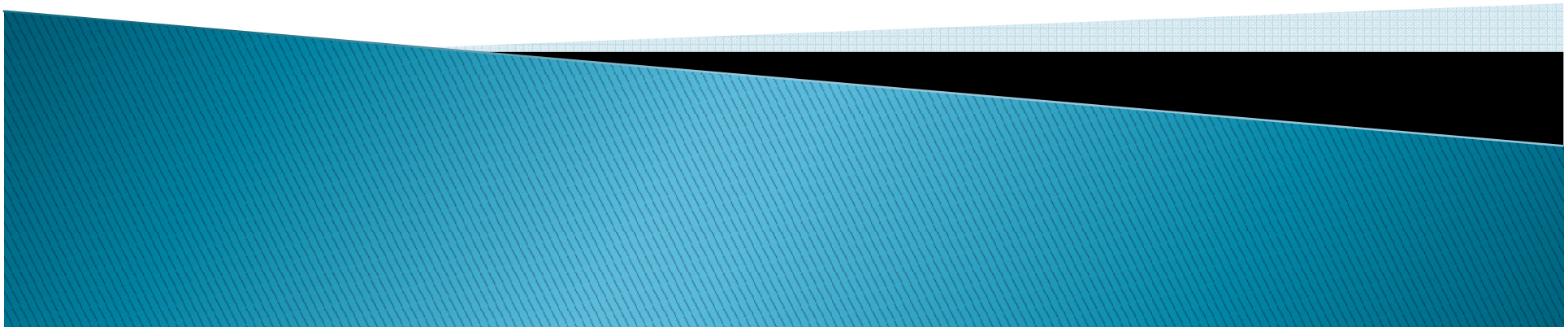


Optimizing Income Over Feed Supplement Cost

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Ohio Dairy Health and Management Certificate Program
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Introduction

- ▶ Large fluctuations in milk and supplemental feed prices create anxiety and uncertainty
 - More than 90% of dairy farm income comes from the milk
 - More than 40% of variable expenses are supplemental feed
 - Correct decisions about income over feed supplement cost (IOFSC) have a large influence on dairy farm profitability
- ▶ Important to make correct decisions to maximize IOFSC

Justification

- ▶ Surface responses to IOFSC for levels of crude protein (CP) have been studied in the past
- ▶ However, there are further needs to more detailed CP components responses to milk productivity
 - Rumen Undegradable Protein (RUP)
 - Rumen Degradable Protein (RDP)
- ▶ There is an opportunity to fine-tune the supplementation to maximize IOFSC

Justification

- ▶ Traditional diet formulation is based on finding the least cost ration for a target level of nutrients for a desired level of milk production
- ▶ Typically, traditionally diet formulation does not consider changes in milk production due to dynamic changes on CP, RUP, RDP that could be fine-tuned to maximize IOFSC

Justification

- ▶ Profitability of dairy farms can be improved by decreasing CP and adjusting RUP and RDP through a better selection of ingredients
- ▶ Lower CP diets decrease N excretion and consequently environmental impacts
- ▶ Not available user-friendly decision support systems to perform this kind of optimization

Objective

- ▶ Present a simple framework to optimize IOFSC
- ▶ Perform some case studies
- ▶ Implement the optimization model into user-friendly decision support system
- ▶ Hands-on practice in the use of the IOFSC optimization model

Framework

- ▶ Objective = $\max(MV - \sum_{i=1}^N SV_i)$
- ▶ Subject to $\sum_{i=1}^N SQ_i = \text{DMI}$
 - $\text{RUP} \leq \max \text{RUP}, \text{RDP} \leq \max \text{RDP}, \text{SQ} \leq \max \text{SQ}$
- ▶ DMI = Using NRC, 2001
- ▶ MP = Using NRC

Framework

Feed Stuff	A (%)	B (%)	C (%)	Kd	Calculated				
					Kp	RUP (%)	RDP (%)	CP (%)	
Forages									
35-Corn silage	51.00	30.20	18.80	4.40	5.93	3.15	5.62	8.80	
74-Mixed silage	58.10	34.20	7.70	10.40	5.93	3.82	15.18	19.00	
83-Alfalfa silage	57.30	35.30	7.40	12.20	5.93	4.15	17.75	21.90	
Energy Supplements									
27-Corn grain	23.90	72.5	3.60	4.90	8.34	4.63	4.77	9.40	
8-Barley grain	30.20	61.20	8.60	22.70	8.34	3.11	9.29	12.40	
Protein Supplements									
106-Soybean meal	22.50	76.80	0.70	9.40	8.34	18.37	31.53	49.90	
25-Corn gluten meal	3.90	90.90	5.20	2.30	8.34	49.69	15.31	65.00	
23-Corn distiller grains	28.50	63.30	8.20	3.60	8.34	15.57	14.13	29.70	
104-Soybean meal expellers	8.70	91.30	0.00	2.40	8.34	32.83	13.47	46.30	

A Case Example

	Value
Herd	Holstein
DIM	100 d
Production	80 lb/d
DMI	53.67 lb/d
Forage proportion of DMI	50%
Forage CP, RUP, RDP	7.7%, 1.8%, 5.9%
Target CP, RUP, RDP	18%, 6.5%, 11.5%

A Case Example

	Current	Optimized
Corn grain	20.9 lb	17.6 lb
Soybean meal	6.0 lb	4.2 lb
Corn distillers	0.0 lb	5.0 lb
IOFSC	\$5.20	\$5.54

- ▶ \$0.34/d per cow
 - ▶ \$124/yr per cow
 - ▶ \$12,400/yr per 100-cow farm

Data for IOFSC Optimization

Feed Stuff	Price		Upper Limit		Current in Diet	
Energy Supplements	\$/kg	\$/bu	kg	lb	kg	lb
27-Corn grain	0.16	4.0	6.81	15	4.54	10
Wheat grain	0.27	7.4	4.54	10	0.68	1.5
Protein Supplements	\$/kg	\$/ton	kg	lb	kg	lb
106-Soybean meal	0.28	250	6.81	15	2.27	5
25-Corn gluten meal	0.61	550	0.91	2		
24-Corn gluten feed	0.18	160	4.54	10	2.27	5
23-Corn distiller grains	0.22	200	4.54	10	2.27	5
104-Soybean meal expellers	0.20	402	6.81	15		
14-Blood meal ring dried	0.99	900	0.45	1		
Urea	0.70	635	0.45	1		

Spreadsheet Application

Income Over Feed Supplement Cost (IOFSC)										
					Overwrite yellow cells and make appropriate selection Click on blue button to optimize IOFSC: results appear in					Units
V.E. Cabrera, R.D. Shaver, and M.A. Wattiaux					blue cells. Click on red button to substitute between feed supplements; results appear in figures and table .					<input type="radio"/> Metric <input checked="" type="radio"/> English
1 Calculate Dry Matter Intake (DMI)										
1.1	Milk Production (MP)	lb/cow/day	80							
1.2	Body Weight (BW)	lb/cow	1400							
1.3	Days in Milk (DIM)	day	180						103	
1.4	Dry Matter Intake (DMI)	lb/cow/day							56.06	
2 Set the Sources and Proportion of Forage in the Diet										
2.1	Proportion of Forage in Diet	% of Diet	50%							
2.2	35-Corn Silage-CoSi	% of Forage	50%							
2.3	83-Alf. Silage-AISi	% of Forage	50%							
2.4	Own Forage	% of Forage	0%							
2.5	Crude Protein in Diet Provided by Forage	lb/cow/day							4.30	
3 Set Source of Energy Supplements and Prices										
		Price (\$/bu)	Current Diet (lb)	Upper Limit (lb)	Optimal (lb)					
3.1	27-Corn-CGG	4	10	15	14.51					
3.2	8-Barley-BGR			0	0.00					
3.3	116-Wheat-WGR	7.4	1.5	10	0.00					
4 Set the Source of Protein, Byproduct Supplements and Prices										
		Price (\$/ton)	Current Diet (lb)	Upper Limit (lb)	Optimal (lb)					
4.1	106-Soybean Meal-SBM	300.00	5	15	1.14					
4.2	25-Corn Gluten Meal-CGM	550.00		2	2.00					
4.3	24-Corn Gluten Feed-CGF	160.00	5	10	10.00					
4.4	23-Corn Distiller Grains-CDG	300.00	5	10	0.00					
4.5	109-Soybean Whole Roasted- HSB	318.00		7	0.00					
4.6	104-Soybean Meal Expellers-SBMx	402.00		15	0.37					
4.7	14-Blood Meal Ring Dried-BMRD	900.00		1	0.00					
4.8	Urea	635.00		1	0.00					
5 Set the Upper Limits for RUP and RDP, and Milk Price										
				Upper Limit	Amount in Diet					
5.1	RUP Rumen Undegradable Protein	% of Diet DM		6.50%	6.50%					
5.2	RDP Rumen Degradable Protein	% of Diet DM		11.50%	11.49%					
5.3	CP Crude Protein	% of Diet DM		18.00%	18.00%					
5.4	Milk Price	\$/cwt	10							
6 Perform Optimization, Maximize IOFSC										
6.1	Click the button to maximize the Income Over Feed Supplement Cost (IOFSC)									
6.2	Expected Milk Production (E-MP)	lb/cow/day		Current	Optimal					
6.3	Maximum Income Over Feed Supplement Cost (IOFSC)	\$/cow/day		5.54	5.99					
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Online Application

Income over Feed Supplement Cost
Dr. Victor E. Cabrera

UW Extension THE UNIVERSITY OF WISCONSIN COLLEGE OF AGRICULTURE AND MECHANICAL ENGINEERING MADISON WISCONSIN Dairy Team

English Metric Documentation Instructions



I Calculate Dry Matter Intake

1. Milk Production	110	lb/cow/day
2. Body Weight	1380	lb/cow
3. Days in Milk	180	day
4. Dry Matter Intake	67.53	lb/cow/day

II Set the Sources and Proportion of Forage in the Diet

Proportion of Forage in diet: 50 %

35-Corn Silage-CoS	100	% of Forage	Edit Row
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Crude Protein in Diet Provided by Forage: 2.37 lb/cow/day

Add Row

III Set Source of Energy Supplements and Prices

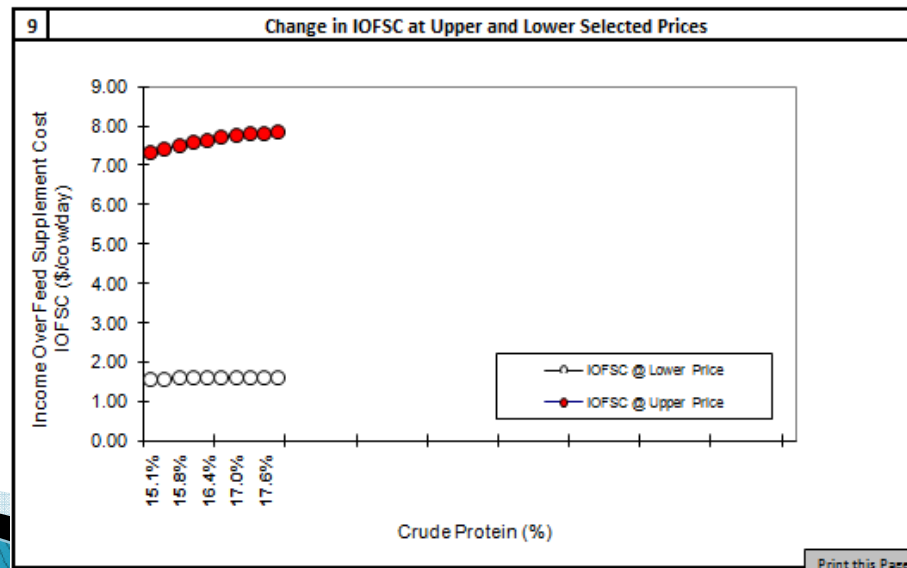
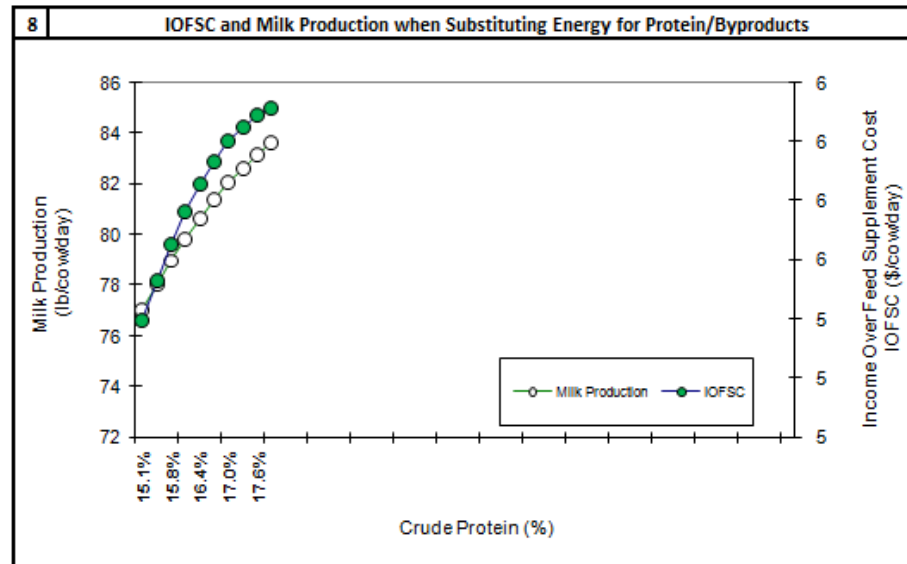
Source	Price (\$/lb)	Current Diet (lb)	Upper Limit (lb)	Edit Row
35-Corn Silage-CoS	4	10	30	Edit Row

Add Row

Substitution of Supplements

INPUT		OUTPUT				
ENERGY	PROTEIN	RUP	RDP	CP	MILK	IOFSC
20.42	7.656	5.5%	9.7%	15.1%	77.43	4.75
...						
18.29	9.783	5.9%	10.0%	15.9%	80.43	4.78
...						
16.16	11.91	6.3%	10.4%	16.7%	83.22	4.79
...						
14.46	13.61	6.6%	10.7%	17.3%	85.3	4.78
...						
13.61	14.46	6.7%	10.8%	17.6%	86.29	4.76
...						
12.76	15.31	6.9%	11.0%	17.9%	87.25	4.75

Substitution of Energy/Protein



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Feeding

- Optigen® Evaluator
- Income Over Feed Supplement Cost

Maximizes the income over feed supplement cost (IOFSC) for a fixed amount of forage used in the diet and graphs the IOFSC to a substitution of two selected feed supplements

Excel Spreadsheet (Open)

Online (Open)

Instructions (Download)

Documentation (Download)

- Wisconsin Dairy Feed Cost Evaluator
- Corn Feeding Substitutes
- Dairy Ration Feed Additive Cost-Scan Analysis

Heifers

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

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