Data-based Decision Making For Swine Production Systems

Dr. John Mabry
Iowa Pork Industry Center
Iowa State University

GOAL = Maximum Profit

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

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 ?

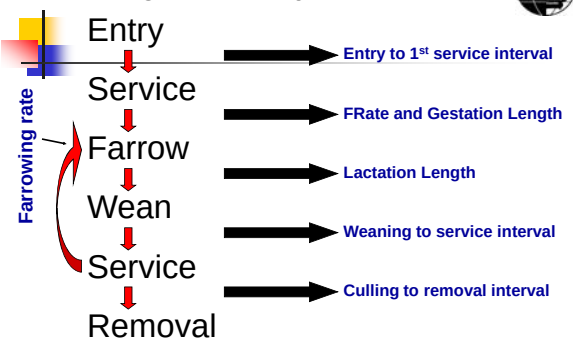
- Feed costs: *function of feed price, feed usage, feed conversion, and pigs marketed/sow/year*
  - Business records, computerized sow management systems and spreadsheets
- Non-feed costs: *Labor, Fixed (facilities, etc), Variable (ins., util., supplies, repairs, taxes, etc), Professional fees (mgt, 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



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 sows 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

- Using 'Sow Management System' software
- Action Lists to find inactive or lost sows
  - Gilts entered but not served
  - Sow found open and no action
  - Sows weaned but not served
- Accurate pregnancy checking
  - Farrowing rate report

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
  - = [sum of gestation days/ sum of breeding female days] * [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 = [115/138]*[365/115]= 2.65

What To Expect For L/S/Y

- 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 = [115/152]*[365/115]= 2.40

Pigs Weaned/Sow/Year

- PW/S/Y for a period of time
  - = [No. pigs weaned/avg brd female inventory] * [365/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 * 13 * 0.92 = 29.9 P/S/Y (rare)
- 2.45 * 11 * 0.88 = 23.7 P/S/Y (good)
- 2.40 * 10.5 * 0.85 = 21.4 P/S/Y (avg)
- 2.20 * 9.5 * 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 spreadsheeet
- 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

Microsoft Excel - pig cost calculator.oct08.xls

File Edit View Insert Format Tools Data Window Help

1		INPUTS:	input in shaded areas										
2		P/S/Y	23.0								Misc Outputs:		
3		Pigs weaned/litter	10.5			End wt	265	lb			Bushel corn/hd	10.97	
4		replacement gilt $	180	/gilt		FE W-F	2.8				W-F FE with dead wt	2.70	
5		Wean wt	10	lb		Corn price $/bu	$ 4.00	/bu			Feed $/hd in dead lbs	$ 2.18	
6		Sow gain	100	lb		SBM $/ton	$ 250	/ton			W-F Feed $/ton	$ 179.33	
7		turnover	0.5			VTM $/ton	$ 600	/ton			Pre-wean feed $/ton	$ 199.72	
8		W - F % death loss	6.00	%		Additive $/lb	$ 2.00	/lb			Whole herd FE	3.01	
9		Avg death loss weight	150	lb		ADG	1.6						

Iowa Pork Industry Center

Inputs From Records

11	**Farrowing**			
12	Gilt Dev purchase cost/female genetics			$ 3.91
13	Breeding cost/ semen & boars			$ 1.00
14	Vet / Medicine			$ 2.00
15	Labor			$ 6.50
16	Fixed (rent, etc)			$ 6.00
17	Variable (ins,util,sup)			$ 3.00
18	Mgmt / acct fees/ other			$ 1.00
19	Repairs, taxes			$ 1.50
20	GMD average cost per tor	$ 16.00	/ton	$ 0.76
21	Cull sow value	@ 0.3	/lb	$ (1.30)
22		Total non-feed costs		$ **24.37**

Iowa Pork Industry Center

Inputs From Records

24	**Farrowing**						
25		Litters/yr	Lact d	Days	intake	tot feed	
26	Lact	2.0	16	32	13	416	
27	Gest			333	5.3	1764.9	
28	**Total**					**2180.9**	
29							
30					Sow feed per pig	**95**	
31				Life Cycle PM-489 L6 Lact diet			
32	**bushels**		%age	LB	Price/lb	Cost/pig	
33	**1.20**	Corn	0.71	67.3	$ 0.07	$ 4.81	
34		SBM	0.255	24.2	$ 0.13	$ 3.02	
35		VTM	0.03	3.2	$ 0.30	$ 0.95	
36		Additive	0.002	0.1	$ 2.00	$ 0.28	
37						$ **9.07**	
38				LB	$/LB		
39		Prewean Pig Feed		1	$ 0.50	$ **0.50**	
40							
41				Total SEW Pig feed cost		$ **9.57**	

Iowa Pork Industry Center

Inputs From Records

Post-Weaning (W-F)

Death loss			$ 2.04
Vet / Medicine			$ 3.00
Labor			$ 5.00
Fixed (rent, int., etc)			$ 14.25
Variable (ins, etc)			$ 1.75
Management fee			$ 1.00
Trucking			$ 3.00
GMD average cost per ton	$ 15.00	/ton	$ 5.36
Other			$ -
	Total non-feed costs		$ **35.39**

Iowa Pork Industry Center

Inputs From Records

Post-Weaning (W-F)

		Wean to finish feed per pig:				**714**
		Average Life Cycle PM-489 diet stage 9				
bushels		%age	LBS	Price/lb	Cost/pig	
9.76	Corn	0.77	546.8	$ 0.07	$ 38.27	
	SBM	0.21	149.9	$ 0.13	$ 18.74	
	VTM	0.023	16.2	$ 0.30	$ 4.86	
	Additive	0.002	1.1	2.00	$ 2.14	
				Paylean $/hd		
					$ **64.02**	
			Farrowing	W-F	Total	
	Total feed cost		$ 9.57	$ 64.02	$ **73.59**	
	Total non-feed cost		$ 24.37	$ 35.39	$ **59.76**	
TOTAL COST			$ **33.94**	$ **99.41**	$ **133.35**	

Iowa Pork Industry Center

Inputs From Records

Farrowing

% attributable to farrowing:	25.4%
Price attributable to farrowing:	$ 37.68
Profit / (Loss) Per Head:	$ 3.75

Post-Weaning (W-F)

% attributable post weaning:	74.6%
Price attributable post wean:	$ 110.39
Profit / (Loss) Per Head:	$ 10.97

Iowa Pork Industry Center

Outputs From Spreadsheet

Income:	$/cwt carcass	Dress %	/head	/cwt gain	/cwt sold	per day on feed
6-mo expected price:	$ 75.00	74.5	$ 148.07	$ 0.58	$ 0.56	$ 0.93
Expense:						
Feed	$ 37.28		$ 73.59	$ 0.29	$ 0.28	$ 0.46
Non-feed			$ 59.76	$ 0.23	$ 0.23	$ 0.37
Total	$ 67.54		$ 133.35	$ 0.52	$ 0.50	$ 0.84
Profit/loss	**$ 7.5**		**$ 14.72**	**$ 0.06**	**$ 0.06**	**$ 0.09**

Summary

- 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