Ways to Improve Precision

1. Increased replication
2. Careful selection of treatments
3. Refinement of technique
4. Selection of experimental material
5. Selection of the experimental unit
6. Taking additional measurements
7. Planned grouping of experimental units

Formula for Calculating Number of Replicates

\[
 r \geq 2 \frac{CV^2}{D^2} \left( t_1 + t_2 \right)^2
\]

\[
 r \geq 2 \frac{s^2}{d^2} \left( t_1 + t_2 \right)^2
\]

Where:
- \( r \) = number of reps
- \( CV \) = Coefficient of variation
- \( D \) = true difference it is desired to detect as a % of mean
- \( t_1 \) = tabular t value for a specified level of significance and df for error
- \( t_2 \) = tabular t value for df for error and a probability of \( 2(1-P) \), where \( P \) is the probability of detecting a significant result in a particular experiment
- \( s^2 \) = variance
- \( d \) = true difference it is desired to detect

Options for Obtaining the Desired Number of Replications

<table>
<thead>
<tr>
<th>Conditions</th>
<th>D</th>
<th>CV</th>
<th>( t_1 )</th>
<th>( t_2 (P) )</th>
<th>( r )</th>
</tr>
</thead>
<tbody>
<tr>
<td>100 bu</td>
<td>10%</td>
<td>10%</td>
<td>1%</td>
<td>95%</td>
<td>33</td>
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<tr>
<td>Reduce ( t_1 ) &amp; P</td>
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<td>10</td>
<td>5</td>
<td>90</td>
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<tr>
<td>Inc. D</td>
<td>20</td>
<td>10</td>
<td>5</td>
<td>90</td>
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<tr>
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</table>

From Cochran and Cox, 1957.