

Value of Sexed Semen

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Introduction

- ▶ Sexed semen: higher proportion of female calves
- ▶ Female calves: more valuable than male calves
- ▶ Sexed semen: economically attractive
- ▶ However: sexed semen also compromises fertility
- ▶ Bottom line: sexed semen brings more female calves but with lower conception rates

Introduction

- ▶ A series of other factors affect the economic decision of using sexed semen
- ▶ The decision of using sexed semen could be based on economics of using a new technology
- ▶ Sexed semen is recommended for virgin heifers
- ▶ Wisconsin dairy producers are using sexed semen with heifers in first and second services

Objectives

- ▶ Present a framework of how to calculate the economics of using sexed semen on heifers
- ▶ Define biological and economic parameters needed to evaluate the use of sexed semen
- ▶ Discuss results for baseline conditions
- ▶ Demonstrate the use of a user-friendly decision support system
- ▶ Hands on use of the decision support system

Framework

- ▶ Partial budgeting: new technology will impact a specific part of management
- ▶ Partial budgeting:
 - Additional revenues
 - Additional costs
 - Revenues foregone
 - Reduced costs

Framework

- ▶ Net Present Value (NPV): fair comparison between technologies

- $$NPV = \sum_{s=1}^5 (\delta_s)(NPV_s) + (\delta_5)(HC - HR)(1 - PP_5)$$

- ▶ Expected Value (EV): difference between sexed semen and conventional programs

- $$EV = NPV(X) - NPV(NX)$$

Framework

- ▶ Overall EV

- Overall EV = $\left(\sum_{t=1}^5 \sum_{CR=1}^3 EV_{t,CR} \right) / (5trt * 3CR)$

- ▶ 5 treatments

- ▶ 3 levels of conception rate

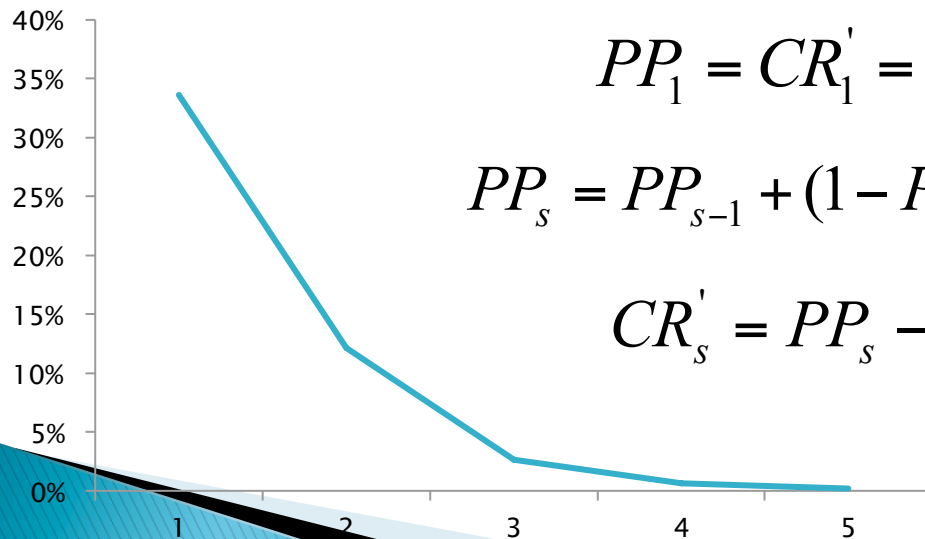
- ▶ Average of 15 possible outcomes

Framework

- ▶ NPV for each service

- $NPV_s = CR'_s * (CV - DC) - (1 - PP_s) * MC - AIC$

- ▶ Survival curves using conditional probabilities



$$PP_1 = CR'_1 = CR_1$$

$$PP_s = PP_{s-1} + (1 - PP_{s-1}) * CR_s \quad \text{for } s = 2 \text{ to } 5$$

$$CR'_s = PP_s - PP_{s-1} \quad \text{for } s = 2 \text{ to } 5$$

Framework

▶ Assumptions

- Reproductive program starts on 14-mo old heifers (420 d age)
- Producers will attempt up-to 5 consecutive reproductive services on heifers

Experiment

Treatment	Service 1	Service 2	Service 3	Service 4	Service 5
Trt 1	X	NX	NX	NX	NX
Trt 2	X	X	NX	NX	NX
Trt 3	X	X	X	NX	NX
Trt 4	X	X	X	X	NX
Trt 5	X	X	X	X	X
Control	NX	NX	NX	NX	NX

Reproductive Parameters

- ▶ Conventional CR:

Low	Average	High
34%	56%	83%

- ▶ Sexed semen CR: **80%** of Conventional

- ▶ Decrease in CR: **2.5%** for additional service

- ▶ Heifer calf rate:

Conventional	Sexed Semen
46.7%	89%

Economic Parameters

▶ Premium paid for sexed semen: **\$30**

▶ Calf value:

Female	Male
\$562	\$48

▶ Dystocia cost:

Female	Male
\$22.15	\$34.91

Other Economic Parameters

Parameter	Conventional and Sexed Semen
Maintenance or day open (DO) cost	\$2.4/d
Salvage value of 20-mo non-pregnant heifer	\$904
Value of 20-mo pregnant heifer	\$1,200
Interest rate	12%/yr

Results & Discussion

► Overall EV: **\$30.1/heifer**

Treatment	Low CR 34%	Average CR 56%	High CR 83%	CR for positive EV
	(\$/heifer)			
Trt 1	6.5	49.3	100.0	31%
Trt 2	-3.4	57.8	111.6	36%
Trt 3	-23.1	46.4	96.1	41%
Trt 4	-48.9	24.7	71.7	48%
Trt 5	-78.5	-2.7	43.9	58%

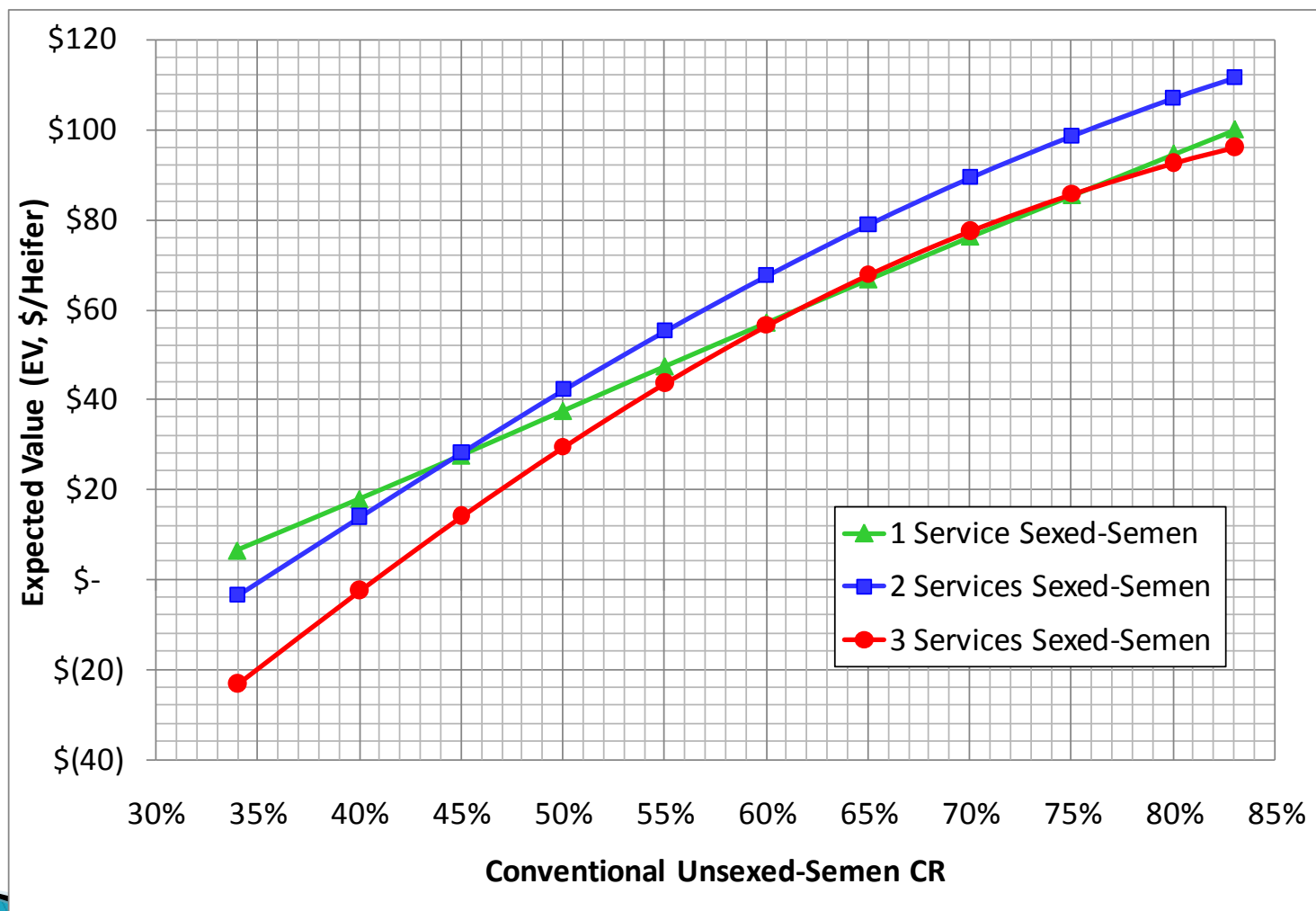
Results & Discussion

Scenario	Overall EV	CR for positive EV	Low CR 34%	Average CR 56%	High CR 83%
	(\$/heifer)	(%)	# Consecutive Services + EV		
X CR 85% of NX	46.10	31	1	4	5
X CR 75% of NX	12.50	36	0	4	5
X heifer ratio 95%	52.40	27	2	5	5
X heifer ratio 78%	-10.90	41	0	3	4
Female calf \$700	69.30	25	3	5	5
Female calf \$280	-50.10	59	0	0	2
X premium \$40	1.10	37	0	3	4
X premium \$20	59.1	26	3	5	5
Dystocia \$42.8	32.40	30	1	5	5
Dystocia \$14.27	27.70	31	1	4	5

Results & Discussion

Scenario	Low CR 34%	Average CR 56%	High CR 83%
	Number of Services with Maximum +EV		
Baseline	1	2	2
X CR 85% NX & X heifer ratio 95%	2	2	2
X heifer ratio 95% & female calf \$700	2	2	2
X CR 85% NX & female calf \$700	2	2	2
X CR 85% NX & X heifer ratio 95% & female calf \$700	2	3	2
X CR 75% NX & X heifer ratio 78%	NONE	1	1
X heifer ratio 78% & female calf \$280	NONE	NONE	1
X CR 75% NX & X heifer ratio 78% & female calf \$280	NONE	NONE	NONE

Results and Discussion



Results & Discussion

	Baseline Value	Change Value	Change on Overall EV
Maintenance or DO cost	\$2.4/d	+\$0.1	-\$1
Salvage value	\$1.79/kg	+\$0.1	-\$1
20-mo old pregnant heifer value	\$1,200	+\$100	-\$2.84
Dystocia cost	\$28.53/heifer	+\$10	+\$1.44
Premium paid for X semen dose	\$30	+\$5	-\$14.50
Discount rate	12%	10%	-\$0.1

Conclusions

- ▶ In most of the cases sexed semen would have a higher economic value than conventional semen
- ▶ Single most important factor in the decisions is the conventional CR:
 - Between 34 and 44%: Optimal Trt 1
 - 45% or higher: Optimal Trt 2

Conclusions

- ▶ Other important parameters:
 - Female calf value (++)
 - X semen CR (+)
 - X expected proportion of females (+)
 - Premium for X semen (+)
- ▶ Other parameters will only have limited impact on the decisions

Other Considerations

- ▶ Implications for farm herd expansion
- ▶ Faster genetic improvement
- ▶ Greater incidence of stillbirths
- ▶ Longer gestation period
- ▶ Decreased bio–security risks
- ▶ Implications for US herd expansion

Decision Support Challenge

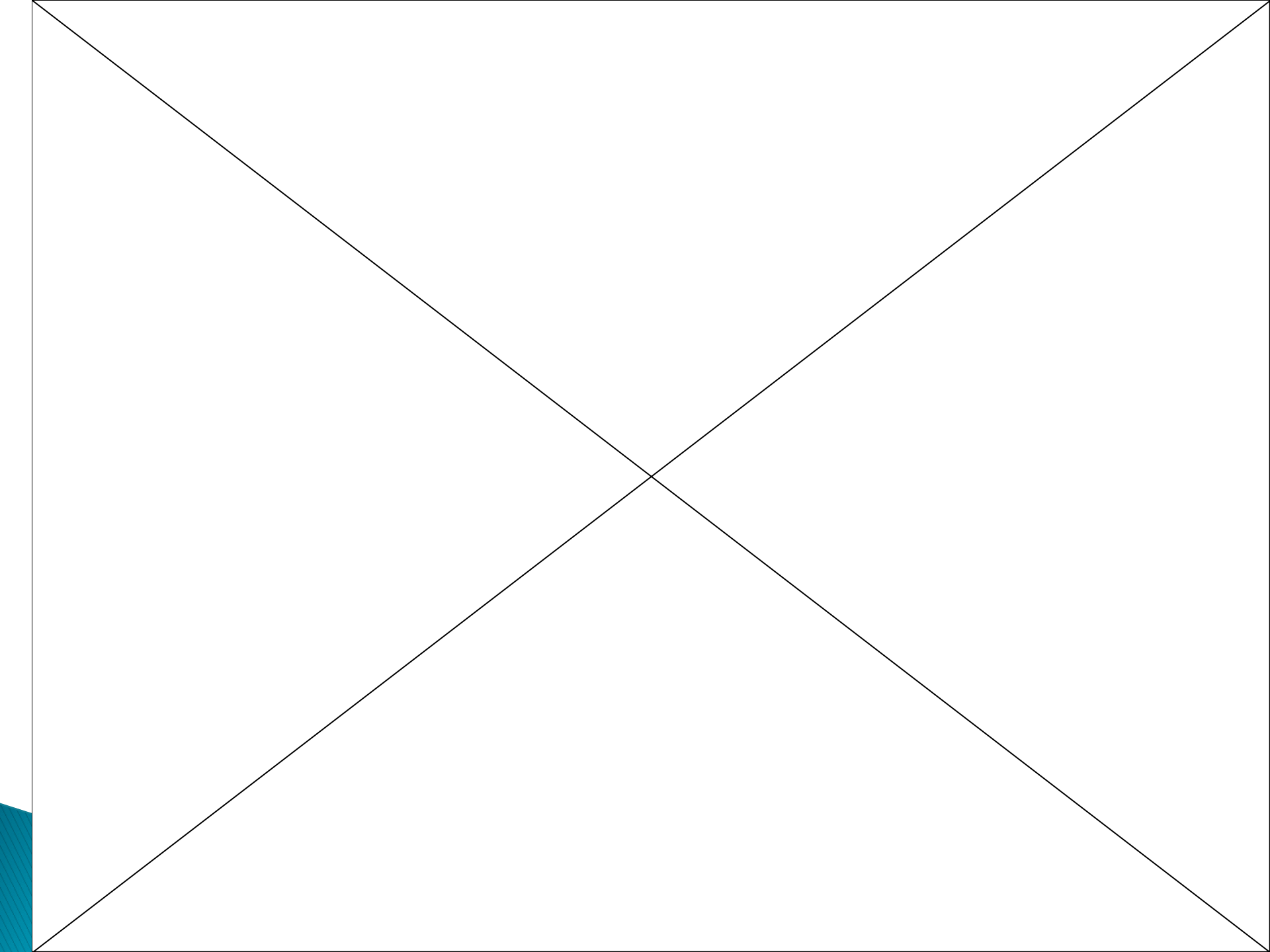
- ▶ Results are not applicable to all farm situations
 - Every farm is different
- ▶ Results are not applicable to all market conditions
 - Market conditions change permanently
- ▶ Challenge: provide the same analysis, but as a decision support system aid for practitioners

Decision Support Challenge

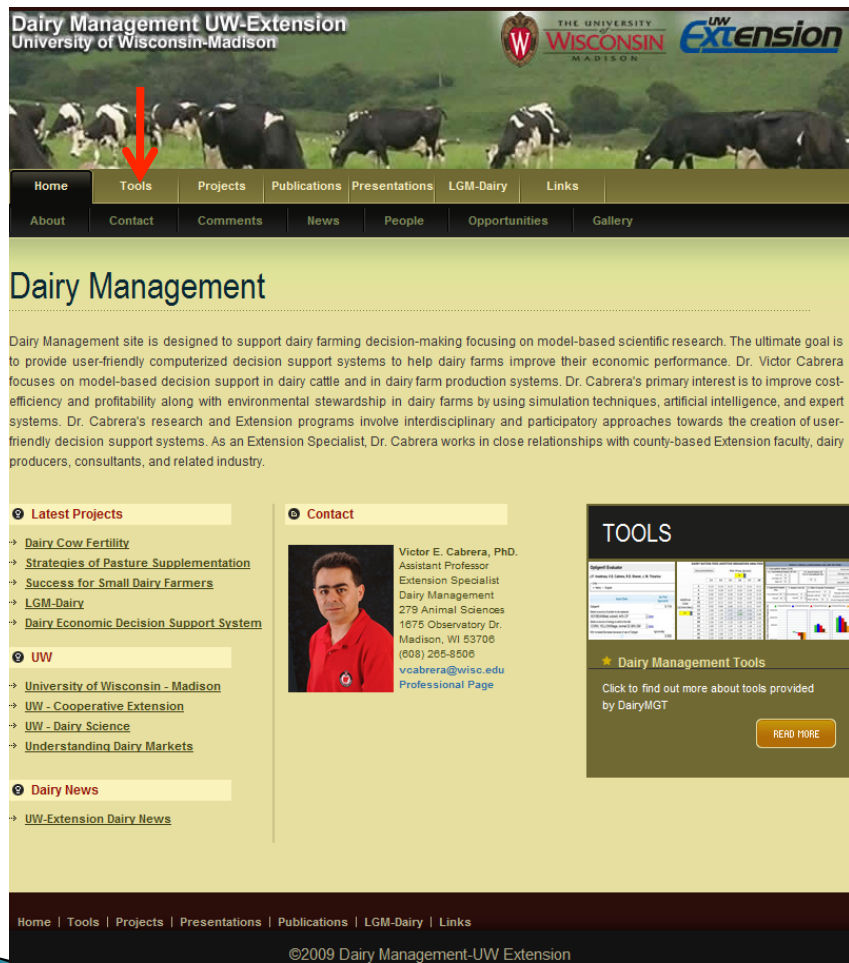
- ▶ Spreadsheets are good and popular, but:
 - Need download
 - Could have compatibility issues
 - Difficult to maintain latest updated version
- ▶ A Decision Support System (DSS) should preferably be:
 - Visually attractive
 - Interactive
 - Robust
 - Available online
 - Self-contained

Decision Support Challenge

- ▶ A Decision Support System (DSS) should have preferably:
 - Secured calculations
 - Clear instructions
 - Technical support available



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Dairy Management

Dairy Management site is designed to support dairy farming decision-making focusing on model-based scientific research. The ultimate goal is to provide user-friendly computerized decision support systems to help dairy farms improve their economic performance. Dr. Victor Cabrera focuses on model-based decision support in dairy cattle and in dairy farm production systems. Dr. Cabrera's primary interest is to improve cost-efficiency and profitability along with environmental stewardship in dairy farms by using simulation techniques, artificial intelligence, and expert systems. Dr. Cabrera's research and Extension programs involve interdisciplinary and participatory approaches towards the creation of user-friendly decision support systems. As an Extension Specialist, Dr. Cabrera works in close relationships with county-based Extension faculty, dairy producers, consultants, and related industry.

Latest Projects

- Dairy Cow Fertility
- Strategies of Pasture Supplementation
- Success for Small Dairy Farmers
- LGM-Dairy
- Dairy Economic Decision Support System

UW

- University of Wisconsin - Madison
- UW - Cooperative Extension
- UW - Dairy Science
- Understanding Dairy Markets

Dairy News

- UW-Extension Dairy News

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Feeding Heifers Reproduction Production Replacement Financial Environment

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A collection of state-of-the-art dairy management tool that are: user-friendly, interactive, robust, visually attractive, and self contained. All these tools have clear or self-explanatory instructions and technical support available.

Click on the Tool title to learn more.

Feeding

- Optigen® Evaluator
- Income Over Feed Supplement Cost
- Wisconsin Dairy Feed Cost Evaluator
- Corn Feeding Strategies
- Dairy Ration Feed Additive Program Analysis

Heifers

- Cost-Benefit of Accelerated Liquid Feeding Program for Dairy Calves
- Economic Value of Sexed Semen Programs for Dairy Heifers

Estimates the difference of the net present value of various sexed semen reproductive programs and a conventional semen reproductive program for dairy heifers

Flash Online Tool (Play)

Flash Offline Tool (Download)

Instructions (Download)

Documentation (Download)

Decision (Click to View the Video)

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- Heifer Replacement
- Heifer Break-Even

Reproduction

- Economic Value of Sexed Semen Programs for Dairy Heifers

Production