Economically Relevant Traits and Selection Indices

Matt Spangler

University of Nebraska - Lincoln

Follow this and additional works at: http://digitalcommons.unl.edu/rangebeefcowsymp

http://digitalcommons.unl.edu/rangebeefcowsymp/363
**ECONOMICALLY RELEVANT TRAITS AND SELECTION INDICES**

Matt Spangler
University of Nebraska-Lincoln

*P=G+E
*Phenotype = Mean + BV + Environment
*There is more than one trait that impacts the profitability of your herd!

**How To Begin?**

*What are my breeding/marketing goals?*
*What traits directly impact the profitability of my enterprise?*
*Are there environmental constraints?*

**Value Discovery of Added Information**

*Many ERTs are not currently evaluated nor collected routinely in the seedstock sector*
*However, they drive value downstream*
*Reproduction phenotypes (longevity)*
*Disease (pulps, treatments, mortality)*
*“Routine” carcass data*
*Plant value—primal yield, dark cutters, blood splash, etc.*

**Indicators Traits**

*Traits that are genetically correlated to an ERT*
*Why use indicator traits?*
*Measured earlier in life*
*Cheaper/easier to measure*
*Measured on both sexes*
*Coheritability > heritability of ERT*
Breeding table factor ($A_i$) to add to the EPD for bull of breed $i$:

$$M_i = \text{USMARC}(i)/b + [\text{EPD}(i)_{YY} - \text{EPD}(\text{Angus})_{YY}]$$

$A_i = (M_i - M_{\text{Angus}}) - (\text{EPD}(i)_{YY} - \text{EPD(\text{Angus})}_{YY})$

USMARC($i$) is solution for effects of sire breed $i$ from analysis of USMARC data

EPD($i$)$_{YY}$ is the average within-breed 2012 EPD for breed $i$ for animals born in the base year YY (which is two years before the update)

$\text{EPD}(i)_\text{USMARC}$ is the weighted average of 2012 EPD of bulls of breed $i$ having descendants with records at USMARC

$b$ is the pooled coefficient of regression of progeny performance at USMARC on EPD sire

$i$ denotes sire breed $i$

Adapted from Kuehn et al., 2015.
*Tandem Selection

*Independent Culling Levels

*Selection Indices

*Methods of Multiple Trait Selection

---

**INDEPENDENT CULLING LEVELS**

CED = 2.1 WW = 43 MM = 18 SC = 0.9 IMF = 0.04

<table>
<thead>
<tr>
<th>CED</th>
<th>WW</th>
<th>MM</th>
<th>SC</th>
<th>IMF</th>
<th>SBMI</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2.5</td>
<td>55</td>
<td>20</td>
<td>1.0</td>
<td>0.10</td>
</tr>
<tr>
<td>2</td>
<td>5.0</td>
<td>50</td>
<td>25</td>
<td>1.2</td>
<td>-0.10</td>
</tr>
<tr>
<td>3</td>
<td>4.0</td>
<td>45</td>
<td>20</td>
<td>1.0</td>
<td>0.25</td>
</tr>
<tr>
<td>4</td>
<td>1.6</td>
<td>62</td>
<td>19</td>
<td>1.0</td>
<td>0.20</td>
</tr>
</tbody>
</table>

Moser, 2005

---

* [Dam Weight*Lean Value of Dam + No. Progeny*Progeny Weight*Lean Value of Progeny] - [Dam Feed*Value of Feed for Dam + No. Progeny*Progeny Feed*Value of Feed for Progeny].

*By simply increasing number of progeny per dam through either selection, heterosis from crossing, or better management, we will increase efficiency of production.*

---

*Economic Index*

*I = a₁ x EPD₁ + a₂ x EPD₂ + aₙ x EPDₙ*

*Where a = index weight and n = number of traits*

---

*Economic values from simulation

---

*Simulation Framework*

*Stochastic Model

*Allows for random variation in multiple traits

*Variation based on fluctuation in historical data

*Simulated base herd

*Multiple iterations

---

*Terminal or Maternal?*

**Terminal**

• SB, $F, $G (Angus)
• TI (Simmental)
• CHB$ (Hereford)
• MTI (Limousin)
• EPI and FPI (Gelbvieh)
• Charolais
• GridMaster (Red Angus)

**Maternal**

• $W, $EN (Angus)
• API (Simmental)
• BM$, BI$, CEZ$ (Hereford)
• HerdBuilder (Red Angus)
• $Cow (Gelbvieh)
*Profitability per exposure
*HerdBuilder
*Bull A 134
*Bull B 110
*30 cows/yr. over 4 yrs. = 120 exposures
*120 exposures X (134-110) =
*$2,880 profit difference
*If you follow the assumptions of the index!

*Example

*Improvement in current indices can be made by increasing the number of ERT that have EPD
*Input traits
*Fertility
*Enterprise level profitability should move closer to industry level profitability
*Example: What is the direct economic benefit for a producer to improve tenderness?

*Establish production goals
*Use economic indices that fit your desired breeding objectives
*Do not make sire selection more cumbersome than it needs to be

*Summary

*Know your costs
*Select on PROFIT not just revenue
*Multiple trait selection is critical and could become more cumbersome
*Economic indexes help alleviate this
*Use index values that meet your breeding objective

*Summary

*http://beef.unl.edu
*www.beefefficiency.org
*www.nbcec.org
*www.eBEEF.org

*Helpful Resources