

Efficiency: The complexities of a seemingly simple subject

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Pork industry's definition of "efficiency" has changed over the years (centuries)

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    graph TD
      A["Forage to convert 'food' of no or poor value (roots, nuts, grass, etc.) into products of value to humans: food, leather, etc"] --> B["On subsistence farm, convert low value materials into food, etc and generate cash to purchase goods not produced on the farm"]
      B --> C["On mixed farm, convert grain into cash for profit, to cover other farm costs and provide food, etc to the farm family"]
      C --> D["On increasingly specialized farms, convert grain into cash for profit and raise standard of living of farm family"]
      D --> E["On heavily capitalized farm, cover expenses and provide expected return on investment"]
    
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Our definition of "efficiency" has changed over the years (centuries)

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    graph TD
      A["Forage to convert 'food' of no or poor value (roots, nuts, grass, etc.) into products of value to humans: food, leather, etc  
Efficiency not measured"] --> B["On subsistence farm, convert low value materials into food, etc and generate cash to purchase goods not produced on the farm  
Efficiency = cash income"]
      B --> C["On mixed farm, convert grain into cash to pay bills, cover other farm costs and provide food, etc to the farm family  
Efficiency = cash income"]
      C --> D["On increasingly specialized farm, convert grain into cash for profit and raise standard of living of farm family  
Efficiency = productivity"]
      D --> E["On heavily capitalized farm, cover expenses and provide expected return on investment  
Efficiency = financial returns"]
    
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Measures of efficiency change over time
because farm goals change




"Efficiency" means different things to different people

- Financial efficiency
- Feed efficiency
- Labor efficiency
- Total enterprise efficiency
- Animal efficiency
- Environmental efficiency
- Efficiency of use of natural resources
- Nutrient efficiency



WHAT GETS MEASURED GETS MANAGED

OR

YOU CANNOT MANAGE WHAT YOU DO NOT MEASURE

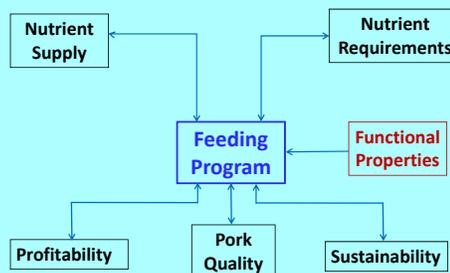


Impact of Increasing Energy Concentration on Grow-Finish Performance

DIET DE, Mcal/kg	3.09	3.24	3.34	3.42	3.57
Initial wt., kg	31.2	31.1	31.5	31.2	31.1
Final wt., kg	115.1	115.3	115.1	115.0	115.5
Daily gain, kg	1.00	1.01	1.03	1.03	1.03
Daily feed, kg	2.80	2.66	2.64	2.61	2.47
Feed conversion	2.78	2.63	2.56	2.56	2.38
Fat, mm	16.8	17.8	18.3	18.6	19.4
Loin, mm	61.7	60.6	62.7	60.3	61.1



Framework for Developing Feeding Programs



An evolving U.S. pork industry: 1992 to 2004

- Due to consolidation, average farm inventory grew from 945 hd to 4,646 hd
- Farrow-to-finish production declined from 65% to 18% of total sales; specialized finishing operations grew from 22% to 77% for the same period
- The share of corn fed to hogs on the same farm it was grown declined from 49% to 19%



Key and McBride, 2007

An evolving U.S. pork industry: 1992 to 2004

- Feeder-to-finish farms
 - improved feed conversion by 4.7% per year
 - improved labor efficiency by 13.8% per year
 - “Total factor productivity” increased an average of 6.3% per year
 - Attributed to two factors: scale of production and adoption of new technology. Technological change drove 50% of the improvement
 - 3X historical increases in productivity in agriculture as a whole
- These increases in productivity contributed to a 30% decline in farm gate prices for pigs



Key and McBride, 2007

Net income by region and size of feeder-to-finish operation

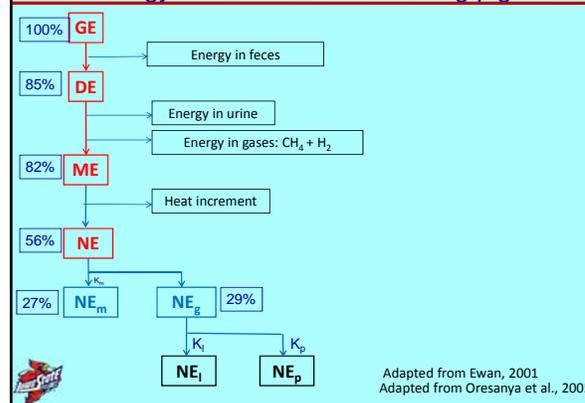
Region	Mkt hog, \$/cwt	Small	Medium	Large
E. Corn belt	45.22	-2,653	-513	778
W. Corn belt	44.90	-2,750	-232	1,095
South	43.27	-2,495	-337	734
Northeast	42.11	-4,466	-2,637	-1,638
West	49.66	-4,592	-1,681	-333

Net income = revenue less total cost of production; budget based per 100 hogs
 Corn priced at \$2.54, \$2.45, \$2.79, \$2.84 and \$2.99 per bushel for the ECB, WCB, S, NE and W, respectively.



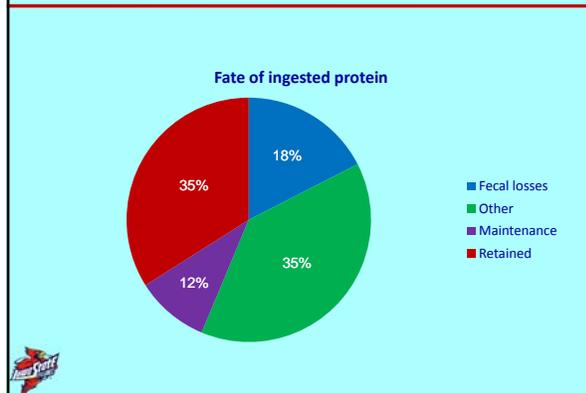
Source: Adhikari et al., 2004

Energy utilization in the weanling pig



Adapted from Ewan, 2001
 Adapted from Oresanya et al., 2005

Protein utilization in the weanling pig



Conclusions

1. Measures of efficiency have changed because the pig industry has changed
2. The correct measures of efficiency can only be determined after a farm's definition(s) of success have been clearly defined
3. Monitoring the wrong indicators of efficiency may take an organization in the direction very different from that intended

“By three methods we may learn wisdom:
 First, by reflection, which is noblest;
 Second, by imitation, which is easiest;
 third by experience, which is the bitterest.”

- Confucius

