BENCH MARKS

NUTRITION

1

Nutrient requirements (dry matter basis) for dry cows

Nutrient	Far-Off	Close-up
DMI (% BW)	**1.6**	**2.0**
NEL (Mcal/lb)	**0.60**	**0.68**
Crude Protein (CP) % DM	**13**	**15**
SIP % of CP	35-40	30
UIP (RDP);% of CP	25-30	35-40
ADF, %	**30**	**24**
NDF, %	**40**	**33**
Forage NDF, %	30	24
NFC, % Max	30	34
Crude fat, %	2	3
Potassium, %	**0.65**	**0.65**

2

Major Mineral requirements (dry matter basis) for CIsoe-up Dry Cows

Nutrient	% Dry matter
Ca	1
Phosphorous	0.30-0.40
Mg	0.30
Potassium	**0.65**
Na	0.07
Chlorine	**0.15**
Sulfur	0.2-0.3

3

Nutrient requirements for lactating cows

Nutrient	%
DMI (% BW)	3.2
NEL (Mcal/lb)	0.72-0.74
Crude Protein (CP) % DM	16-18
ADF, %	19
NDF, %	Min 28 ; Max 31
Forage NDF, %	75
NFC, % Max	40
Crude fat, %	6

Forage : Concentrate → **60%:40%**

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Practical Feeding Management

Question to ask?

- **Feed Intake**
- **Are cows actually consuming feed?**
  - **amounts fed at least 1.1 times more than milk per cow**
  - **amounts weigh back**
  - **number of cows per group**

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Question to ask?

- **Does fresh feed have any "off" odor?**
- **Is the feed uniformly mixed?**
- **Is the bunk clean to begin with?**
- **Is the fresh feed warm/hot?**
- **Do we have adequate bunk space?**
- **Do cows sort the feed and what do they sort for ? Evaluation of feed left over**
- **What percent of the cows chewing their cuds? At least 50%**
- **How much time cows spend away from the feed bunk? Maximum 3 hours/day**

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Feeding a TMR Free Choice

- **2-4 percent weigh back (orts)**
- **Weigh back is uniform**
- **Weigh back is not sorted**
- **Feed is available > 20 hours a day**

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TMR GUIDELINES

- Feed available over 20 hours a day
- In the holding pen and parlor < 1 1/2 hr per milking
- Weigh backs should average 2-4%
- Avoid rations over 50% moisture from fermented feeds

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- **Reformulate when dry matter intakes change by 2 lb/cow/day**
- **Reformulate if wet ration ingredients changes 5% or 2 lb D.M. per cow**

Testing TMR OR Weigh Backs

USE THE 1-2-3 RULE

1: +/- one unit of crude protein

2: +/- two units of ADF

3: +/- three units of dry matter

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Penn State Separator

	Top	Middle	Bottom
Corn Silage (1/4)	< 5	> 50	< 50
Corn Silage (1/2)	< 5	> 70	< 30
Haylage	> 20	> 40	< 40
TMR	> 10	> 30	< 50

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Factor affecting Feed Efficiency

- Days in milk (the lower DIM the higher FE)
- BCS (low BCS indicates higher FE) caution!
- Lactation number and Days in milk
  - Lactation 1 has lower FE (0.1-0.2 units lower)
  - Fresh cows FE should ~1.3. Higher FE in fresh cows = loosing BCS too fast
  - Check fat test

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Factor affecting Feed Efficiency

- NDF digestibility (specially above 35%)
  - High NDF ↓ FE
- Acidosis and lack of rumination ↓ FE
- Excessive temperature and walking distance ↓ FE

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Group	DIM	FE (lb milk/lb DM)
All herd	150 - 225	1.4 – 1.6
1 st lactation	Peak - 255	1.3 – 1.5
Fresh cows	< 25 days	1.2 – 1.3
Problem herds	150 - 225	<1.3

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FIELD TOOLS

- **Milk yield changes**
- **Milk component changes**
- **Manure appearance**
- **Grain in manure**
- **Signs of acidosis**

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PRODUCTION

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FIELD TOOLS

- **Peak mature cows 100 lbs**
- **Peak 1st lactation 80% of mature cow**
- **Lactation curve,: milk decrease <8% per month after peak**
- **Avg milk: >80 lbs/cow/day**

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HEIFER MGT.

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Goals for Heifer Management

Parameter	Brown Swiss & Holstein	Ayrshire & Guernsey	Jersey
Mortality (%)	<5	<5	<5
Weaning age (weeks)	6-8	4-6	4-6
Average daily gain (lbs./day)	1.6-1.8	1.4-1.6	1.2-1.4
Maximum prepubertal ADG (lbs./day)	1.8	1.6	1.4
Average age at first breeding (months)	14	14	12
Weight at first breeding (lbs.)	750-800	650	550
Wither height at first breeding (inches)	50	46	43
Services per conception	1.5 - 1.8	1.5 - 1.8	1.5 - 1.8
Age at first calving (months)	23-24	23-24	22 - 24
Postcalving weight (lbs.)	1250	1000	800
Peak milk production (lbs./day)	75-80	60	55

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GROWTH STAGES

Age	Weight (Lbs.)	Average Daily Gain (Lbs.)	Percent Death Loss	Percent Culled
Birth to 3 Days	90 to 100		2 to 5	
Liquid Feeding	160 to 180	1.2 to 1.4	2 to10	
Weaning to 7 Mo.	450	1.7 to 2.2	1 to 2	4 to 5
7 Mo. to Breeding	880	1.7 to 2.2	<1	1
Breeding to Calving	1366	1.5 to 2.2	<1	1 to 2

A very good program has 90 percent of the heifers born alive enter the barn as springers.

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Breeding Age Heifers

- **Breeding age (13-14 months)**
  - **Body condition score**
  - **Wither height measurement**
  - **Balanced ration: ~19-20 lb DM**

CP: 13-14 %DM	**TDN: 65% DM**
ADF: 32% DM	**RUP: 20% of CP**

- **Make sure that heifers do not loose BW and body condition at this stage.**

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METABOLIC DISORDERS

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Rumen Buffers Function

- **Maintain pH 6.25**
- **Stimulate DM intake**
- **Improve rumen environment**

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Effects of Acidosis

- **Shift rumen microbial population**
- **Shift rumen VFA pattern**
- **Slow the rate of feed passage**
- **Lower feed digestibility, especially fiber**

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Rumen Acidosis

- **Lack of cud chewing**
- **Appearance of hoof lines**
- **Abnormal hoof growth**
- **Loose manure**
- **Eating of soil or bedding**
- **Milk fat depression**
- **Free choice buffer consumed**
- **Fat test responses to buffers**
- **Variable dry matter intake**

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Milk Components

- Milk fat <0.4 point below milk protein
- Milk fat 1 full point below herd average

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Strategies with Buffers

- Add 0.75% ration DM
- Conditions that favor response
  - Ration ADF < 19%
  - Ration NDF < 28%
  - eNDF < 20%
  - Over 6 lb of grain per meal
  - Over 2% BW as concentrates
- Monitor dry matter intake

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Fresh Cow Problems

Health event	Goal	Intervention	cost
DA	1%	> 3%	>$500
Milk fever	1%	>5%	$300
Ketosis	5%	>10%	$250
Retained placenta	3%	>7%	$285
Metritis	<5%	>10%	$200
Mastitis	1%	>3%	$250
Acidosis	None		??

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COWS LEAVING THE HERD

- Involuntary Culling goals:
  - Overall <35%
  - < 6% in the first 30 DIM
  - <11% in the first 100 DIM
- Culling reason Guidelines:
  - < 5% lameness
  - <7% mastitis
  - <8% Reproduction
  - ~2% other

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Mastitis

CHECK LIST:

- ✓**Check type of mastitis**
- ✓**Check the cows environment**
- ✓**Check teat ends and milking machines**
- ✓**Check SOP's for mastitis treatment**
- ✓**Check dry cow therapy**
- ✓**Check new incidence, chronic, and new cases**
- ✓**Check the trend for SCC**
- ✓**Check the trend of mastitis occurrence**
  - ➢**By DIM**
  - ➢**By month**

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Herd Somatic Cell Counts

SCC information has many uses. Some of the more important uses are listed below.

- Monitoring the prevalence of subclinical mastitis in a herd, especially that caused by contagious microorganisms.
- Evaluating the severity and duration of infections in individual cows.
- Determining if the herd mastitis situation is improving or worsening.
- Classifying mastitis as being primarily contagious or environmental or both.
- Evaluating precalving and postcalving mastitis management.
- Identifying problem cows.

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Mastitis Bench Mark

Item	*Goal*	*Problem*
Somatic cell counts	**< 200,000**	**> 350,000**
SC Liner score	**< 3.5%**	**> 4**
% incidence affected cows at given time	**1%**	**>3%**
Item	***Milk Loss***	
Milk loss for 1 point increase in LSC score	**1.5 lb cow/day**	
Milk loss for SCC >300,000	Approx 300-400 lbs	
Clinical case ($/case)	**$180**	
Return on investment For curing mastitis	**$1 to $5**	

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REPRODUCTION

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Reproductive Performance Goals

	Ideal Goals	Realistic goals
Reproductive Cull Rate	< 8 %	10%
% Heat Detection	> 70	60%
Average Days to First Breeding	70 – 75 d	75 d
First Service Conception Rate	60%	50%
Overall Conception rate	50-55%	45%
Breeding Per Conception	< 1.8	2.3
Days Open	110	130
Calving Interval	13 months	13
Pregnancy rate	> 25%	22%

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Labor Efficiency Benchmark

Goals:

- *Cows/worker:* 50-60 (dairy &crop operation; 90-110 (dairy only)
- *Milk sold/worker:* >1,000,000 lbs

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Financial Benchmark

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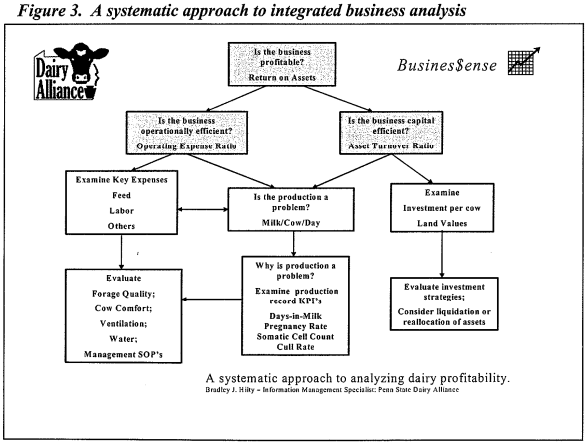
Figure 3. A systematic approach to integrated business analysis



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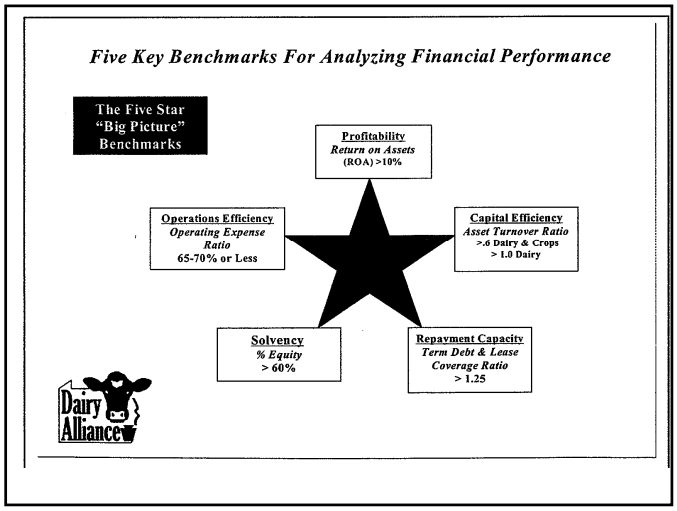

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10 Key Financial Indicators

Formula: Operating cost % = operating costs ÷ Gross income

1. Operation Expense Ratio (cost as a % of gross Income)

65-70% of the gross income

Operation Cost= All expenses - depreciation and interest expense

Factors affecting OER: production level, poor cost control mgt. (feed, labor, heifer cost) milk price, operation efficiency and expenses

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10 Key Financial Indicators

2. Feed Cost (% gross income)

- **Only buying mineral & protein supplements 20-25%**
- **Only buying grain and commodities 30-35%**
- **Buying everything 45-50%**

- **Income over feed cost:**
- Goal:> $6.00/cwt Avg: $5.00 Problem ,$4.50

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10 Key Financial Indicators

3. Investment per cow

Goal $6,000

Avg: $7,000 -$8,000

Problem: >$8,000

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10 Key Financial Indicators

4. Livestock expenses, Labor expenses

5-6% **11-12%**

Breeding costs

- **Veterinarian costs**
- **bST**

Useful in partial budgeting

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10 Key Financial Indicators

Formula

$$\frac{\text{NFI}^1 \text{ (from operations)} + \text{Interest} - \text{Return to Owner \& Unpaid family labor \& management}}{\text{Average Total Farm Assets}}$$

5. ROA: Return On Assets (part of profitability)

Avg 2-4%, Goal 8-10%

- ROA evaluates how well the business generate returns in its resources.
- Factors affecting ROA: production level, milk price, operation efficiency and expenses

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10 Key Financial Indicators

Formula:

$$\frac{\text{Gross Income (Revenues)*}}{\text{Average Total Assets**}}$$

5. ATO: Asset Turnover Ratio (part of profitability)

Gross Income / Avg total assets

Avg <40%, Goal >40%

- ATO evaluates how efficient a dairy uses its asset to generate income
- Factors affecting ATO: production level, milk price, land values, investment on capital

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10 Key Financial Indicators

Percent (%) Equity (part of solvency)

Gross Income / Avg total assets

Avg 50-55%, Goal >50%

Formula:

$$\frac{\text{Assets} - \text{Liabilities}}{\text{Total Assets}}$$

- How much of the business owned by the owner
- Factors affecting equity: Debt levels, assets turn over and/or return on assets, debt/cow

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10 Key Financial Indicators

Current Equity/Current Ratio (part of liquidity)

1.7 stable ;<1.10 Vulnerable

•Should be 2:1 ratio ideally

$2 current assets for each $1 current liabilities

Increase the ability to work with lenders

Current Liabilities = bills over 30 days old
Current Assets = cash, feed on hand, prepaid expenses, animals values

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Financial Bench Mark

Item	Goal	Problem
Return on Asset	> 8%	<4%
Asset TO	>40%	<25%
Current Ratio % equity	>1.5 50-55%	<1.0 <45
Operating expense as % of gross income	<70%	>80%
Debt/cow	<$5,000	>$8,000
Labor (dairy only)	90-100/cow Or >1 mil lb/worker	
Investment/cow	<$10,000	> $15,000

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Farm Financial Ratios and Benchmarks Calculations & Implications

Liquidity Analysis	Calculation	Good	Caution	Danger
Current Ratio	Total Current Assets ÷ Total Current Liabilities	> 1.50	0.80 - 1.50	< 0.80
Working Capital / Total Expenses (expanding business)	(Total Current Assets – Total Current Liabilities) ÷ Total Expenses	> 50%	15 - 50%	< 15%
Working Capital / Total Expenses (stable business)	(Total Current Assets – Total Current Liabilities) ÷ Total Expenses	> 25%	15 - 25%	< 15%
Solvency Analysis	**Calculation**	**Good**	**Caution**	**Danger**
Debt / Asset Ratio	Total Liabilities ÷ Total Assets	< 30%	30 - 70%	> 70%
Equity / Asset Ratio	Total Equity ÷ Total Assets	> 70%	30 - 70%	< 30%
Debt / Equity Ratio	Total Liabilities ÷ Total Equity	< 42%	42 - 230%	> 230%
Profitability Analysis	**Calculation**	**Good**	**Caution**	**Danger**
Rate of Return on Assets (ROA) (mostly owned)	(NFIFO* + Interest Expense – Operator Management Fee) ÷ Total Assets	> 8%	3 - 8%	< 3%
Rate of Return on Assets (ROA) (mostly rented or leased)	(NFIFO* + Interest Expense – Operator Management Fee) ÷ Total Assets	> 12%	3 - 12%	< 3%
Operating Profit Margin	(NFIFO* + Interest Expense – Operator Management Fee) ÷ Gross Revenue	> 25%	10 - 25%	< 10%
Financial Efficiency	**Calculation**	**Good**	**Caution**	**Danger**
Asset Turnover Ratio	Gross Revenue ÷ Total Assets	> 40%	20 - 40%	< 20%
Operating Expense / Revenue Ratio (owned)	(Operating Expenses - Interest - Depreciation) ÷ Gross Revenue	< 65%	65 - 80%	> 80%
Operating Expense / Revenue Ratio (mostly rented or leased)	(Operating Expenses - Interest - Depreciation) ÷ Gross Revenue	< 75%	75 - 85%	> 85%
Net Farm Income From Operations Ratio	NFIFO* ÷ Gross Revenue	Look at trends; varies with cyclical nature of agricultural prices & income		
Repayment Analysis	**Calculation**	**Good**	**Caution**	**Danger**
Term Debt and Lease Coverage Ratio	[(NFIFO* + Gross Non Farm Revenue + Depreciation Expense + Interest on Term Debts and Capital Leases) – Income Tax Expense – Family Living Withdrawals)] ÷ Scheduled Annual Principal and Interest Payments on Term Debt and Capital Leases	> 150%	110 - 150%	< 110%
Term Debt/EBITDA	(Total Non-Current Liabilities + Current Portion of Term Debt) / (NFIFO + Interest Expense + Depreciation Expense)	< 3	3 - 7	> 7

DAIRY INDUSTRY BENCHMARKS		Good	Caution	Danger
Debt Per Cow	Total Farm Liabilities / (Lactating + Dry Cows)	≤ $5,000	$5,001 - 7,999	≥ $8,000
Investment Per Cow	Total Farm Assets / (Lactating + Dry Cows)	≤ $13,000	$13,001 - 16,999	≥ $17,000
Tillable Acres Per Cow	Total Tillable Acres / (Lactating + Dry Cows)	≥ 4	2 - 3.99	≤ 1.99
Machinery Investment Per Cow	Total Machinery & Equipment Value / (Lactating + Dry Cows)	≤ $2,500	$2,501 - 3,499	≥ $3,500
Lbs Milk Sold Per Cow	Lbs Shipped / (Lactating + Dry Cows)	≥ 24,000	18,001 - 23,999	≤ 18,000
Lbs Milk Sold Per FTE Worker	Lbs Shipped / FTE for all dairy-related labor	>1.5 million	1.0 - 1.5 million	<1.0 million
Gross Cash Income Per Cow	(Milk + Culls + Calves & Heifers + Patronage) / (Lactating + Dry Cows)	≥ $4,500	$3,001 - 4,499	≤ $3,000
Interest Cost Per Cow	Total Interest Expense / (Lactating + Dry Cows)	≤ $270	$269 - 349	≥ $350
Net Farm Cash Income Per Cow	(NFIFO + Depreciation) / (Lactating + Dry Cows)	≥ $600	$201 - 599	≤ $200
Cost of Producing CWT of Milk	(Total Dairy-Related Expenses + Interest + Depreciation) / CWT Shipped	≤ $17.49	$17.50 - 18.99	≥ $19.00

*NFIFO = Net Farm Income From Operations: (Total Revenues - Total Expenses, excluding gains or losses from disposal of farm capital assets).

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