

6/1/17

CONSIDERATIONS FOR ADJUSTING CARCASS TRAITS TO DIFFERING ENDPOINTS

Matt Spangler
University of Nebraska-Lincoln

6/1/17

- “Whenever possible, carcass data from harvested fed cattle and ultrasound measurements from yearling breeding bulls and heifers should be jointly analyzed with multiple trait models. Such an evaluation would provide genetic predictions for both carcass and ultrasound measurements, but since the carcass measurements are the economically relevant traits, the carcass trait predictions and their associated accuracy values should be published for use in selection. Both carcass and ultrasound measurements should be evaluated on an age-constant basis.”
- BIF subcommittee, 2007

6/1/17

Thesis

- Age adjusted carcass traits are not ERT. However, they represent a pragmatic means of comparing animals for genetic merit as parents given the way data are collected and reported.

6/1/17

Collection of Carcass Data

- Data are not collected at a constant endpoint.
 - Regardless of the desired endpoint (Age, weight, fat, marbling) variation exists (there is a distribution around the desired endpoint).
 - In example, while a pen of cattle may be “ready”, are all of them?
 - Harvesting cattle based on pen average “readiness” (fat, weight, etc.) does nothing to place carcass EPD on a differing endpoint than age.

6/1/17

Collection of Carcass Data

- Assume a pen of 99 fed cattle of known source, age, and sire.
- Assume they are harvested in 3 groups based on external fat.
 - Visual appraisal of a mean of a group
 - Is the mean 12th rib fat equal in the 3 harvest groups?
 - Are sires equally represented in all 3 groups?
 - Would breed (type) be equally represented in all 3 groups?
 - What is the contemporary group?

6/1/17

Collection of Carcass Data

- Large cohort groups are desirable.
 - Sorting based on estimated finish maybe unavoidable depending on ownership of the cattle.
- “Cherry picking” based on market readiness is problematic at best.
 - The degree of cherry picking determines the degree to which the data become less valuable.
 - In the example on the previous slide, original pen grouping needs to be a fixed CG effect and slaughter date within CG is a random effect.
 - Given this type of structure of carcass data collection, breed differences for carcass traits from field data is at a minimum problematic.

6/1/17

Adjusting Carcass Data

- Carcass data can be adjusted to a common endpoint.
 - Assuming it is practical (cannot adjust fullblood Piedmontese to 0.6 inches of fat)
 - In the case of age adjustments, age windows are defined which help with the assumption of linear changes in body composition with age.
 - As windows widen, the assumption of linearity may not hold.
 - Think of fat, as the variation within a pen increases linearity may not be appropriate.
 - If this endpoint varies across breeds, the value of such an approach is diminished in my mind.

6/1/17

This is Not a New Question

- Rank correlations between sire EPD were high regardless of endpoint in Simmental sired calves
 - Endpoints of FAT, MARB, CWT, Age
 - Spearman rank correlations ranged from 0.90 to 0.99 between age and other possible endpoints
 - Lowest value adjusted REA to carcass weight endpoint
- Rumph et al., 2007 in J. Anim Sci.

6/1/17

What About Breed Differences?

- Knowledge of breed differences for carcass traits can inform breeding program design and enable the production of EPD that are comparable across breeds.
- Assume a fat (or marbling) adjustment.
 - Is the same endpoint appropriate for all breeds?
 - Commonality is needed for across-breed predictions
 - Is the slope (rate of change) of tissue deposition the same for each breed?
 - I don't know but I suspect strongly that it is not.

6/1/17

Possible Approach

- Index-based selection whereby goal traits are carcass traits adjusted for something other than age (i.e., fat).
- This requires estimates of the genetic correlations between these two suites of traits (age and other desired endpoint).
 - I am unaware of these estimates (at least anything recent)
 - Given the potential for differences between breeds, and non-linear changes in tissue deposition over the desired evaluation period, structured serial data is needed.

INDEX COEFFICIENTS FOR EPD

$$b = G_{11}^{-1} * G_{12} * v$$

Index coefficient or index weight

Matrix of genetic (co)variances among selection criteria

Matrix of genetic (co)variances among objective traits

Economic values from simulation

MEASURING INDEX SENSITIVITY

- Index theory assumes genetic parameters and economic values are known without error
 - Test sensitivity to errors in genetic parameters and/or economic values
 - Here our interest is in the sensitivity to the relationship between age and composition adjusted endpoints
- Efficiency: proportion of maximum selection response achieved if one set values are 'used' when another set of values are 'true'
 - Where $E_u = \frac{R_{H_u}}{R_{H_t}}$ and $R_{H_u} = i \frac{b' G_{12} v}{\sqrt{b' G_{11} b}}$

6/1/17

Action Points

- Mine existing serial slaughter data
 - USMARC (limited and historic)
 - Others?
- Estimate slopes by breed (biological type)
 - Concern would be that historic data may not reflect current breed differences.
- Estimate r_g
- Renew (continue) serial slaughter efforts
 - Costing may necessitate serial ultrasound

6/1/17

Summary

- The current question is regarding appropriate adjustments. No data are collected at a constant endpoint.
 - Attempting to collect data at a constant only messes up the evaluation.
- Age adjustments are the most pragmatic way to conduct NCE.
- If carcass data endpoints is a concern, then the first step is to quantify the genetic relationship between the traits.
 - In an index-based approach sensitivity to assumed relationships could be investigated.

6/1/17

Summary

- It is my belief that serial data collection (carcass or an ultrasound proxy) should occur.
- At the end of the day the question is if we are ranking animals correctly and generating response at the commercial level.

6/1/17

Helpful Resources

- <http://beef.unl.edu>
- www.nbcec.org
- www.eBEEF.org

