumer s

Potential Barriers

- Agriculture is risky and competitive, making change difficult
- Global markets have pushed the country towards industrialization decreasing small, family-farmed agriculture.
- The high costs and low profits make it difficult to fund new ideas.

Potential Solutions

- Carbon Cap and Trade: When managed correctly, grazing land from bison would produce money from the carbon sequestered by the prairie. This could be used to boost profits and mitigate initial capital.  
- Capitalize on Niche Markets: With the growing focus on health and “green” foods, niche markets are on the rise. With bison’s health and environmental benefits, it would thrive in rediscovered industries like farmer’s markets and Whole Foods.
- Implement Bison in School Lunches: Bison are still considered an “exotic” product. By introducing kids to it through school lunches, they will be familiarized with the product and can remove this stigma. The benefits can also improve some current health issues as well as give economic security to those entering the bison industry.

Economics

Agriculture is an industry which means an individual needs to be profitable to survive. If bison are not profitable, that would be a major barrier to implementation. To evaluate the profitability of bison, two business plans of a beef and bison calf-cow operation were compared. This cost analysis considered four inputs: replacement heifers, feed cost, variable costs, and fixed costs. These expenses were then evaluated to find break even points and compared against current market prices.

<table>
<thead>
<tr>
<th>ITEM</th>
<th>Cost</th>
<th>ITEM</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>REPLACEMENT HEIFER</td>
<td>150.00</td>
<td>REPLACEMENT HEIFER</td>
<td>200.00</td>
</tr>
<tr>
<td>FEED COST</td>
<td>228.00</td>
<td>FEED COST</td>
<td>390.44</td>
</tr>
<tr>
<td>VARIABLE COSTS</td>
<td>138.95</td>
<td>VARIABLE COSTS</td>
<td>167.02</td>
</tr>
<tr>
<td>FIXED COST</td>
<td>273.6</td>
<td>FIXED COST</td>
<td>390.44</td>
</tr>
<tr>
<td>TOTAL COST</td>
<td>778.55</td>
<td>TOTAL COST</td>
<td>1,057.46</td>
</tr>
<tr>
<td>PROFITS ON 575 LB BEEF</td>
<td>144.24</td>
<td>PROFITS ON 575 LB BEEF</td>
<td>125.09</td>
</tr>
<tr>
<td>BREAK EVEN PRICE</td>
<td>771.33</td>
<td>BREAK EVEN PRICE</td>
<td>804.24</td>
</tr>
<tr>
<td>CURRENT SALE PRICE (FROM DEC 2016 AUCTION)</td>
<td>400.00 2,300</td>
<td></td>
<td></td>
</tr>
<tr>
<td>TOTAL PROFITS</td>
<td>265.86</td>
<td>TOTAL PROFITS</td>
<td>1,529.00</td>
</tr>
</tbody>
</table>

Table 2. Shows the results from the cost comparison of the University of Wisconsin Extension’s Source on Bison-Calf-Cow Operations and Pennsylvania State University Extension’s Source on Beef-Calf Cow Operations.

Key Findings

- Bison show 12x the profitability of beef
- The lower medical and feed costs by bison management showed major cost savings
- The higher market price of bison is mitigated by the longer lifespan and reproductive potential

Potential Barriers

- Initial capital to purchase bison heifers needed since they are 3x the price of beef
- Changes in fencing and building infrastructure shown in fixed costs
- Newer market which could lead to greater fluctuations in profits

Acknowledgements

There are multiple individuals who worked together to make this thesis possible.

- Thank you to the office of Experiential and Professional Development (XPD) at the College of Saint Benedict and Saint John’s University for providing the grant that funded the site visits across SD and NE.
- Thank you to Dan Rasmussen, Moritz Epsy, Steve Suter, Dave Hutchinson and all others who were interviewed.