



# Type I and II Error analysis for product selection

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## Type I and II Error Products

- Products are an essential component of an economically sustainable dairy operation
- They must be viewed as investment opportunities, investments that only the dairy can invest in
- To be successful, dairy producers must not only manage cows, but select and manage products as well
- Products can offer returns over shorter time horizons compared to traditional investments
- Management must evaluate their economic value to the dairy enterprise
- Products require marginal analysis (partial budget) to evaluate their average responses and Type I and II error analysis to understand their risk.







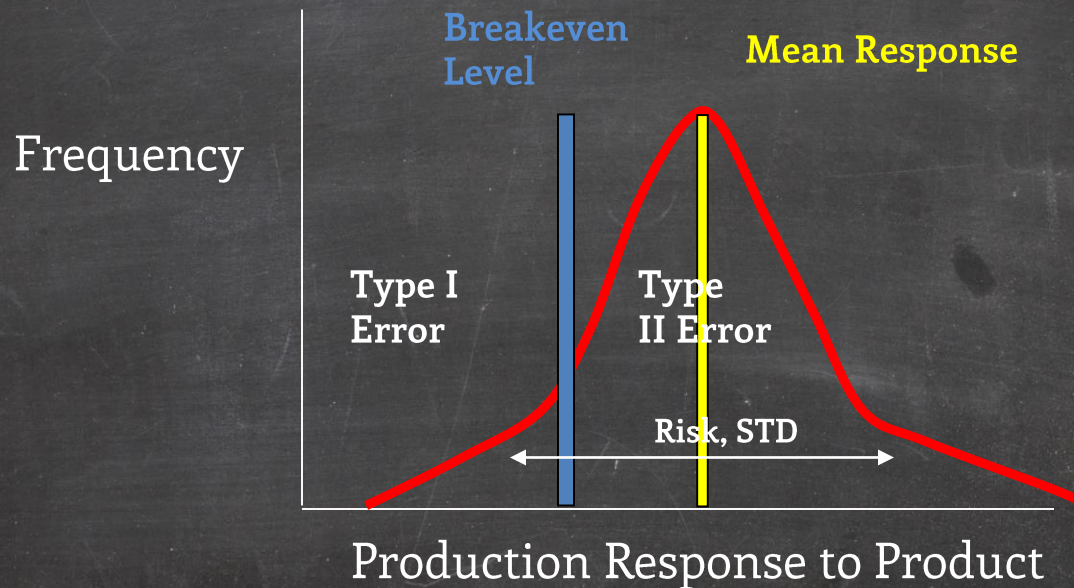
## Type I and II Error Product Economics

- Products can have impacts production functions of the cow
  - Milk yield
  - Composition
  - Reproductive efficiency
  - Other or combination of impacts
- Products have
  - Direct costs
  - Associated costs (implementation, increases in DMI..)
- Products have a mean response as well as a variation in response
  - Mean response
  - Variation in response





# Type I and II Error for Product Selection Product Attributes

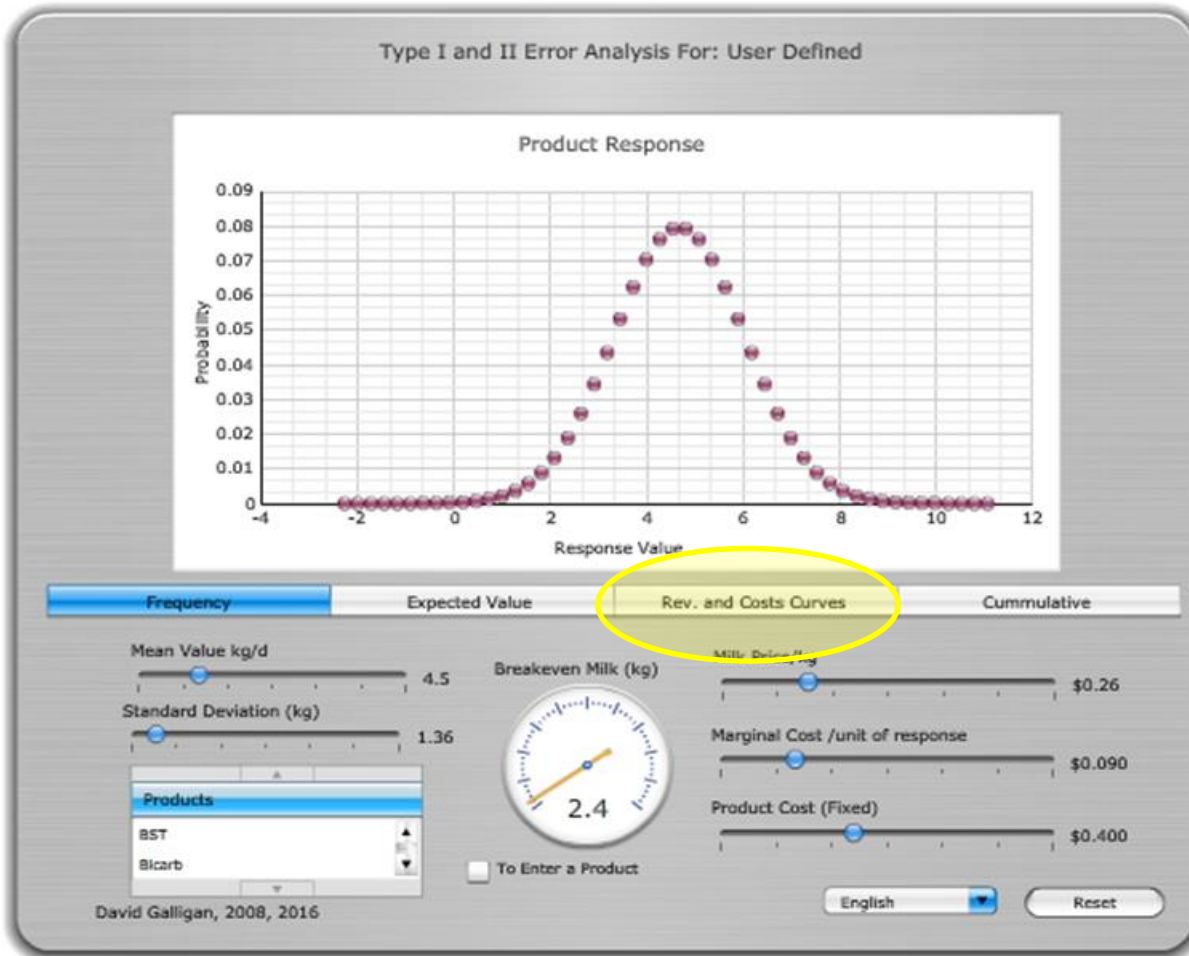


What are the expected cost of the Errors – based on their frequency?



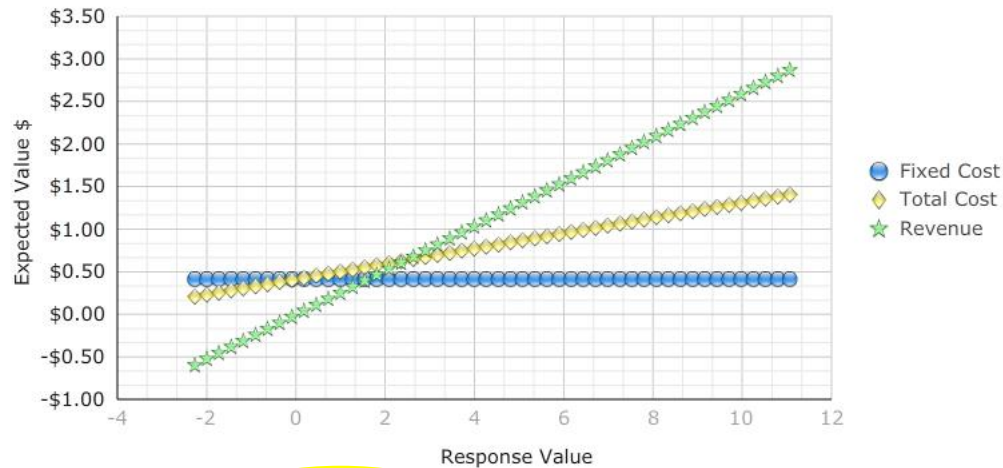


# Type I and II Error Frequency Distribution



# Type I and II Error Analysis For: User Defined

Revenue and Costs Curves



Frequency

Expected Value

Rev. and Costs Curves

Cummulative

Mean Value kg/d

4.5

Breakeven Milk (kg)

Milk Price/kg

\$0.26

Standard Deviation (kg)

1.36

Marginal Cost /unit of response

\$0.090

Products

BST

Bicarb

2.4

Product Cost (Fixed)

\$0.412

☐ To Enter a Product

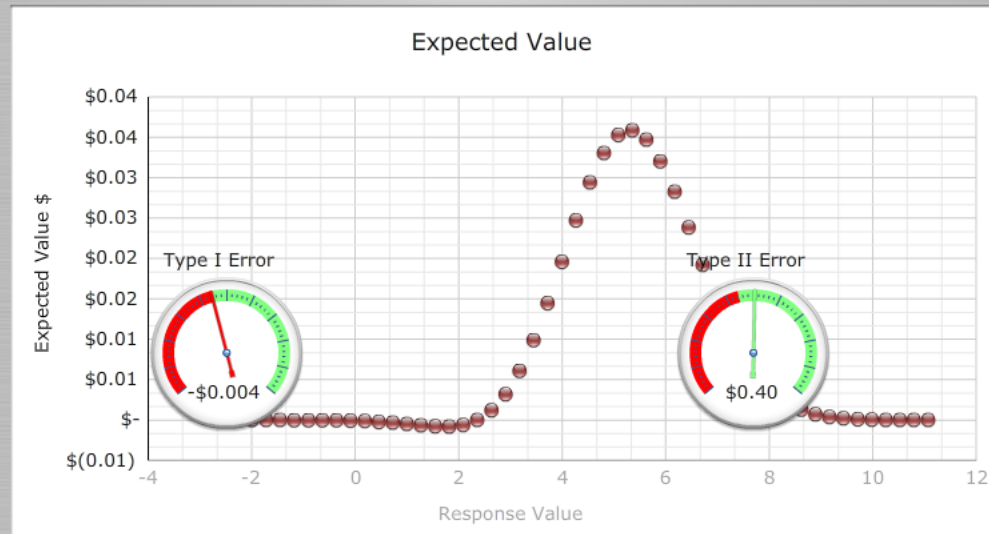
English

Reset

David Galligan, 2008, 2016



# Type I and II Error Analysis For: User Defined



Frequency

Expected Value

Rev. and Costs Curves

Cummulative

Mean Value kg/d

4.5

Breakeven Milk (kg)

2.4

Milk Price/kg

\$0.26

Standard Deviation (kg)

1.36

Marginal Cost /unit of response

\$0.090

Products

BST

Bicarb

☐ To Enter a Product

Product Cost (Fixed)

\$0.400

English

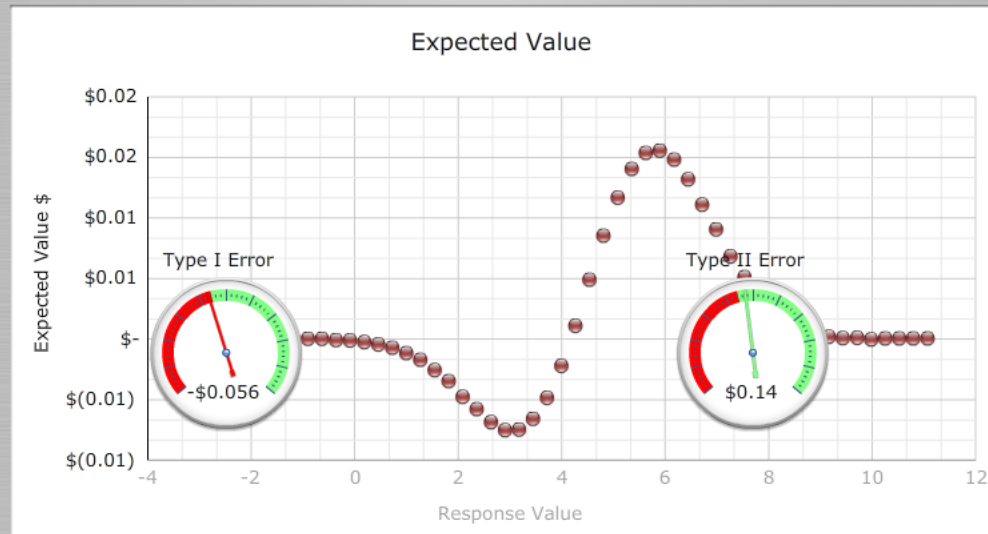
Reset

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Type I and II Error Analysis For: User Defined



Frequency	Expected Value	Rev. and Costs Curves	Cummulative
<p>Mean Value kg/d</p> <p>Standard Deviation (kg)</p> <p>Products</p> <p>BST</p> <p>Bicarb</p>	<p>4.5</p> <p>1.36</p> <p>4.2</p> <p>To Enter a Product</p>	<p>Milk Price/kg</p> <p>Marginal Cost /unit of response</p> <p>Product Cost (Fixed)</p>	<p>\$0.26</p> <p>\$0.090</p> <p>\$0.710</p>

David Galligan, 2008, 2016

English

Reset







## Type I and II Error Conclusions

- Products vary in their response attributes
- The value of a product is not only a function of it's mean response but also influenced by it's risk characteristics
- If a product has a Type II > Type I error, the product should be used, since the expected cost of the product failing is less than the lost opportunity cost of it succeeding





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