Utilizing Forage in the Feedlot

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Factors Influencing Carcass

- Feeding program
- Genetics
- Implant program
- Health
- Others

Building a Ration

- Simple or as complex as one makes it
- UIP : DIP ratios
- Synchronizing CHO and N availability
- Positive/Negative Associative Effects
- Feed Additives and Label Use

Experience is Valuable

- Previous knowledge is valuable
- Was it the group of cattle or ration?
- Records are invaluable piece of the puzzle
- Knowledge of fellow cattlemen and university personnel tapped

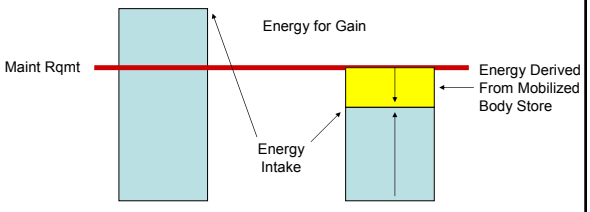
Energy Basics

Energy Partitioning

- Net energy system partitions energy into biological functions
  - Maintenance, Lactation, Gain, Fetal Growth
- Efficiency of energy utilization not static
  - Lactation and Maintenance greater than Gain

Energy

- Relationship b/w performance and energy intake
- Maintenance energy must be met first



1996 Beef NRC Requirements

Holstein	500	700	900	1100	1300	1500
NEm	5.4	7.0	8.4	9.8	11.1	12.3
NEg						
2.5 lb/d	3.0	3.9	4.7	5.4	6.2	6.9
3.5 lb/d	4.4	5.6	6.8	7.9	8.9	9.9

Angus						
NEm	4.5	5.8	7.0	8.1	9.2	10.3
NEg						
2.5 lb/d	3.0	3.9	4.7	5.4	6.2	6.9
3.5 lb/d	4.4	5.6	6.8	7.9	8.9	9.9

1. **Breed differences for energy utilization eff. (15-20% Holsteins)**
2. **Energy eff. ↓ as weight ↑**
3. **Adjust diet energy to maintain performance**

Genetics




Rations & Feedstuffs

What is the proportion
of corn silage DMB?

Feed

- Other than the cost of the animal, feed is the largest expense
- Cost per unit of energy considered
- Energy intake or diet energy density
  - 55 Mcal or 64 Mcal ration

Forages Feedlot Rations

- Consider the costs per on nutrient basis
  - FEEDVAL can be a tool or other rations programs with least-cost optimization
- Protein source versus starch diluter
- When and Where

Co-products as Feedstuffs

- Consider differences in dry matter
- Consider energy source
  - Fat, starch, roughage
- Consider spoilage losses
- Know what the energy content is
- Don't overlook transportation and handling costs

Calculating the Cost

- Making some assumptions
  - Nutrients known or equal to reported values
  - No dietary interactions

Corn vs. Hay NRG

- Corn is $90/ton and Mixed Hay is $60/ton
- Dry matter basis
  - Corn = $90/.88 = $102/ton = $0.051/lb
  - Hay = $60/.86 = $70/ton = $0.035/lb
- Per unit of energy basis (1996 Beef NRC)
  - Corn NEg 0.68 Mcal/lb = $0.075/Mcal
  - Hay NEg 0.36 Mcal/lb = $0.097/Mcal

Check and Check Again

- Important to consider alternative feedstuffs
- Test co-products to get the actual nutrient levels
- Consult a nutritionist for ration help

Utilizing Roughage Sources

Roughage Levels

- Typically low levels in finishing ration
  - Range from 0% to 10% common
- Lower levels require increased bunk management or intake control
- Roughage utilization is lower in high grain diets
  - Ex Soyhulls energy equal to corn in a high roughage diet and approx. 75% in high grain diet

Roughage and Holsteins

Traxler et al. 1995 JAS

"…feed efficiency and profits were highest with whole corn and no forage in the diet. …including **implant and ionophore** use is critical for optimal performance and greatest economic return utilizing whole corn and pellets."

Protein Exchange

- Form of protein differ in forage sources
- Alfalfa Haylage more soluble protein than soyhulls or grass hay
- Supplement changes needed
  - Base supplement + protein sources (SBM) rather than a supplement fed at 1.0 lb / hd / d

Protein Contribution Example

Assumptions: 750 lb calf DMI 18 lb 11% CP

	Haylage		
	0	20	40
Corn Silage	93.0%	75.75%	58.40%
SBM	5.65%	3.00%	0.50%
Urea	0.25%	0.15%	-----
Misc.	1.10%	1.10%	1.10%

Alfalfa Haylage and Holsteins

Item	50%	30%	10%
On wt., lb	310-378	310-378	310-378
Off wt., lb	592	614	639
ADG, lb	2.5	2.8	3.1
F/G	5.1	4.7	4.5
Overall	Switched to 10% Haylage until slaughter		
ADG, lb	2.8	2.8	2.8
F/G	6.2	5.9	6.0

Fox and Ketchen, 1991

UW Haylage Trial – ADG Growing

~ 380 to 675 lb live weight

Alfalfa haylage 21% CP and 33% ADF High
Alfalfa haylage 15% CP and 40% ADF Low

	High				Low			
Level	10	30	50	70	10	30	50	70
ADG	3.42	3.14	2.87	2.67	3.24	3.20	2.69	2.28
DMI	12.9	14.0	13.5	13.9	13.2	14.1	13.7	13.3
F/G	3.79	4.45	4.71	5.21	4.08	4.41	5.09	5.83

Siemens and Schaefer, Research Report

UW Haylage Economics

	COG, $/cwt	Income, $/hd	REQ, %/yr
10 High	37.94	70.50	32.89
30 High	38.14	71.70	32.09
50 High	38.98	63.28	26.74
70 High	40.48	43.04	18.07

Concluded that overall performance was only significantly different at 70% inclusion rates.

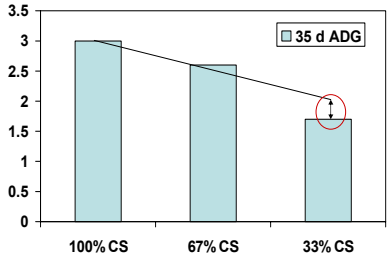
Siemens and Schaefer, Research Report

Corn Silage

- Growing rations (anticipate 1.5 – 3.0 lbs/d)
- Roughage source for finishing rations
  – 40-50% grain and 50-60% roughage
- Cob refusal eliminated by processors
- Protein supplementation needed

Corn Silage : Cup Plant Silage

Cup plant : CP = 8.0 NEg = 20 Mcal/cwt
Corn silage : CP = 9.2 NEg = 41 Mcal/cwt



Based on NRG in ration expect 2.0 lb/d for 33%, but DMI is lower reducing gains

Illustrates quality issue with forage

Beef steers 550 lb

2003-2004 UW Arlington Trial

Corn Silage - UMN

	12	24	36	48
DMI, lb[a]	22.18	22.90	23.39	24.17
ADG, lb	3.29	3.23	3.16	2.96
F/G[b]	6.74	7.08	7.46	8.18

[A] Linear trend
[B] Linear response (P<.05)

1997 UMN Beef Report, DiCostanzo

UW Corn Silage - Holsteins

430 – 1100 lbs live weight

Corn:Forage	60:40	75:25	90:10
NEg, Mcal/cwt	60	64	68
DOF	229	202	194
ADG, lb	2.95[c]	3.25[b]	3.50[a]
DMI, lb	16.2	16.5	16.6
F/G	5.9[a]	5.4[b,c]	5.2[c]

Schaefer et al., 1986 JAS 63:(Suppl 1)

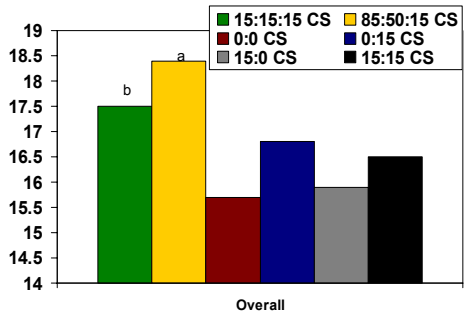
Replacement Beef Heifers

- Lancaster heifers - outdoor mound pen
- Target 2.0 lb/d gain
- 46% Corn silage 32% Alf. Haylage
  18% Corn 4% Supplement
  43% Conc. : 57% Roughage
- Predicted ADG – 2.1 lb/d
- Actual ADG – 1.8 lb / d

Replacement Heifer Alternative

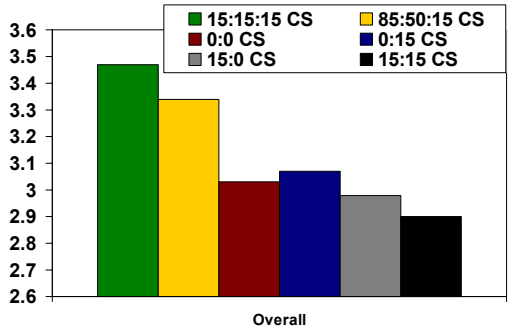
- Excess corn silage short on haylage
- 46% Corn silage 32% Alf. Haylage
  18% Corn 4% Supplement
  43% Conc. : 57% Roughage 11.5% CP
- 86% Corn silage 10% Alf Haylage
  0% Corn 4% Supplement
  43% Conc. : 57% Roughage 10% CP

DMI – Corn Silage



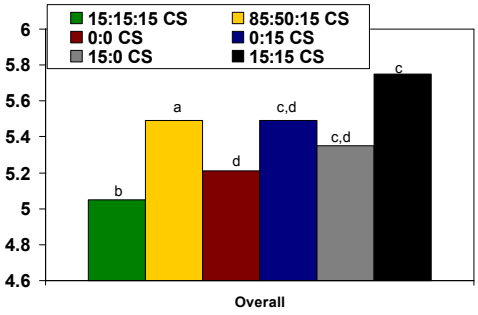
Loerch & Fluharty, 1998 & Rossi & Loerch, 2001

ADG – Corn Silage



Loerch & Fluharty, 1998 & Rossi & Loerch, 2001

F/G – Corn Silage

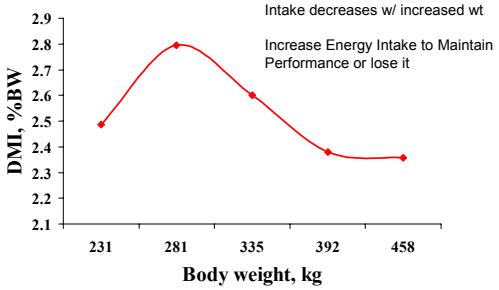


Loerch & Fluharty, 1998 & Rossi & Loerch, 2001

Feed Intake : Body Weight

- Dry matter intake increases with body weight
- Energy intake does not increase proportionately with body weight gains
- Express intake as a % of BW
- Look at total NRG intake and total gains to correct for ration NRG density differences

Feed Intake and Body Weight



Lehmkuhler et al.

Feed Intake and Body Weight

Body weight, lb	% of BW	DMI lb/d	% Increase
475	2.5	11-12	--
900	2.2	19-20	70%
1300	1.6	20-21	5%

Take home point – Energy intake is not increasing proportionately to weight while energy for maint. is increasing and eff. is decreasing

Comerford et al., 1992 JAS

Feed Efficiency Depression

Holstein steers fed 90% concentrate 10% corn silage diet

Interval	1100-1400	1400-1700
DMI, lb	18.2	18.8
ADG, lb/d	2.3	1.6
F/G	7.8	12.1

Take home point – Efficiency diminishes rapidly at heavy weights

Schaefer et al., 1991

UW Jersey / Holstein Trial

12 Jersey and 12 Holstein steers ind. penned

	Forage Hayl:CS:Conc	Conc CS:Conc
Phase 1	40:30:30 (50:50)	50:50 (25:75)
Phase 2	10:30:60 (25:75)	25:75 (12:88)
Phase 3	0:12:88 (6:94)	12:88 (6:94)

Numbers in parenthesis est. Roughage:Conc.
Ratios expressed on a DM basis

Jersey / Holstein Trial

	Forage			Conc		
	ADG	DMI	E F/G	ADG	DMI	E F/G
P 1	2.54	12.7	4.9	2.71	12.5	4.5
P 2	2.56	15.6	6.1	2.56	14.9	5.8
P 3	3.11	19.8	6.2	3.04	19.1	6.1

Data support previous findings that moderate levels of roughage early on

Lehmkuhler et al., 2004

Feeding Programs

- Phase feeding programs
- Increase energy density of ration
- Consider supplementations and how protein will be adjusted

Thank you for Your Attention

Questions or Comments