Using USDA Evaluation Data

Making sense of the numbers
Agenda

- ADGA Genetics Overview
- Basic Concepts
  - USDA Production and Type Evaluations
  - Predicted Transmitting Ability (PTA)
    - Reliability
    - Confidence interval
  - Production Type Index (PTI)
  - Estimated Transmitting Ability (ETA)
- ADGA Genetics Tools
  - PTI/ETA Index Search
  - Type Evaluation Search
  - Production Evaluation Search
- Practical Application / Tips and Tricks
- Questions?
ADGA Genetics Overview

- History
  - 2001 First release
  - 2005 Cooperative agreement with ADGA
  - 2007 Second release, complete rewrite

- What is ADGA Genetics?
  - Utility for presentation of USDA evaluation data and ADGA registry/genetic information
  - Tools to help make informed breeding decisions
Basic Concepts – USDA Evaluations

- What data is used?
  - Production records from DHI
  - Linear Appraisal and pedigree records from ADGA
- Complex processing ("Animal Model") is applied to arrive at a relative genetic merit for various traits
- Production Evaluation
  - Done twice a year
  - Traits include PTA of yield, fat, fat%, protein and protein%
- Type Evaluation
  - Done once a year after Linear Appraisal is complete
  - Traits include PTA of 13 linear traits and Final Score
Basic Concepts – PTA
(Predicted Transmitting Ability)

- PTA is the average genetic value for a certain trait that an animal transmits to its offspring.
- This may be calculated with a certain degree of confidence (called Reliability).
- Three sources of information for a specific trait are used in this calculation:
  - The genetic merit of the parents and relatives.
  - Performance of the animal itself (when applicable).
  - The progeny of an individual.
- PTA = 0 is given to animals at the average genetic merit for a specific trait.
Basic Concepts – PTA (Predicted Transmitting Ability)

- PTA of a sire is an average number, the best estimate of the sire’s genetic merit.
- Genetic value and performance of progeny contains a certain degree of unpredictability.
- Chance determines genes contributed at the time of mating.
- Mating two animals of high genetic merit does not guarantee progeny will be above average.
Basic Concepts – PTA (Predicted Transmitting Ability)

• With a normal distribution there may be overlap between the offspring these two animals
• Although Sire A’s offspring are more likely to be above average, there will be some that will be below the average of Sire B
Basic Concepts – Reliability

- Reliability is the degree of confidence in a PTA estimate and is based on:
  - The reliability of the PTA of the parents and other relatives
  - The number of records (lactations, appraisals)
  - The number of herds in which the daughters are located for sire PTAs
- Sires with low Reliability involve greater risk but also greater opportunity
- Sires with high Reliability offer more of a known quantity
Basic Concepts – Confidence Interval

- Confidence Interval is the range of PTA values for a given trait that 68% of offspring are expected to fall into.
- Calculated from the PTA and standard deviation for a trait
- Basically:
  - Low Reliability means a larger confidence interval (more uncertainty)
  - High Reliability means a smaller confidence interval (more certainty)
- Example (PTA 100, STDEV 25):
  - If Reliability = 25%, Confidence Interval will be 100 ± 22
  - If Reliability = 50%, Confidence Interval will be 100 ± 18
  - If Reliability = 99%, Confidence Interval will be 100 ± 2.5
Basic Concepts – PTI
Production Type Index

- An artificial index calculated from production and type evaluations to help identify genetically promising animals
  - Production component uses PTA of Fat Corrected Milk (FCM)
  - Type uses PTA of the Linear Appraisal Final Score
- There are two flavors:
  - PTI 2:1 production has twice the weight as type
  - PTI 1:2 type has twice the weight as production
- Caveat:
  - The type component of this index uses Final Score, a non-linear and semi-subjective trait.
Basic Concepts – ETA
Estimated Transmitting Ability

- Artificial index based on PTIs of Sire and Dam (or Dam’s Sire). PTIs must be present for ETA to be calculated.
- Is an estimate of transmission of genetic merit to offspring.
- Can be calculated for a planned breeding and can be used to identify young sires with high genetic potential.
- There are two flavors:
  - ETA 2:1 production has twice the weight as type.
  - ETA 1:2 type has twice the weight as production.
ADGA Genetics Tools

PTI/ETA Search

- Good starting point for a general search
- Many filtering and ordering options
- Can view PTI and ETA values on one page
- Can drill down into individual animal details
- Direct Link:
  - http://adgagenetics.org/IndexSearch.aspx
## ADGA Genetics Tools
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ADGA Genetics Tools
Production Search

- Emphasis on production
- Separate searches for bucks and does
- Many filtering and ordering options
- Can view all production related PTAs and other data on one page
- Can drill down to individual animal details

Direct Link:
- [http://adgagenetics.org/ProductionSearch.aspx](http://adgagenetics.org/ProductionSearch.aspx) (bucks)
- [http://adgagenetics.org/ProductionSearchDoe.aspx](http://adgagenetics.org/ProductionSearchDoe.aspx) (does)
# ADGA Genetics Tools

## Production Search Results - Buck

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ADGA Genetics Tools
Type Search

- Emphasis on type
- Separate searches for bucks and does
- Many filtering and ordering options
- Can view all type related PTAs, ETAs and other data on one page
- Can drill down to individual animal details
- Direct Link:
  - [http://adgagenetics.org/TypeSearch.aspx](http://adgagenetics.org/TypeSearch.aspx) (bucks)
  - [http://adgagenetics.org/TypeSearchDoe.aspx](http://adgagenetics.org/TypeSearchDoe.aspx) (does)
### ADGA Genetics Tools

#### Type Search Results - Buck

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1 2 3 4 5 6 7 8 9 10 ...

Gene Dershewitz - 2013 MDGA Conference

11/2/2013
• Type charts are found on the goat detail page if a type evaluation has been done
• Negative PTAs on some traits are not necessarily “bad” but reflect the biological range of a trait
• Some criteria for interpretation:
  • Breeding priority (production, show or both)
  • Daughter trait Average (for bucks)
  • Personal trait preferences
  • Reliability of PTAs
Practical Application / Tips and Tricks

- Choosing a sire for milk production
- Choosing a sire for cheese
- Choosing a sire for a specific type trait
- Using MyGenetics and Sire Compare
- Viewing actual DHI records for a doe
- Have questions or need help?
  - Choose the Help menu item on the menu bar for context sensitive help or access the Support Forum
Resources

- ADGA Genetics website
  - http://adgagenetics.org
- American Dairy Goat Association website
  - http://adga.org
- USDA Goat Evaluation Details
- Excellent articles by Michel A. Wattiaux of the Babcock Institute
  - Basic Genetics Concepts
  - Principles of Selection
  - Predicted Transmitting Ability and Reliability
- Interpreting Linear Type Trait STAs
- ADGA Sire Development Program
Questions?