Don't Blame the Bull: Rethinking Contemporary Groups Starting At or Before Conception

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Traditional Models for Genetic Evaluation

- Animal (genetic effect)
  - Relationship matrix connects records of relatives
- Environment (contemporary group)
  - Herd/year/season/management group
- Residual effect (unexplained variation)
- Genetic and environmental variances (components of heritability)

Which Environment?

- Birth/Calving CG's include management prior to calving
- Weaning and Yearling CG's build upon Birth CG
- Carcass CG's build upon Yearling

Developmental Programming

- Recent research has shown management during pregnancy can have long-lasting effects on progeny performance

Epigenetics

- Other studies, especially in humans, show modified gene expression in progeny and grandprogeny of females subjected to severe stressors during pregnancy

Potential Stressors

- Forage availability/forage quality
  - Drought
  - Improper stocking rate
- High milk production during early pregnancy
- Late weaning
- General incompatibility of genetics with production environment

Can we successfully model developmental programming and/or epigenetic effects in national cattle evaluation programs?

Modeling Developmental Programming

- Might extend CG definition to common management from weaning of previous calf
- First-calf heifers in separate CGs
  - Some of these effects might be accounted for in age of dam adjustments, on a breed-wide basis
- Would reduce contemporary group size

Modeling Epigenetic Effects

- Group progeny data by dam birth CG?
- Severe reduction in CG size, especially when dams are retained to an advanced age

Other Considerations

- Heifer calves from malnourished dams may be less likely to enter the cowherd
- All sorts of issues involving embryo transfer/cooperator herds, etc.
- In general, effects of developmental programming and epigenetics appear small
- CG structure limits our ability to model these effects

Other Considerations

- Today, loss of CG size can be partially offset by genomic evaluations
- Field data research with detailed management information is needed to clarify the significance of these effects