Data-based Decision Making For Swine Production Systems

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GOAL = Maximum Profit

- Profit = Return > Cost of Production
- Return = market volume * price
- Volume = #animals sold * weight

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Return is then Dependent On:

- Volume being a function of:
  - reproductive rate
  - growth rate
  - survival rate
- Price being a function of:
  - percent lean
  - meat quality
  - marketing expertise

How Do You Increase Return?

- Increase volume by increasing:
  - reproductive rate
  - growth rate
  - survival rate
- Increase price having optimal:
  - percent lean
  - meat quality
  - marketing expertise

How Do You Measure?

- Reproductive rate and survival rate
  - Computerized sow management system
- Growth rate and survival rate and percent lean and marketing expertise
  - Computerized spreadsheets
  - Enter group records of inventory, feed usage, info from kill sheets (sales, percent lean)
  - Meat quality (harder)

GOAL = Maximum Profit

- Profit = Return > Cost of Production
- Return = market volume * price
- Volume = #animals sold * weight
Cost of Production Comes From Multiple Components

- Feed costs:
  - function of feed price, feed usage, feed conversion, and pigs marketed/sow/year

- Non-feed costs:
  - Labor, Fixed (facilities, etc), Variable (ins., util., supplies, repairs, taxes, etc), Professional fees (mgt, acct.), Labor, Vet/Medicine, Breeding/Genetic costs, death losses, Trucking, and more

How Do You Measure?

- Feed costs: function of feed price, feed usage, feed conversion, and pigs marketed/sow/year
  - Business records, computerized sow management systems and spreadsheets

- Non-feed costs: Labor, Fixed (facilities, etc), Variable (ins., util., supplies, repairs, taxes, etc), Professional fees (mgt, acct.), Labor, Vet/Medicine, Breeding/Genetic costs, death losses, Trucking, and more
  - Business records

Sow Herd Costs/Returns

Basic Unit of Cost:
Breeding Female Days

- Once a female enters the herd inventory, she starts to accumulate 'Breeding Female Days'
- Those days where she is pregnant with a successful litter are 'Gestation Days' that are also defined as 'Productive Days'
- Those days where she is lactating are 'Lactation Days' and are also 'Productive Days'
- All others are 'Non-Productive Days'

Breeding Female Days Accumulation

Entry to 1st service interval

Entry

Service

Farrow

Wean

Service

Removal

Farrowing rate

FRate and Gestation Length

Lactation Length

Weaning to service interval

Culling to removal interval

What Is a Non-Productive Sow Day?

- Any time a female is in the breeding herd and is not pregnant or nursing a litter
Why Is This Important?
- Every day a sow is in the breeding herd, she incurs feed costs, fixed costs, interest costs, and opportunity costs.
- If she is not producing a litter, she is not paying for herself.
- Reducing NPSD can lower the cost of production.
- How much?

Economic Value of 1 NPSD
- Feed cost = $0.50
- Interest on buildings cost = $0.22
- Labor costs = $0.26
- Opportunity costs = $0.66
- Facility costs = $????
- Approximately $1.50–2.50/sow/day

Components of NPSD
- Entry to first service interval
- Farrowing rate
- Wean to service interval
- Culling decision to removal interval
- How do we improve each of these to minimize NPSD?

Entry to First Service Interval
- Gilts are entered into a 'gilt pool' when they are approximately 7-8 months of age, weigh 250+ pounds, and have just started cycling.
- The specific farm procedure is a management decision.
- Many farms enter the gilt into inventory at first service to save on ear tag costs.
- But this underestimates true NPSD.

How to Improve Entry → First Service Interval?
- Earlier puberty will decrease entry to first service interval.
- Select for fast growth in maternal lines.
- Correct gilt pool management.
- Be of adequate age and size at herd entry.
- Keep gilts in separate ‘area’ from boars.
- Proper boar exposure to stimulate estrus.

Farrowing Rate
- Sow is mated to a boar (AI usually, some natural service) by a farm worker.
- In order to farrow:
  - Sow must be bred at the proper point of estrus cycle.
  - Insemination technique is important.
  - Semen must be fertile.
  - Sow must be fertile.
  - Sow must be managed correctly to maintain pregnancy.
How to Improve Farrow Rate

- Good reproductive management
- Semen quality of boar
- Ability of the inseminator
- Timing of insemination
- Technique of insemination
- Difficult to select for via genetics
  - A sow’s farrowing or not farrowing is confounded between many factors

Wean to Service Interval

- Sow must express visible estrus
- Influenced by lactation length, sow condition, parity
  - $h^2$ estimated at 0.12 – 0.36
  - Can be selected for at the farm level

Culling to Removal Interval

- Decision to cull a sow is usually made:
  - During lactation when she has poor performance
  - After weaning when she fails to cycle
  - After breeding when she recycles
  - The time from deciding to cull a sow until she is removed from the herd is a management decision based on sow marketing strategy

Reducing NPSD

- Management
  - Gilt development program to enhance cycling
  - Estrous detection program to quickly and accurately find cycling females
  - High quality AI program with fertile boars and trained inseminators
  - Sow feeding program to enhance feed intake and lower wean to estrus interval

Reducing NPSD - Genetics

- If possible, find a seedstock source that includes wean to estrous interval (W2E) in their genetic improvement program
- Include wean to estrous interval (W2E) in your selection program at the GGP and GP farms
- BLUP sow indexing program for overall genetic improvement in reproduction
How to Measure Return Factors in a Sow Unit?

- Products of a sow unit that are sold:
  - Weaner pigs
  - Cull sows
- How do we measure the number of pigs sold and relate this to the cost factors:
  - Litters/sow/year
  - Pigs weaned/sow/year

Litters/Sow/Year

- L/S/Y for a period of time
  - \[ \text{L/S/Y} = \frac{\text{sum of gestation days}}{\text{sum of breeding female days}} \times \frac{365}{115} \]
- Responds to better management, facilities, health, genetics, nutrition
- Industry average is 2.30-2.45
  - Better farms > 2.45

What To Expect For L/S/Y

- Best scenario:
  - Entry to first service = 0 days
  - A successful first service, giving 115 gestation length
  - 17 day lactation length
  - 6 day wean to service interval
  - Breeding female days = 138
  - Gestation days = 115
  - L/S/Y = \( \frac{115}{138} \times \frac{365}{115} = 2.65 \)
- Real scenario:
  - Entry to first service = 7 days
  - A successful first service, giving 115 gestation length
  - 24 day lactation length
  - 6 day wean to service interval
  - Breeding female days = 152
  - Gestation days = 115
  - L/S/Y = \( \frac{115}{152} \times \frac{365}{115} = 2.40 \)

Pigs Weaned/Sow/Year

- PW/S/Y for a period of time
  - \[ \text{PW/S/Y} = \frac{\text{No. pigs weaned}}{\text{avg brd female inventory}} \times \frac{365}{\text{days in period}} \]
- Responds to better management, facilities, health, genetics, nutrition
- Industry average is 21-22 now
  - Better farms > 24

Can You Expect 30 P/S/Y?

- If you have 2.5 L/S/Y, 13 NBA, 8% pre-weaning mortality
  - 2.5 \times 13 \times 0.92 = 29.9 P/S/Y (rare)
  - 2.45 \times 11 \times 0.88 = 23.7 P/S/Y (good)
  - 2.40 \times 10.5 \times 0.85 = 21.4 P/S/Y (avg)
  - 2.20 \times 9.5 \times 0.80 = 16.7 P/S/Y (poor)
Use of Sow Management System Software As A Decision Making Tool

- Many commercially available software systems for reproductive data management
- Full service programs
  - PigChamp (Care3000), PigWin, Herdsman, SwineBooksPro, PigKnows, MetaFarms, etc
- Entry level programs
  - SowTracker, Herdsman, etc

Basic Swine Reproductive Management System

- Focus on breed-farrow-wean-inventory
- Common terms
- Areas of reproduction to analyze
- Management tools
- Demonstrate SowTracker®

Animal Events

- Inventory events
- Breeding/pregnancy events
- Farrowing events
- Weaning events
- General events

Inventory Events

- Enter
- Group
- Location
- Remove
- Lost tag

Breeding/Pregnancy Events

- Mating
- AI
- Heat No Service
- Skipheat
- Not in pig
- Preg. Exam
- Abortion

Farrowing Events

- Farrow
- Foster
- Nurse on / nurse off
- Pig deaths
**Weaning Events**
- Wean
- Part wean

**General Events**
- Condition
- Treatment
- Disease
- General comment
- User defined

**Common Terms**
- Service
- Mating
- Weaning
- Farrowing
- Parity
- Number born
- Number born alive
- Number weaned
- Stillborns
- Mummies
- Farrowing rate
- Adjusted farrowing rate
- Litters/sow/year
- Mortality
- Weaning weight

**Common Terms**
- Weaning age
- Pigs weaned/sow/year
- Inventory
- Gilt
- Sow
- Boar
- Replacement rate
- Culling rate
- Death rate
- Non-productive sow day

**Reproductive Areas to Analyze**
- General reproductive efficiency
- Boar fertility/usage
- Sow reproduction
- Reproductive management tools

**General Reproductive Efficiency**
- Reproductive Summary
- breeding performance
- farrowing performance
- weaning performance
- Population
- Farrowing rate report
- Sow pregnancy counts
- Reasons for open sows
Analyzing Boar Fertility

- Boar comparison
  - Compare the fertility of boars used at the farm
  - Conception rate, farrowing rate, litter size
- Boar use
  - List boar usage by month
  - Reconcile versus semen purchases

Analyzing Sow Reproduction

- Parity comparison
- Genetics comparison
- Sow performance by status

Reproductive Management

- Multiple matings analysis
- Repeat service analysis
- List ID's
- Sow management lists
- Sow cards

Demonstrate Reproductive Data Management Software

SowTracker®
From Iowa State University

Order of Reports to Show

- Reproductive Summary
- Farrowing Rate
- Boar Comparison
- Boar Use
- Parity Comparison
- Genetics Comparison
- Sow Performance by Status
- Multiple Matings
- Repeat Service
- List ID's
- Sow Management Lists
- Sow Cards

PigProfit Tracker
Pig COP/Profit Estimator

- Excel spreadsheet
- Enter production information
  - Farrowing from sow management system
  - Post-weaning from spreadsheet summary
- Enter cost of production estimates for primary component of costs (per pig)
- Enter feed component prices of interest
- Enter anticipated market return
- Program estimates the net profit/loss per pig
- Can change inputs to see impact on net profit
Inputs From Records

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Microsoft Excel - pig cost calculator.act08.xls

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<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
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<td>Prem. $/lb</td>
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<td>W</td>
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<td>Weight non-NCT</td>
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Farrowing

11 | Git day purchase | $ 3.51 |
13 | Breeding cost | $ 1.00 |
16 | Vet/medicine | $ 2.00 |
19 | Labor | $ 5.00 |
19 | Fixed (rent, etc) | $ 6.00 |
17 | Variable (fuel, supp) | $ 3.00 |
18 | Mgmt / acc feed/other | $ 1.00 |
19 | Repairs, taxes | $ 1.50 |
20 | CME average cost per ton | $ 16.00 Eon | $ 0.70 |
21 | Cull sows value | @ 0.30 lbs | $ 1.30 |
22 | Total non-feed cost | $ 24.37 |

Farrowing

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<td>3</td>
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<td>4</td>
<td>Total</td>
<td>95</td>
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Post-Weaning (W-F)

Death loss | $ 2.04 |
Vet/medicine | $ 3.00 |
Labor | $ 5.00 |
Fixed (rent, int, etc) | $ 14.25 |
Variable (fis, etc) | $ 1.75 |
Management fee | $ 1.00 |
Tailing | $ 3.00 |
CME average cost per ton | $ 11.00 ton | $ 5.36 |
Total non-feed cost | $ 35.36 |

Post-Weaning (W-F)

% attributable to farrowing | 26.4% |
Total farrowing cost | $ 9.57 |
Total non-feed cost | $ 24.37 |
Total cost | $ 33.94 |

Profit / Loss Per Head

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To make accurate business decisions the producer needs to have accurate information base these decisions on.

This requires accurate data on performance of the herd, as well as, accurate business records.

There are 'decision making' tools available that can assist the producer in planning and decision making.

### Outputs From Spreadsheet

<table>
<thead>
<tr>
<th>Income:</th>
<th>Hog market / Debt % above</th>
<th>Hog gain</th>
<th>Hog weight</th>
<th>per day on feed</th>
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<td>$140.67</td>
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<td>Profit</td>
<td>$ 8.70</td>
<td>$ 14.72</td>
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