Feed Efficiency & some of its issues relevant to genetic evaluation

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Consider choosing among sires evaluated from a large cohort of their collective progeny. Which bull(s) would you want to use as parent? In what direction would you want to shift the average?

Points form a tilted ellipse. Extent of elongation and angle of tilt depends upon genetic correlation (recall these are progeny means).
Feed Efficiency

• Efficiency typically measures output divided by input
  – Big numbers are “desirable”
  – lbs gain per lbs feed (eg 1/6 =0.16 lb/lb)
• Alternative is feed conversion rate
  – input over output
  – Small numbers are “desirable”
  – lbs feed per lb gain (eg 6 lb/lb)
• Rankings are “equivalent”
 Iso-efficiency
• All animals on the line have the same efficiency
  – If efficiency was your goal, you would be equally happy with any of those animals

Feed Requirements
• More productive animals tend to require more feed
• This relationship can be quantified by analytical techniques, such as regression
Residual Feed Intake

- Analysis of "large" bodies of data allows us to compute how much feed average animals requires to produce at average levels of performance
  - Some animals eat more than expected for their level of production and have positive residual feed intake (RFI)
  - Others (desirable animals) eat less than expected, having negative RFI

Consider an “unusual animal”
-ve RFI (eat < expected)

Expected Feed Requirement

Actual Feed Requirement

RFI=0

RFI=0

RFI=0

RFI=0

RFI=0

RFI=0

RFI=0

Improving RFI

Improving RFI

Improving RFI

Improving RFI

Selection for RFI

-ve RFI (eat < expected)

desirable

undesirable

+ve RFI (eat > expected)

Selection for RFI

Takes no account of feed cost or beef returns

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Other Options

• We have considered
  - Feed efficiency (or feed conversion)
  - Residual Feed Intake
• What about an economic approach?
Where do you want to move the average?

Increased Sale weight Increases Revenue $0.86/lb BWT $100/116 lb

Decreased feed costs $5.70 per 100 lb DM 1750 lb costs $100

Iso-income line

Totally driven by the (future) ratio of beef returns to feed cost
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Do you want output, efficiency, residual feed intake or profitability? They represent different sectors of the ellipse.
The "most profitable" approach is the only consideration that takes any account of beef returns relative to feed cost.