Using On-Farm Research to Evaluate Profitability

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10 easy ways to boost profit $20/acre
Will it work on my farm?

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Formulating a hypothesis (a question)

- Well defined research question
- Focus on one practice
- Can be answered with data collected

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Testing the hypothesis

- Design the field layout
- Determine what you will measure
- Limit the number of treatments
- Treatments should be the only man-made variable in the field
- Randomize
- Replicate
Randomizing and replicating

**Randomization** – ensures that favoritism is not given toward a treatment

**Replication** – reduces the possibility that results are due to chance rather than the treatment
Paired comparison design

Two treatments

(Five pairs required—Seven preferred)

<table>
<thead>
<tr>
<th>PAIR 1</th>
<th>PAIR 2</th>
<th>PAIR 3</th>
<th>PAIR 4</th>
<th>PAIR 5</th>
<th>PAIR 6</th>
<th>PAIR 7</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trt A</td>
<td>Trt B</td>
<td>Trt A</td>
<td>Trt B</td>
<td>Trt A</td>
<td>Trt B</td>
<td>Trt A</td>
</tr>
<tr>
<td>Trt B</td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
</tbody>
</table>

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# Randomized complete block design

Three or more treatments

(Four blocks required—Five preferred)

<table>
<thead>
<tr>
<th>Block 1</th>
<th>Block 2</th>
<th>Block 3</th>
<th>Block 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Treatment A</td>
<td>Treatment B</td>
<td>Treatment C</td>
<td>Treatment D</td>
</tr>
<tr>
<td>Treatment C</td>
<td>Treatment D</td>
<td>Treatment A</td>
<td>Treatment B</td>
</tr>
<tr>
<td>Treatment D</td>
<td>Treatment A</td>
<td>Treatment B</td>
<td>Treatment C</td>
</tr>
<tr>
<td>Treatment A</td>
<td>Treatment C</td>
<td>Treatment B</td>
<td>Treatment D</td>
</tr>
<tr>
<td>Treatment B</td>
<td>Treatment D</td>
<td>Treatment A</td>
<td>Treatment C</td>
</tr>
<tr>
<td>Treatment D</td>
<td>Treatment A</td>
<td>Treatment B</td>
<td>Treatment C</td>
</tr>
</tbody>
</table>

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Implement the plan

- Review the field layout plan prior to entering the field
- Follow the experimental plan
- Record deviations from the plan

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Record observations

- Insect pressure
- Precipitation
- Disease
- Weed densities
- Field operations
- Hybrid/variety
- Plant populations
- Weather damage

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Collect data

• Use calibrated weigh wagon or yield monitor to collect yield data
• Measure grain moisture for each harvest sample
• Plant populations
• Soil sampling
• Plant height
• Protein or oil analysis
• Pest damage
• Photos

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Study data - Statistically

• Statistically analyze data
  • Using Excel
  • Consult with UNL
• Decide what confidence level makes sense to you
  • 90% is acceptable to most farmers
  • 95% and 99% used by researchers

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## Study Data - Statistically

<table>
<thead>
<tr>
<th>Results:</th>
<th>Crop</th>
<th>Year</th>
<th>No Lime</th>
<th>Lime</th>
<th>Prob &gt;/T/</th>
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<tbody>
<tr>
<td>pH 5.5/5.5</td>
<td>Corn</td>
<td>1995</td>
<td>74</td>
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<td>43</td>
<td>.32 ns</td>
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<tr>
<td></td>
<td>Corn</td>
<td>1997</td>
<td>121</td>
<td>125</td>
<td>.10 *</td>
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<tr>
<td></td>
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<td>50</td>
<td>58</td>
<td>.0002 ***</td>
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<tr>
<td></td>
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<td>145</td>
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<td>.177 ns</td>
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<tr>
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<td>99</td>
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<tr>
<td></td>
<td>Soybeans</td>
<td>2004</td>
<td>41</td>
<td>44</td>
<td>.0067 ***</td>
</tr>
</tbody>
</table>

* Significant at the 90% confidence level
** Significant at the 95% confidence level
*** Significant at the 99% confidence level

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Study data - Economically

- Economically analyze data
- Include all costs…
  - Depreciation
  - Management time
  - Machinery expense
  - Land costs
- Does the benefit justify the treatment cost?
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Drawing conclusions

• On-farm research allows you to test agronomic practices on your soil using your machinery and management system.

• Field experimental layout is key to successful research.

• Today’s yield monitors and weigh-wagons make yield data collection convenient.
Drawing conclusions

• Good data leads to sound management decisions.
• Decisions should be based on multi-year comparisons.
• What is the cost:benefit ratio for each treatment?
• How will your management plan change based on the results?
CropWatch: Farm Research
Farmers working with UNL to Address Farm Research Questions

Farm Research
Welcome to the University of Nebraska-Lincoln Extension Farm Research Web site!
You read agriculturally-related magazines and attend seminars. You hear of new tools and ideas that other producers are trying. You wonder if any of these tools and ideas will work for you on your operation. That's where farm research can help provide you these answers. Producers working with UNL in farm research groups realize the value of conducting valid scientifically based research on their own farms.

- This research is conducted the full field length and replicated throughout the field to obtain more data across field variability. This research is also performed in a way which can be statistically analyzed.
- Experimental design is important for conducting a valid scientific test.
- Randomization is important for not giving an advantage to one treatment over another as the treatments are replicated across the field.
- Learn more about Describing Farm Research Comparisons.

There are currently two formalized on-farm research groups in Nebraska:

- The Greater Quad County On-Farm Research Group.
- The NE Soybean and Feed Grant Profitability Project.

There are also several UNL Extension Educators working with producers in farm research trials independently across the state. If you are interested in learning more about farm research or conducting your own trials, please contact any of the UNL Extension Educators working with farm research groups from the links provided above or in the right-hand column under Farm Research Groups.
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