Genetic Selection in Practice

Mangaging Information for Profit Field Day
Alberta Agriculture and Forestry

Tom Lynch-Staunton,
Livestock Gentec, University of Alberta
Jim Lynch-Staunton,
Antelope Butte Ranch

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Genomics, DNA, and Markers

- "As easy as ACGT"- the 4 letters of the genetic code

  animal 1 ACGTACGT
  animal 2 ACGCACGT

  this difference is a
  Single Nucleotide Polymorphism or "SNP Marker"

Genomics

- Genotype + Phenotype = Information
- Accuracy and reliability depends on
  - Effective Population Size
  - Number of Markers
  - Number of Animals with Genotypes
  - Number and Integrity of Phenotypic Records

- Can Genomics replace records and collection?

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What can Genomics do now?

1. Create predictors for hard to measure traits
2. Increase accuracies of EPDs/EBVs especially for young breeding animals
3. Identify Parentage
4. Identify birthing problems
5. Genetic Defect or Disease Identification
6. Horned/polled
7. Manage inbreeding

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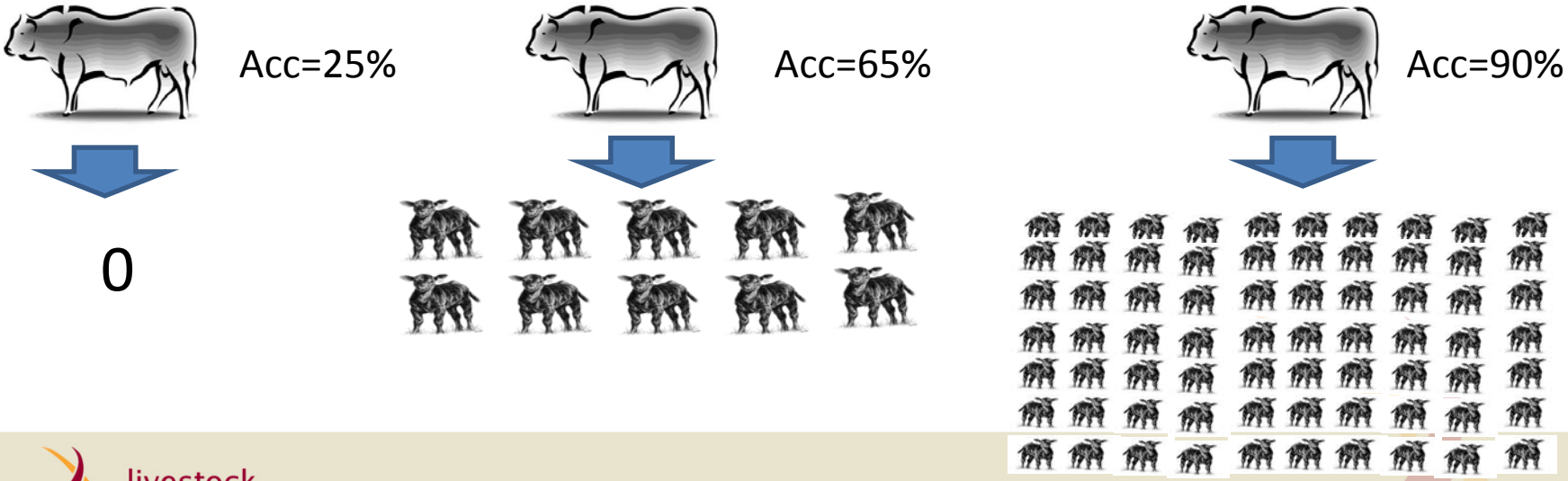
How important is accuracy?

- Pre-genomics, accuracy is accrued through progeny recording (and records of relatives)



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Possible EPD/EBV changes

Accuracy	Birth Wt (90 lb herd Average)	Wean Wt (550 lb herd average)
0.10	±2.4lbs	±10.4lbs
0.30	±1.8	±8.1
0.50	±1.3	±5.8
0.75	±0.8	±2.9
0.90	±0.3	±1.2

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Genomics' Influence (ie 25% increase in accuracy)

Trait	Progeny Equivalent
Birth Wt	10
Weaning Wt	16
Yearling Wt	22
Feed Efficiency	15
Milk	12
Carcass Wt	7
Ultrasound Backfat	28

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Economics of Selection

- If you are selecting (consistently) on BW, WW, PWG, you can expect ***$3.90 profit/ cow mated / year***
- Application of Genomic selection can further increase this to ***$6.58*** at GEBV accuracy of 0.25 on multi-trait index
- If accuracies of GEBV's increase to 0.5, estimated rate of gain increases to ***$9.43/cow/year***

Source: Fennessey et al, 2012 *Cost-Benefit Analysis of Genomic Tools for the Alberta Beef Industry,* Data on file, Livestock Gentec, University of Alberta

Index Traits

- birth weight
- weaning weight direct
- weaning weight maternal
- yearling weight
- heifers 18 month weight
- mature weight
- Backfat
- scrotal circumference
- residual feed intake

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Economic Traits

- cow weight (kg)
- Male fertility (%) / Female fertility (%)
- Calving ease / Calf survival (%)
- weaning weight direct (%) / weaning weight maternal (%)
- backgrounding daily gain using grazing(kg) backgrounding daily gain using feedlot(kg)
- backgrounding feed conversion using grazing(kg/kg) backgrounding feed conversion using feedlot(kg/kg)
- finishing daily gain (kg) finishing feed conversion (kg/kg)
- dressing percentage (%) / carcass Quality Grade / carcass yield Grade

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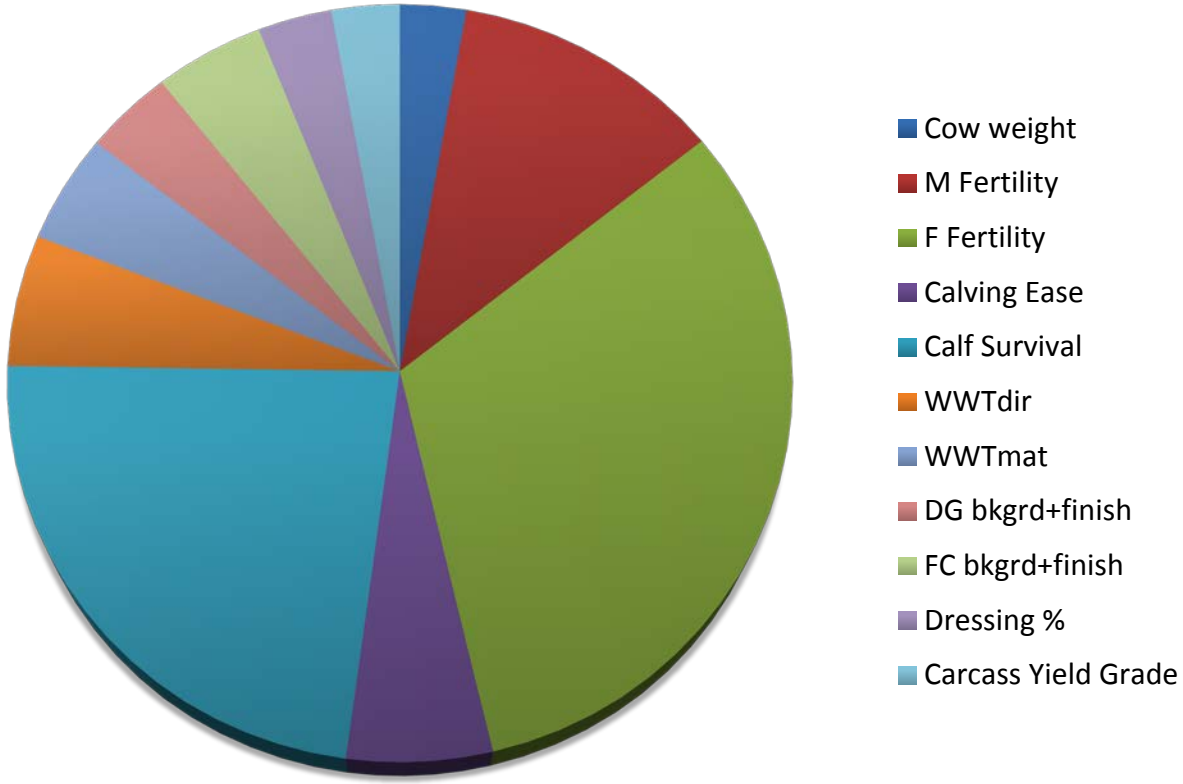
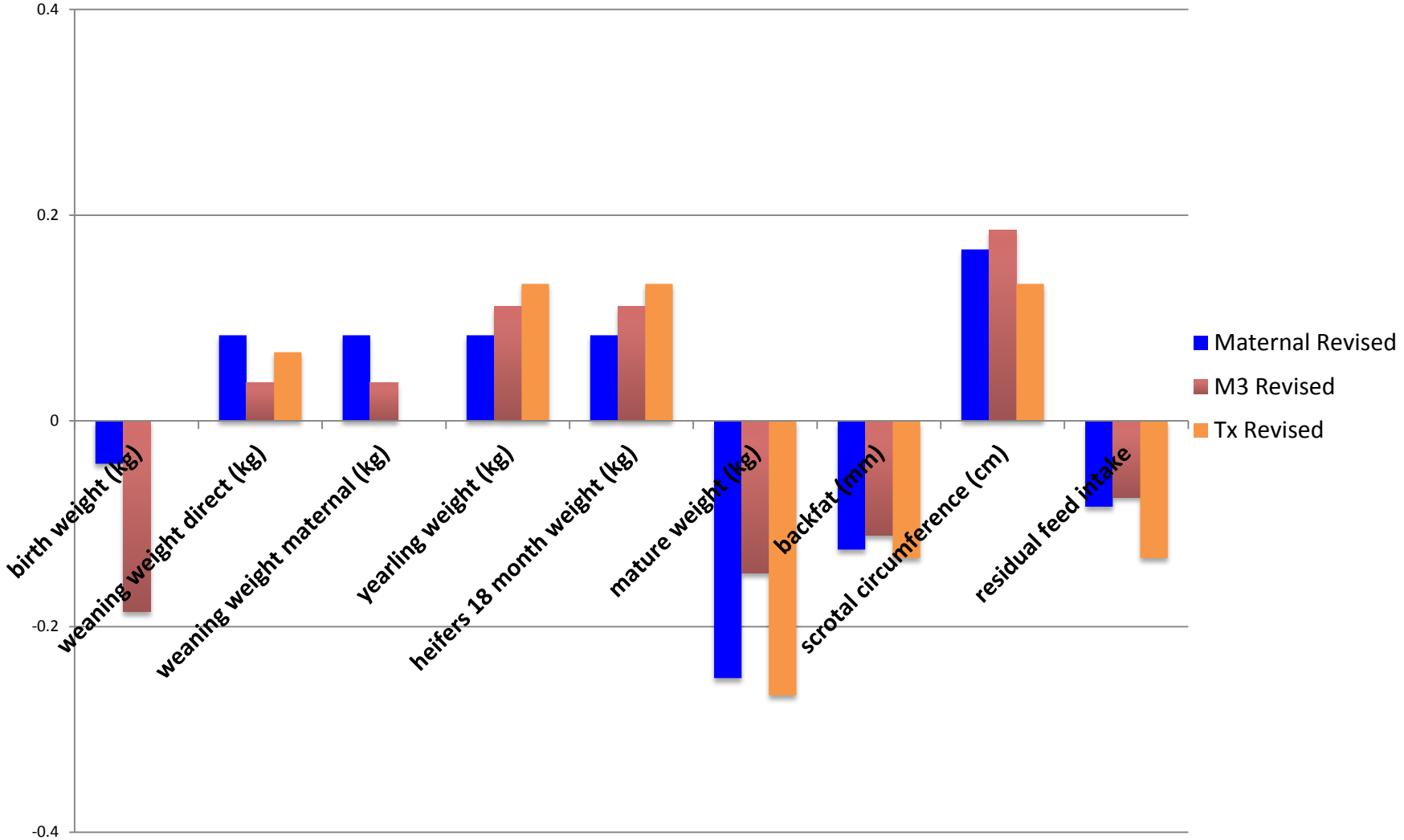
Emphasis (Proportion)



Courtesy of Dr. Steve Miller, University of Guelph

Selection index weighting



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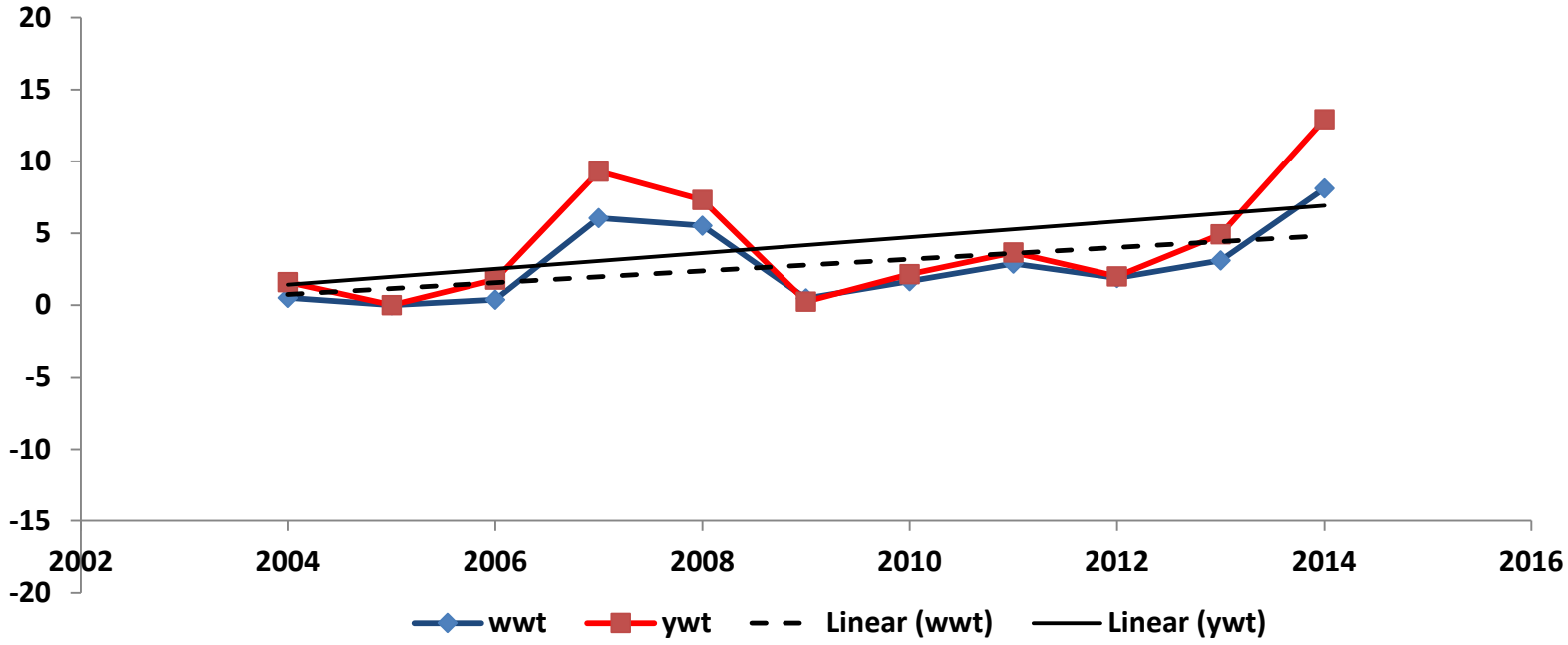
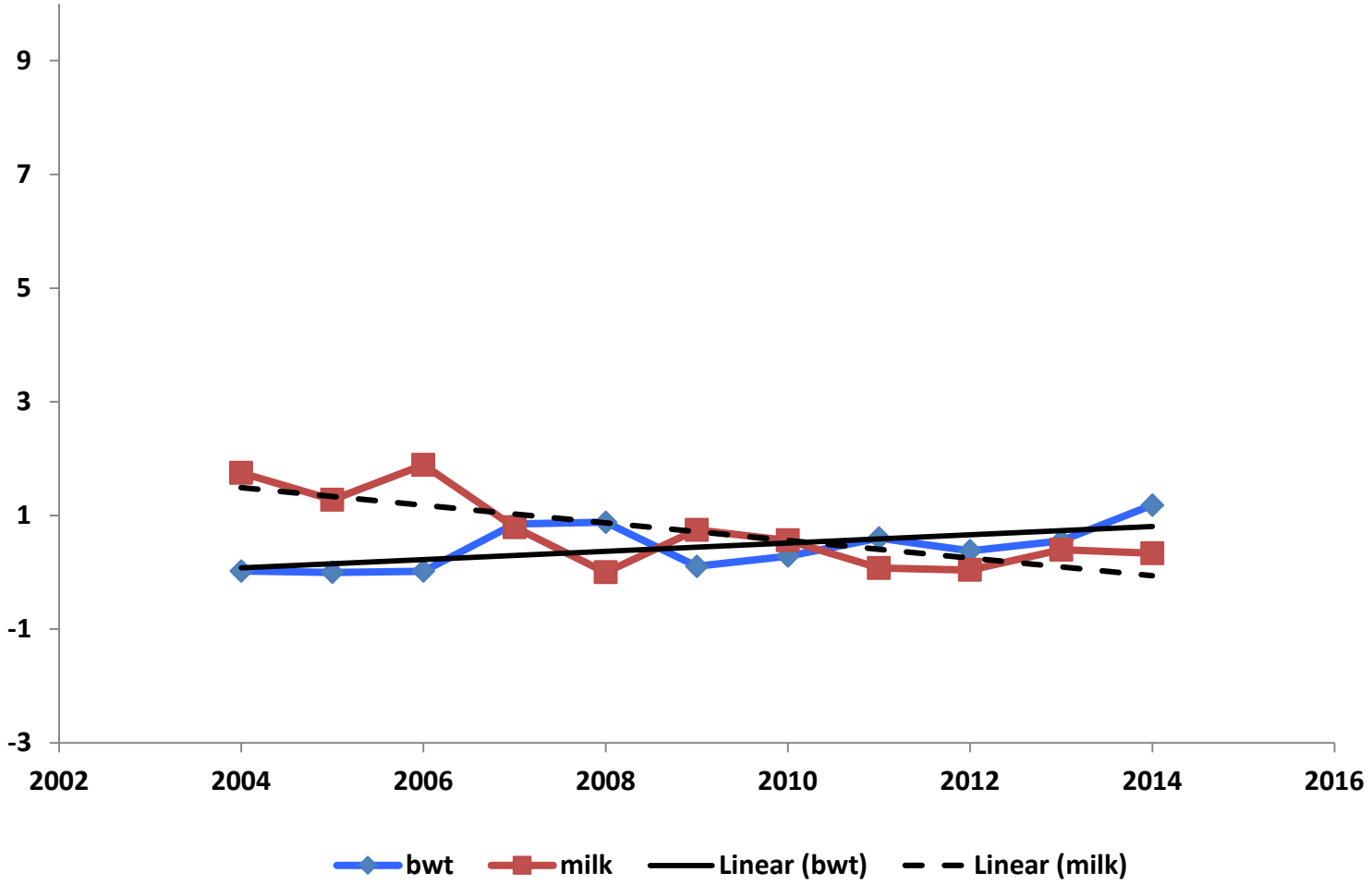
Genetic Trends- WW, YW



Courtesy of Dr. John Crowley

Genetic Trends- BW, Milk



When is the best time to plant a tree?

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