ASSOCIATIONS BETWEEN PREDICTIONS OF LIFETIME NET MERIT AND PROFITABILITY OF DAIRY COWS

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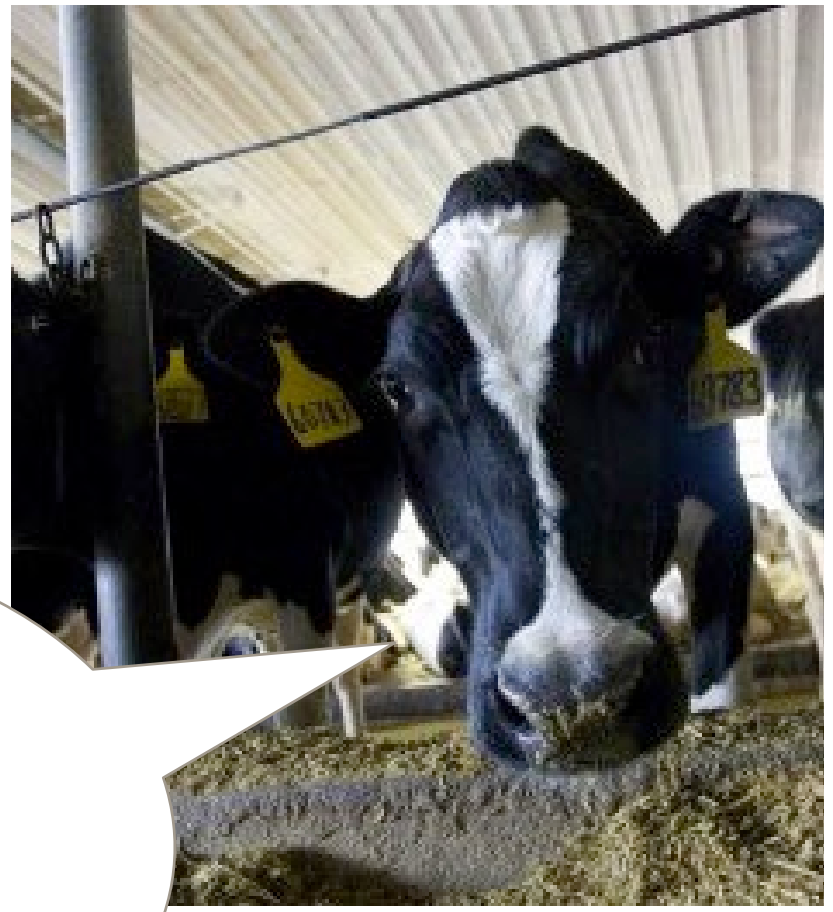

Takeaway: Genetic predictions of lifetime profitability early in life can be observed in differences in actual lifetime profitability

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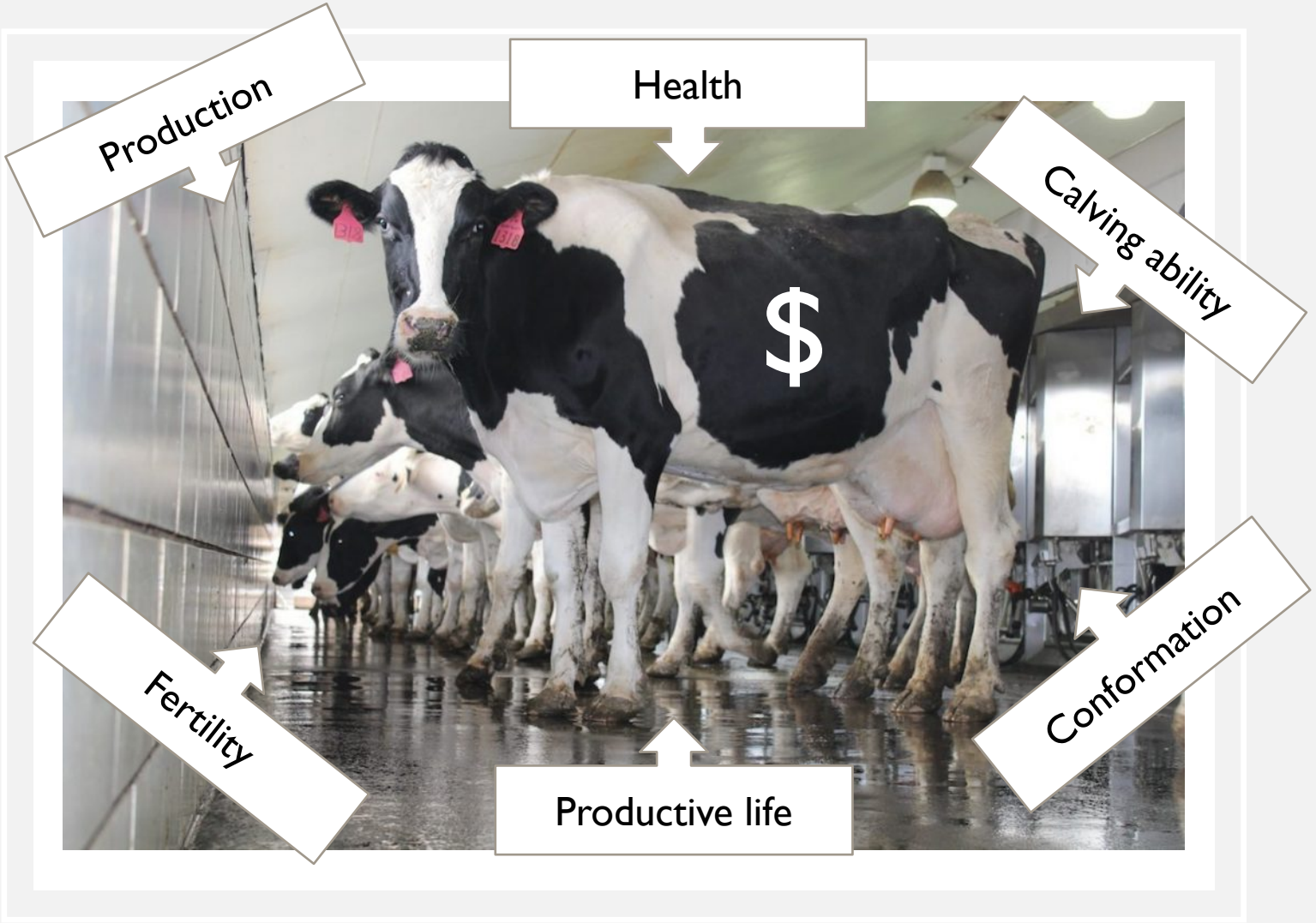
SELECTION INDEXES ESTIMATE PROFIT

- Selection indexes combine traits for overall merit
- How well does Lifetime Net Merit (NM$) predict the profitability of dairy cattle?
- Objective: determine the relationships between genetic estimates of NM$ early in life and the actual profitability of dairy cows



DATA COLLECTION AND ANALYSIS

DATA COLLECTION

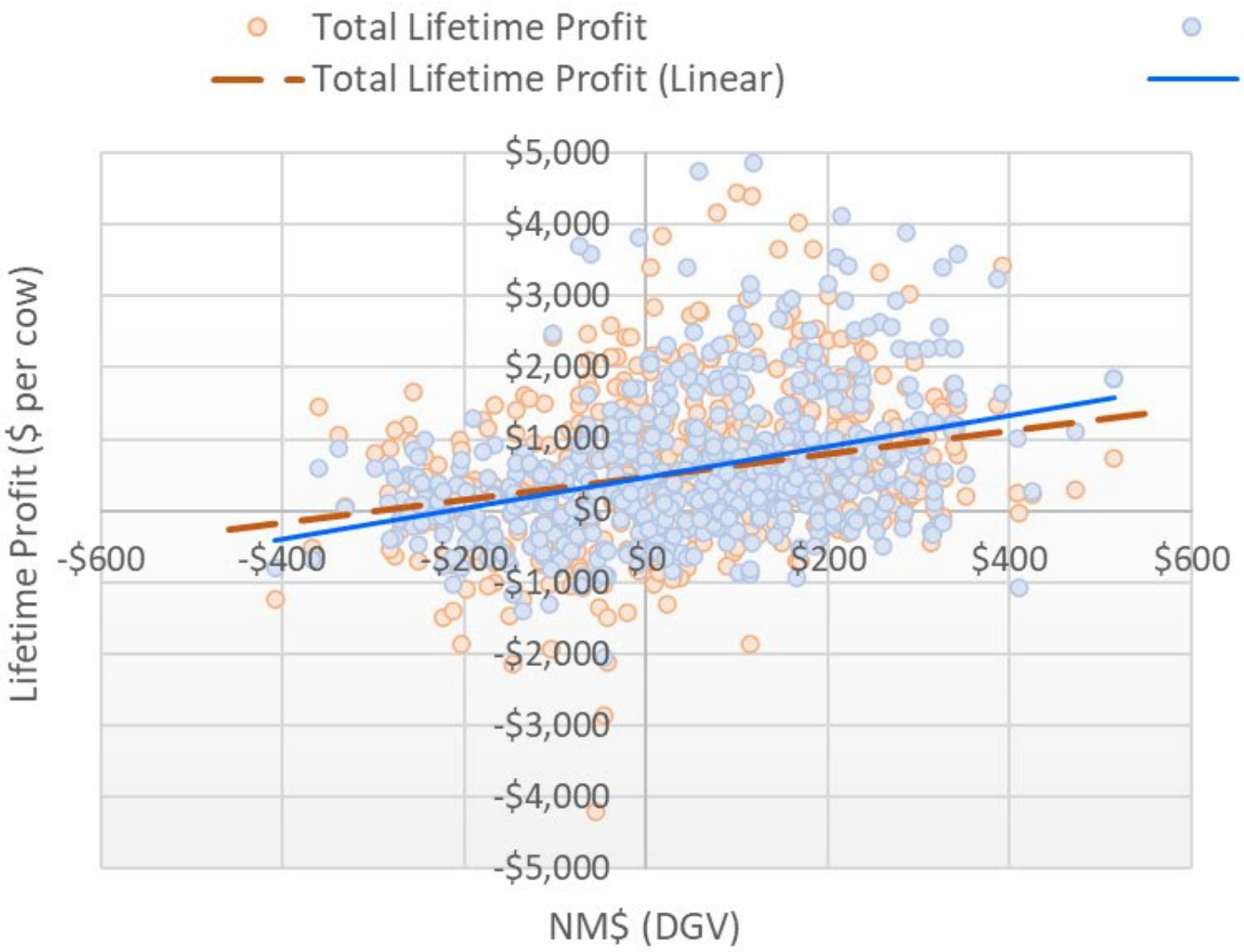
Data collected from PSU for 2,305 cows in their herd from 1998 to 2017 include:

- Daily body weights (kg) and milk weights (kg)
- Monthly DHIA test records (% fat, % protein)
- Birth dates, calving dates, dry-off dates
- Disease treatment data
- **Genetic estimates** of profit:
  - NM$ estimates using Direct Genomic Values (**DGV**) from April 2018 for 532 cows
  - NM$ estimates using Predicted Transmitting Abilities (**PTA**) measured using 1 sire + ½ maternal grandsire + ¼ maternal great-grandsire PTA from December 2019 for 1,109 cows

ANALYSIS STEPS

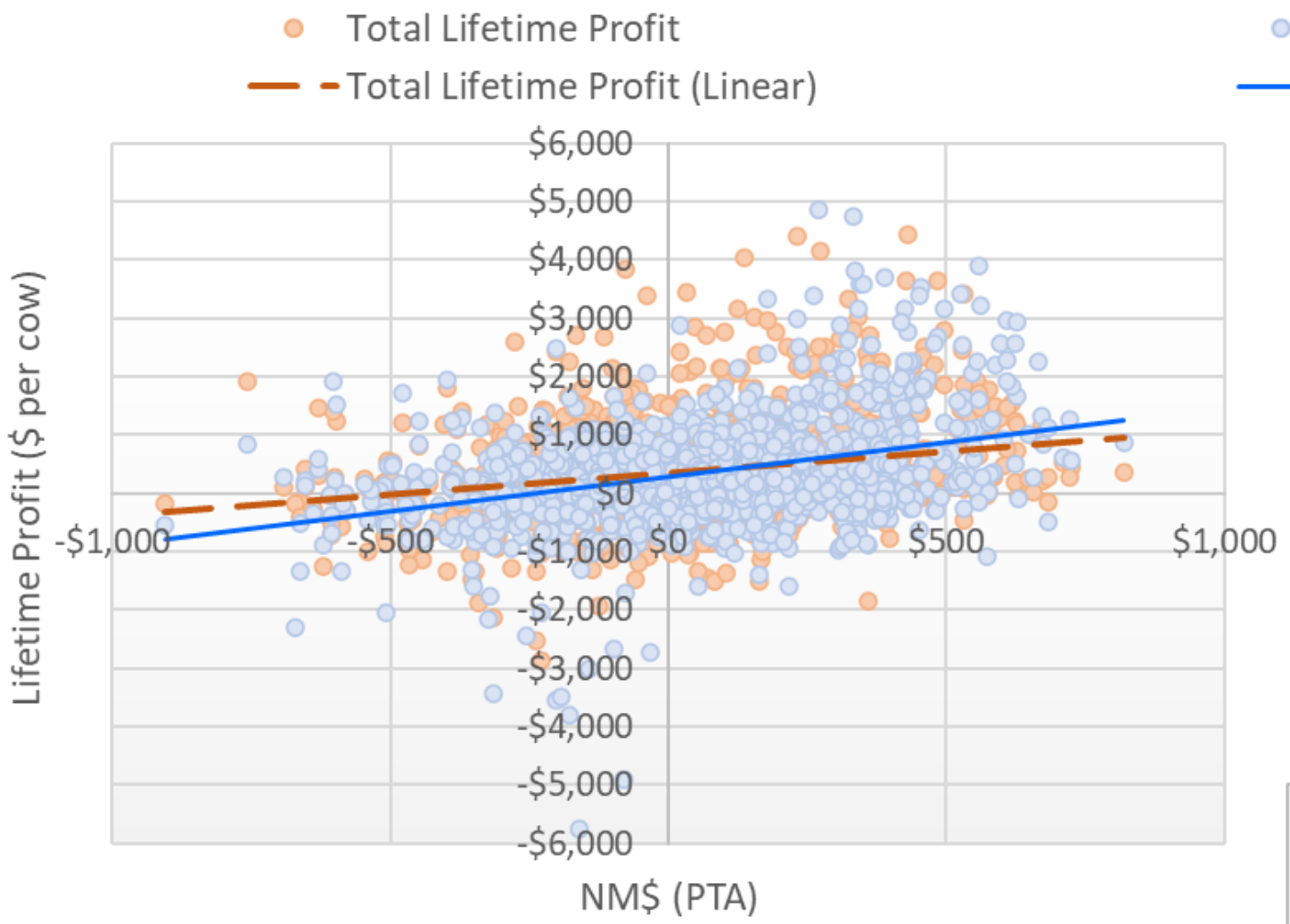
1. Calculate revenues, costs, profit per cow
2. Calculate 2 measures of **profitability** per cow:
   - Total lifetime profit ($ in lifetime)
   - Standardized lifetime profit ($ per 848 days)
3. Perform simple linear regression to establish relationships between genetic estimates of profit and actual profit per cow

RELATIONSHIPS BETWEEN ACTUAL PROFITABILITY AND DGV OF NET MERIT



Total Lifetime Profit:	Standardized Lifetime Profit:
y = 1.599x + 473.15	y = 2.139x + 469.9
R^2=0.062	R^2=0.124
n = 532	n = 532
Observed: b = 1.599	Observed: b = 2.139
Expected: b = 2.0	Expected: b = 2.0

RELATIONSHIPS BETWEEN ACTUAL PROFITABILITY AND PTA OF NET MERIT



Total Lifetime Profit:	Standardized Lifetime Profit:
y = 0.7399x + 349.26	y = 1.180x + 284.34
R^2 = 0.059	R^2 = 0.128
n = 1,109	n = 1,109
Observed: b = 0.74	Observed: b = 1.18
Expected: b = 1.14	Expected: b = 1.14

$$Expectation = \frac{2 * PTA}{\left(1 + \frac{1}{2} + \frac{1}{4}\right) * PTA} = 1.14$$

CONCLUSIONS

- Positive trends exists between lifetime profit predicted by the Lifetime Net Merit Index and actual lifetime profit measures
  - Genetic predictions of profit early in life can reflect differences in real profit of dairy cows
- Correlations between genetic estimates of lifetime profit and actual lifetime profit are strongest when lifetime profit is standardized per unit of time
  - Dairy producers must consider the opportunity cost of delayed replacement