





The EPD we produce entirely depends on the tools we have to use them.







Performance Records*

- 1936 Miles City cattle production records program
- 1941 1st gain test in Texas
- 1945-1950 State BCI programs
- 1955 Virginia was 1st BCIA
- 1955 PRI formed in TX
- 1959 RAAA required performance for registration
- 1964 5 breeds had performance programs

*Eller, A. L., 2007

1965 - ASAS' s U.S. Beef Cattle Records Committee

Report

Recommended Procedures for Measurement of Traits of Economic Importance

Who would process the data and implement?

- PRI
- State BCIA' s
- Breed associations



Cattle Evaluation

- 1971-1972 American Simmental Sire Summary
- 1972 C.R. Henderson's Lush Symposium paper
- 1974-1979 BLUP implemented for several breeds
 EPDS became the standard
 - Mostly designed sire evaluation programs



1962 - DEC's LINC-8 became the first laboratory computer for faculty -Mostly Biomed research¹



1965 - PDP-8²

1969 - Unix was developed²





1974-1979 BLUP Sire Models
y = Xb + Zs + e
 Angus
 Hereford
 Polled Hereford
 Shorthorn
 Limousin
 Red Angus





Breed Associations

- 1989 ~ 20 breed associations conducting genetic evaluations
- mid 1990's Online reporting and recording
- Fundamental shift in associations' roles

Strategic Milestones

- 1995 Whole Herd Reporting
- 1995 International Cattle Evaluation (ICE)
- 1995 Online reporting and recording
- 1996 Across Breed Comparisons
- 2004 Economic Indexes
 Breeding objectives 1994 (Harris and Newman)



Other Technological Milestones

- More models
- Algorithms
- Approaches



More Traits

- 1983(?) Maternal milk
- 1985 Calving ease
 1986 Gestation length
- ? Scrotal Circumference
- 1990 Carcass traits
- 1993 Docility
- 1995 Stayability
- 1997 Heifer pregnancy
- 2003 Maintenance energy

Sire Summary of the Future?

2 Categories of Traits

- Indicator traits
- Economically relevant traits

Economically Relevant Traits

"Economically relevant traits are the traits that directly affect profitability by being associated with a specific cost of production or an income stream."

Golden, B.L., D.J. Garrick, S. Newman, and R.M. Enns. 2000. Economically relevant traits: A framework for the next generation of EPDs. Proc. Beef Improvement Federation 32nd Annual Research Symposium and Annual Meeting. Wichtla. Kansas. op 2-13. **Indicator Trait**

A trait with a genetic correlation to an ERT so that including it in the EPD production analysis increases the accuracy of the ERT EPD.



Using EPD of indicator traits in a selection decision DECREASES the accuracy of the selection decision







Weaning Weight Indicator Trait or ERT?



Should indicator traits be measured?

Should indicator trait EPD be published?



Guideline: Only publish EPD that are used in any type of

Partial Budget Decision Analysis

Partial Budget Decision Analysis

Any analysis that predicts the financial impact of incremental changes in revenue and costs from alternative decisions.



Sire Summaries Have Gotten Better

- Selection Indexes
- More fertility EPD
- Elimination of ultrasound EPD
- Working toward feed consumption EPD
- Still have a lot of Birth Weight EPD
- Some others...

In 2000 (14 years ago):

"...to be used in an optimal manner, ERT-EPD should be used in a decision-making framework incorporating the breeder's/producer's desires for longer-term viability of their production system."

•••

"Finally, systems that are better than EPDs should be developed for presentation to bull breeders and bull buyers."







Questions: Who do you genotype and with what density?

Purebred Breeder

Commercial Producer



Questions: How do you use the information?

E.g., Accuracy



New Models and Methods
Allow New Things
$$x'x$$
 $x'zM$ $x'_n Z_n$ $x'_n Z_n$ $m' Z' X$ $m' Z' Z M + \varphi$ $M'_n Z'_n Z_n$ \hat{a} $Z'_n X_n$ $Z'_n Z_n M_n$ $Z'_n Z_n + A^{nn} \lambda$ $\left[\hat{c}_n \right] \begin{bmatrix} \hat{b} \\ X' y \\ Z'_n y_n \end{bmatrix}$

We Need Production Simulation Models

- Models for producers
- Models for breeders
- What ERT we produce completely depends on the models

