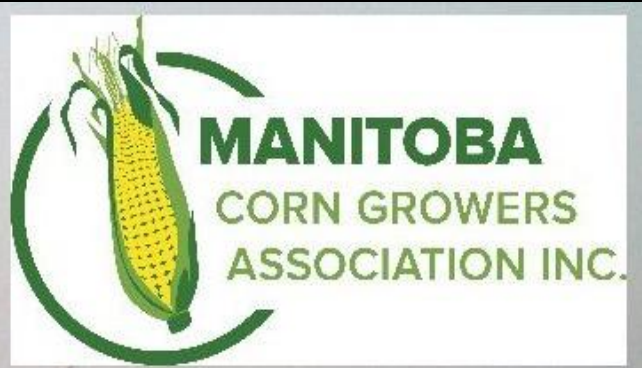


Optimal Rotations with Considerations for Corn in Southern Manitoba

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University of Manitoba's Corn Agronomy Research Project

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Forward 2



Photo: Don
Flaten

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2nd Question: Economic Impact of Rotations

- 95% of all corn for grain seeded area was grown in rotation with another cereal or legume.
- Corn is commonly grown in rotation with soybeans, they improve soil fertility and structure, reduce fertilizer application, diminish the prevalence of weeds and break disease and pest cycles.
- Parts of Manitoba have the same observed cropping pattern although canola becomes part of the rotation in most regions and corn is not grown in northern regions.

| Previous Crop | Crop Planted | | | | | | | | | | | |
|------------------|------------------|--------------|------|--------|--------|------|------|----------|------------|------------|------|----------|
| | Red Spring Wheat | Winter Wheat | Oats | Barley | Canola | Flax | Peas | Soybeans | Navy Beans | Sunflowers | Corn | Potatoes |
| Red Spring Wheat | 85 | 84 | 98 | 96 | 102 | 105 | 103 | 101 | 106 | 101 | 98 | 102 |
| Winter Wheat | 75 | 83 | 97 | 105 | 98 | 94 | 112 | 105 | 83 | 87 | 96 | 74 |
| Oats | 93 | 86 | 77 | 78 | 95 | 92 | 94 | 100 | 77 | 104 | 99 | 87 |
| Barley | 90 | 91 | 90 | 85 | 104 | 104 | 93 | 101 | 67 | 100 | 92 | 106 |
| Canola | 101 | 105 | 101 | 102 | 86 | 87 | 96 | 100 | 99 | 75 | 99 | 108 |
| Flax | 96 | 104 | 97 | 106 | 103 | 79 | 86 | 98 | NSD | 71 | 78 | NSD |
| Peas | 101 | 82 | 112 | 102 | 104 | 145 | NSD | 68 | NSD | NSD | 94 | NSD |
| Soy beans | 108 | 93 | 108 | 108 | 104 | 104 | 96 | 94 | NSD | 101 | 103 | 61 |
| Navy Beans | 119 | NSD | 115 | 114 | 119 | NSD | NSD | 107 | 78 | NSD | 111 | 79 |
| Sun flowers | 102 | NSD | 103 | 103 | 91 | 101 | NSD | 93 | NSD | NSD | 95 | NSD |
| Corn | 98 | 67 | 111 | 96 | 112 | NSD | NSD | 102 | 61 | 119 | 89 | 106 |
| Potatoes | 88 | 70 | 88 | 107 | 117 | NSD | NSD | 111 | 103 | NSD | 91 | 67 |

| Previous Crop | Crop Planted | | | | | | | | | | | |
|------------------|------------------|--------------|------|--------|--------|------|------|----------|------------|------------|------|----------|
| | Red Spring Wheat | Winter Wheat | Oats | Barley | Canola | Flax | Peas | Soybeans | Navy Beans | Sunflowers | Corn | Potatoes |
| Red Spring Wheat | 85 | 84 | 98 | 96 | 102 | 105 | 103 | 101 | 106 | 101 | 98 | 102 |
| Winter Wheat | 75 | 83 | 97 | 105 | 98 | 94 | 112 | 105 | 83 | 87 | 96 | 74 |
| Oats | 93 | 86 | 77 | 78 | 95 | 92 | 94 | 100 | 77 | 104 | 99 | 87 |
| Barley | 90 | 91 | 90 | 85 | 104 | 104 | 93 | 101 | 67 | 100 | 92 | 106 |
| Canola | 101 | 105 | 101 | 102 | 86 | 87 | 96 | 100 | 99 | 75 | 99 | 108 |
| Flax | 96 | 104 | 97 | 106 | 103 | 79 | 86 | 98 | NSD | 71 | 78 | NSD |
| Peas | 101 | 82 | 112 | 102 | 104 | 145 | NSD | 68 | NSD | NSD | 94 | NSD |
| Soy beans | 108 | 93 | 108 | 108 | 104 | 104 | 96 | 94 | NSD | 101 | 103 | 61 |
| Navy Beans | 119 | NSD | 115 | 114 | 119 | NSD | NSD | 107 | 78 | NSD | 111 | 79 |
| Sun flowers | 102 | NSD | 103 | 103 | 91 | 101 | NSD | 93 | NSD | NSD | 95 | NSD |
| Corn | 98 | 67 | 111 | 96 | 112 | NSD | NSD | 102 | 61 | 119 | 89 | 106 |
| Potatoes | 88 | 70 | 88 | 107 | 117 | NSD | NSD | 111 | 103 | NSD | 91 | 67 |

| Previous Crop | Crop Planted | | | | | | | | | | | |
|------------------|------------------|--------------|------|--------|--------|------|------|----------|------------|------------|------|----------|
| | Red Spring Wheat | Winter Wheat | Oats | Barley | Canola | Flax | Peas | Soybeans | Navy Beans | Sunflowers | Corn | Potatoes |
| Red Spring Wheat | 85 | 84 | 98 | 96 | 102 | 105 | 103 | 101 | 106 | 101 | 98 | 102 |
| Winter Wheat | 75 | 83 | 97 | 105 | 98 | 94 | 112 | 105 | 83 | 87 | 96 | 74 |
| Oats | 93 | 86 | 77 | 78 | 95 | 92 | 94 | 100 | 77 | 104 | 99 | 87 |
| Barley | 90 | 91 | 90 | 85 | 104 | 104 | 93 | 101 | 67 | 100 | 92 | 106 |
| Canola | 101 | 105 | 101 | 102 | 86 | 87 | 96 | 100 | 99 | 75 | 99 | 108 |
| Flax | 90 | 104 | 97 | 106 | 103 | 79 | 86 | 98 | NSD | 71 | 78 | NSD |
| Peas | 101 | 82 | 112 | 102 | 104 | 145 | NSD | 68 | NSD | NSD | 94 | NSD |
| Soy beans | 108 | 93 | 108 | 108 | 104 | 104 | 96 | 94 | NSD | 101 | 103 | 61 |
| Navy Beans | 119 | NSD | 115 | 114 | 119 | NSD | NSD | 107 | 78 | NSD | 111 | 79 |
| Sun flowers | 102 | NSD | 103 | 103 | 91 | 101 | NSD | 93 | NSD | NSD | 95 | NSD |
| Corn | 98 | 67 | 111 | 96 | 112 | NSD | NSD | 102 | 61 | 119 | 89 | 106 |
| Potatoes | 88 | 70 | 88 | 107 | 117 | NSD | NSD | 111 | 103 | NSD | 91 | 67 |

| Previous Crop | Crop Planted | | | | | | | | | | | |
|------------------|------------------|--------------|------|--------|--------|------|------|----------|------------|------------|------|----------|
| | Red Spring Wheat | Winter Wheat | Oats | Barley | Canola | Flax | Peas | Soybeans | Navy Beans | Sunflowers | Corn | Potatoes |
| Red Spring Wheat | 85 | 84 | 98 | 96 | 102 | 105 | 103 | 101 | 106 | 101 | 98 | 102 |
| Winter Wheat | 75 | 83 | 97 | 105 | 98 | 94 | 112 | 105 | 83 | 87 | 96 | 74 |
| Oats | 93 | 86 | 77 | 78 | 95 | 92 | 94 | 100 | 77 | 104 | 99 | 87 |
| Barley | 90 | 91 | 90 | 85 | 104 | 104 | 93 | 101 | 67 | 100 | 92 | 106 |
| Canola | 101 | 105 | 101 | 102 | 86 | 87 | 96 | 100 | 99 | 75 | 99 | 108 |
| Flax | 96 | 104 | 97 | 106 | 103 | 79 | 86 | 98 | NSD | 71 | 78 | NSD |
| Peas | 101 | 82 | 112 | 102 | 104 | 145 | NSD | 68 | NSD | NSD | 94 | NSD |
| Soy beans | 108 | 93 | 108 | 108 | 104 | 104 | 96 | 94 | NSD | 101 | 103 | 61 |
| Navy Beans | 119 | NSD | 115 | 114 | 119 | NSD | NSD | 107 | 78 | NSD | 111 | 79 |
| Sun flowers | 102 | NSD | 103 | 103 | 91 | 101 | NSD | 93 | NSD | NSD | 95 | NSD |
| Corn | 98 | 67 | 111 | 96 | 112 | NSD | NSD | 102 | 61 | 119 | 89 | 106 |
| Potatoes | 88 | 70 | 88 | 107 | 117 | NSD | NSD | 111 | 103 | NSD | 91 | 67 |

Returns in Rotation

| | SPRING WHEAT | OATS | CANOLA | SOYBEAN | CORN |
|--|--------------|----------|----------|----------|----------|
| Total Operating Costs (\$ per acre) | \$201.36 | \$161.53 | \$256.98 | \$196.66 | \$315.88 |
| Market Price (\$ per bu.) | \$6.40 | \$2.98 | \$10.89 | \$10.48 | \$4.85 |
| Average yield (bu. per acre) | 55 | 100 | 40 | 35 | 115 |
| Net returns (\$ per acre) | \$150.64 | \$136.47 | \$178.62 | \$170.14 | \$241.87 |

| Year 1 | Year 2 | Year 3 | Year 4 | Average Return |
|--------|----------|--------|----------|----------------|
| Wheat | Wheat | Wheat | Wheat | \$97.84 |
| Canola | Canola | Canola | Canola | \$113.28 |
| Wheat | Canola | Wheat | Canola | \$176.86 |
| Corn | Soybeans | Corn | Soybeans | \$227.21 |
| Corn | Corn | Corn | Corn | \$169.36 |

Source: Sakulanda

Simulations

| Year 1 | Year 2 | Year 3 | Year 4 | Year 5 | Average Return |
|---------|---------|---------|---------|---------|----------------|
| Soybean | Corn | Soybean | Corn | | 227.21 |
| Canola | Soybean | Corn | Soybean | Corn | 216.57 |
| Canola | Corn | Soybean | Corn | | 216.11 |
| Corn | Soybean | Corn | Soybean | Corn | 215.64 |
| Wheat | Corn | Soybean | Corn | Soybean | 212.77 |
| Soybean | Soybean | Corn | Soybean | Corn | 212.13 |
| Wheat | Corn | Soybean | Corn | | 211.73 |
| Soybean | Corn | Canola | Wheat | Corn | 210.00 |
| Canola | Soybean | Corn | | | 209.48 |
| Corn | Wheat | Soybean | Corn | Soybean | 208.96 |

Simulations

| Year 1 | Year 2 | Year 3 | Year 4 | Year 5 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 |
|---------|---------|---------|---------|---------|--------------|--------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|
| Soybean | Corn | Soybean | Corn | | 31.90 | 17.60 | 104.81 | 250.54 | 220.24 | 104.05 | 328.29 | 353.57 | 360.67 | 200.81 | 171.55 | 196.26 | 176.03 |
| Canola | Soybean | Corn | Soybean | Corn | 22.42 | 6.90 | 91.65 | 254.47 | 198.21 | 96.07 | 308.08 | 341.43 | 349.31 | 186.11 | 163.23 | 189.00 | 176.94 |
| Canola | Corn | Soybean | Corn | | 12.00 | 1.97 | 98.48 | 261.03 | 192.42 | 84.96 | 320.72 | 352.06 | 361.69 | 169.15 | 160.39 | 185.67 | 170.44 |
| Corn | Soybean | Corn | Soybean | Corn | 16.37 | 6.93 | 100.91 | 238.70 | 204.86 | 85.50 | 323.32 | 344.74 | 352.83 | 176.11 | 157.31 | 180.67 | 157.09 |
| Wheat | Corn | Soybean | Corn | Soybean | 22.71 | 14.99 | 89.81 | 252.81 | 205.05 | 93.48 | 299.84 | 316.07 | 326.22 | 179.31 | 157.56 | 181.50 | 165.76 |
| Soybean | Soybean | Corn | Soybean | Corn | 23.67 | 4.75 | 76.41 | 219.29 | 195.82 | 93.31 | 282.20 | 309.95 | 315.28 | 189.23 | 149.91 | 174.12 | 159.64 |
| Wheat | Corn | Soybean | Corn | | 14.59 | 14.17 | 99.98 | 261.48 | 204.35 | 84.10 | 315.92 | 326.30 | 338.66 | 163.69 | 156.50 | 179.53 | 159.05 |
| Soybean | Corn | Canola | Wheat | Corn | 8.53 | 3.58 | 86.01 | 262.78 | 185.22 | 80.42 | 296.19 | 317.96 | 329.96 | 157.30 | 150.81 | 175.39 | 163.69 |
| Canola | Soybean | Corn | | | 18.17 | 1.91 | 85.95 | 260.98 | 187.05 | 93.26 | 299.36 | 338.14 | 346.62 | 179.33 | 160.87 | 187.49 | 180.60 |
| Corn | Wheat | Soybean | Corn | Soybean | 16.88 | 9.88 | 84.54 | 242.07 | 195.41 | 85.65 | 290.20 | 305.76 | 315.74 | 168.97 | 149.11 | 172.33 | 156.25 |
| | | | | Diff | 23.37 | 15.69 | 28.39 | 43.49 | 35.02 | 23.63 | 46.09 | 47.80 | 46.41 | 43.51 | 22.44 | 23.93 | 20.69 |

Results

- The most profitable Rotation for a 13 year price series was Soybean Corn and these two crops were part of all of the top ten rotations
- Canola and Wheat both entered 4 of the top ten rotations
- Canola was part of the highest earning rotation in 3 of the last 13 years.

GOING FORWARD

- Explored Price Variations – need better estimates of yield variation and cost variation.
- Regional Impacts - Our next step is to run the same profit equations for each of the top five crops for every RM.
- Across Canada – Drs. Lawley and Brewin part of Prairie Wide research team looking at Data on rotation yield and disease impacts and returns to rotations. Funded by WGRF and MB Pulse and Soybean Producers.

GOING FORWARD

| R.M. | Canola | Barley | Oats | Spring Wheat | Soybeans | Grain Corn |
|------------------|----------------|----------------|----------------|----------------|----------------|----------------|
| | Share of Acres | Share of Acres | Share of Acres | Share of Acres | Share of Acres | Share of Acres |
| LA BROQUERIE | 23.135% | 5.033% | 7.140% | 4.136% | 21.788% | 38.767% |
| LAC DU BONNET | 14.488% | 3.907% | 8.361% | 11.366% | 60.050% | 1.827% |
| HANOVER | 33.117% | 2.452% | 3.264% | 9.680% | 21.696% | 29.791% |
| SOURIS-GLENWOOD | 44.230% | 3.572% | 5.655% | 30.782% | 11.796% | 3.965% |
| DAUPHIN | 49.173% | 2.173% | 1.989% | 32.024% | 14.641% | 0.000% |
| ROSSER | 27.128% | 9.137% | 12.047% | 19.344% | 28.421% | 3.923% |
| MORRIS | 32.680% | 1.566% | 7.245% | 20.180% | 34.761% | 3.568% |
| SWAN VALLEY WEST | 57.428% | 0.675% | 1.777% | 38.999% | 1.121% | 0.000% |

THANK YOU!



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