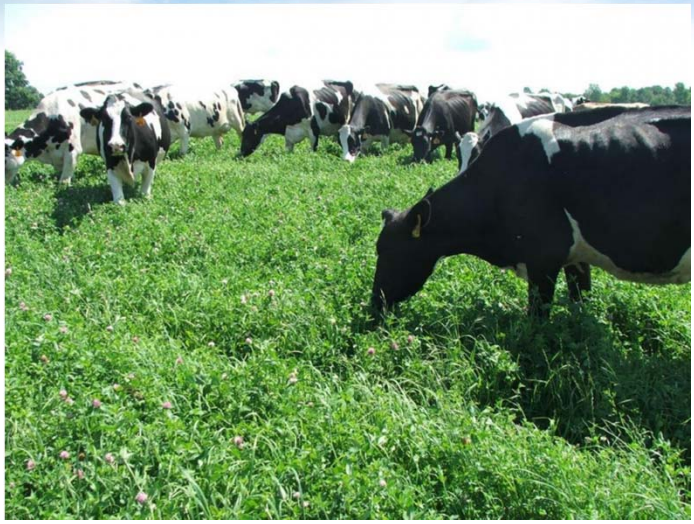


Feeding Dairy Cows on Pasture

Dr. Greg Brickner, Organic Valley Staff Veterinarian

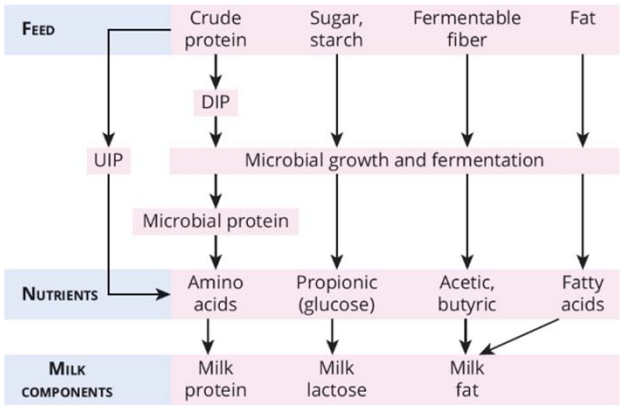
What Is Quality Milk from Pasture?

- High % fat
- High total lbs of fat
- High in CLA
- Excellent Ω 6:3 ratio
- High in β-carotene with excellent color
- Mild flavors of grass

FAT

Milk fat is made with compounds from fiber digestion.

Feed, nutrient flow from the rumen and milk components:



UIP = undergradable intake protein; DIP = degradable intake protein
Source: Sniffen C.J. and H.H. Herdt. The Veterinary Clinics of North America: Food Animal Practice Vol 7, No2. Philedelphia, Pa: W.B. Saunders, 1991.

Effect of Varying the Ratio Forage: Concentrate on Milk Composition

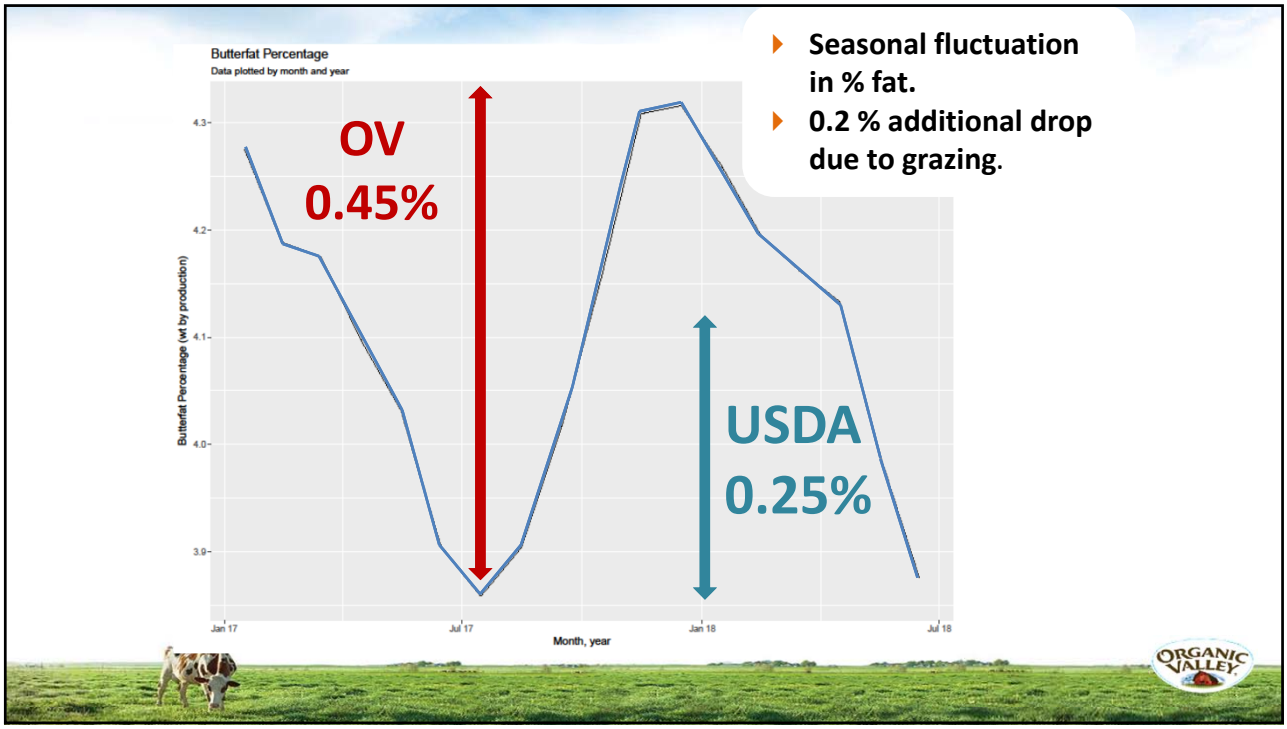
	Ratio Forage:Concentrate			
Item	80:20	65:35	50:50	35:65
Milk, kg	20.80	21.60	22.30	23.40
Composition, %				
Protein	3.11	3.12	3.22	3.26
Fat	3.83	3.72	3.68	3.33
Lactose	5.28	5.33	5.33	5.55

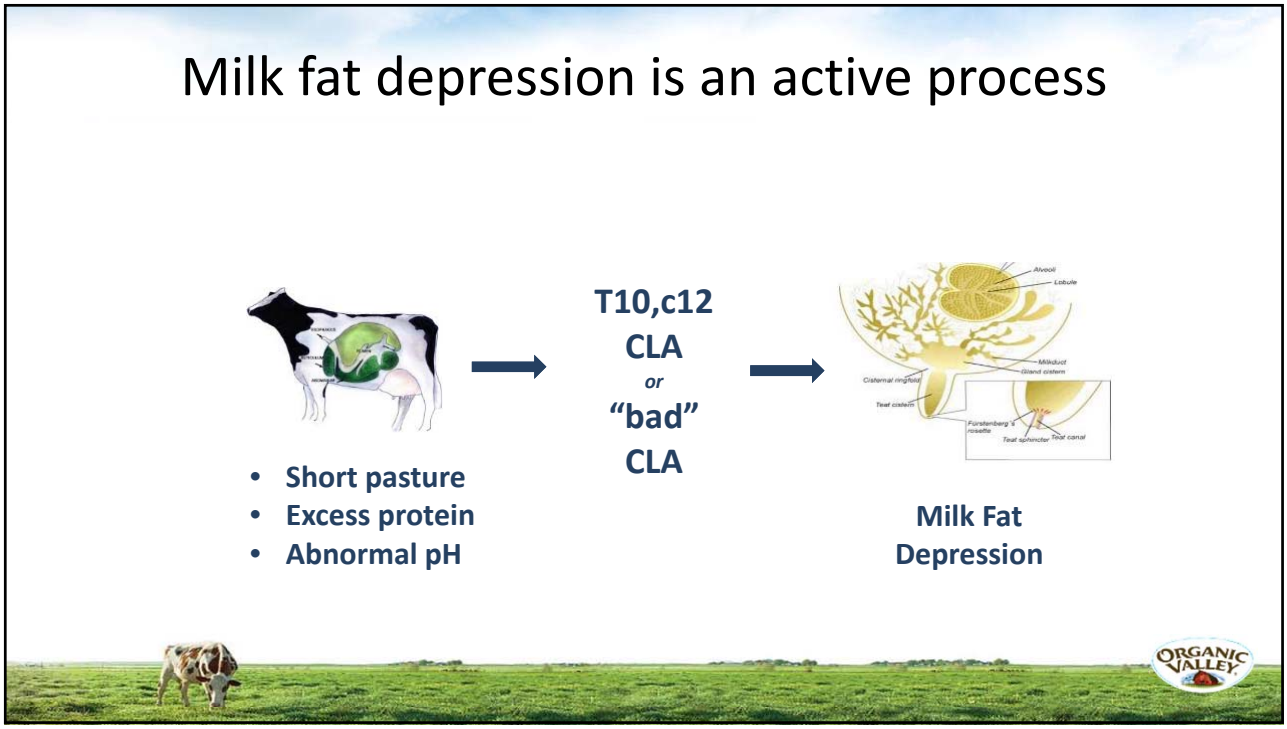
Adapted from Macleod et al.

Improving % Milk Fat on Pasture

1. Preventing "milk fat depression" by keeping the rumen healthy, grazing at the right stage, minimizing heat stress.

2. Feeding a high quality forage ration which keeps grain feeding low.


Butterfat Percentage
Data plotted by month and year
Butterfat Percentage (wt by production)
4.3
4.2
4.1
4.0
3.9
Jan 17
Jul 17
Jan 18
Jul 18
Month, year
OV
0.45%
USDA
0.25%
Seasonal fluctuation in % fat.
0.2 % additional drop due to grazing.


Milk fat depression is an active process
Short pasture
Excess protein
Abnormal pH
T10,c12
CLA
or
"bad"
CLA
Milk Fat
Depression

Alternative biohydrogenation pathways

Linoleic Acid (C18:2)
Polyunsaturated fatty acid in pasture

Healthy rumen fermentation
CLA (c-9, t-11 C18:2)
"Rumenic acid" A desirable CLA accounting for 90% of the CLA in milk and linked to anti-cancer activity.

Vaccinic acid (t-11 C18:1)

Abnormal fermentation / Rumen acidosis
CLA (t-10, c-12 C18:2)
Undesirable CLA linked to milk fat depression.

(t-10 C18:1)

Stearic acid (C18:0)
Saturated fatty acid found in milk fat and used for energy by the cow.

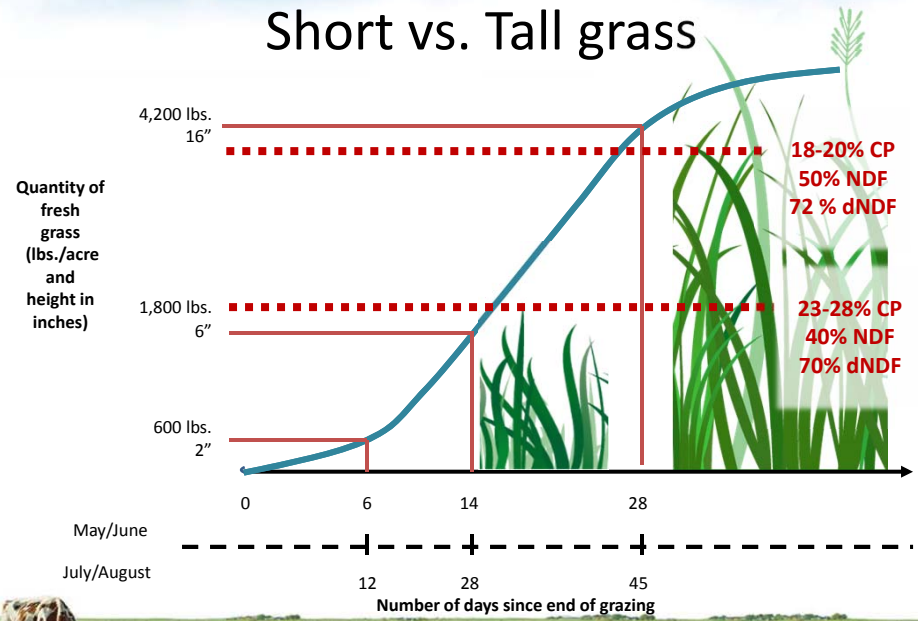
ORGANIC VALLEY

"Bad" CLA takes 12 hours to start MFD.

…It takes 10-21 days to recover.

ORGANIC VALLEY

Short vs. Tall grass



Keep five pounds of good quality DRY hay in the ration.

- During the grazing season, hay provides a steady source of effective fiber to regulate the rumen’s speed of digestion.

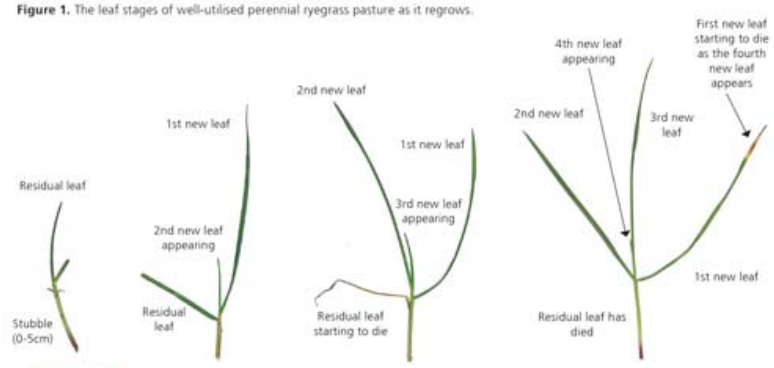
-1350) | 4TH BALAGE

-- -- | Analysis Results
ST|CO|
-- -- | Components | As Fed | DM

Components	As Fed	DM
% Moisture	47.1	
% Dry Matter	52.9	
% Crude Protein	11.6	21.9
% Available Protein	10.8	20.5
% ADICP	.7	1.4
% Adjusted Crude Protein	11.6	21.9
Soluble Protein % CP		45
Degradable Protein%CP		74
% NDICP	2.6	5.0
% ADF	15.1	28.5
% aNDF	22.3	42.2
% Lignin	2.4	4.5
% NFC	10.9	20.6
% Starch	.8	1.5
% WSC (Water Sol. Carbs.)	8.4	16.0
% ESC (Simple Sugars)	5.2	9.9
% Crude Fat	1.8	3.4
% Ash	6.27	11.86
% TDN	36	67
NEL, Mcal/Lb	.37	.70
NEM, Mcal/Lb	.36	.69
NEG, Mcal/Lb	.22	.42
Relative Feed Value		147
% Calcium	.51	.96
% Phosphorus	.22	.42
% Magnesium	.16	.30
% Potassium	1.72	3.25
% Sodium	.069	.130
PPM Iron	1,330	2,510
PPM Zinc	15	28
PPM Copper	4	7
PPM Manganese	42	79
PPM Molybdenum	.1	.3
% Sulfur	.14	.26
% Chloride Ion	.40	.76
IVTD 48hr, % of DM		86
NDFD 48hr, % of NDF		67
kd, %/hr		4.11
Relative Forage Quality		178
Milk Lbs./Ton of DM		3,603

'LEASE
NE.COM
'EY AND
VISA

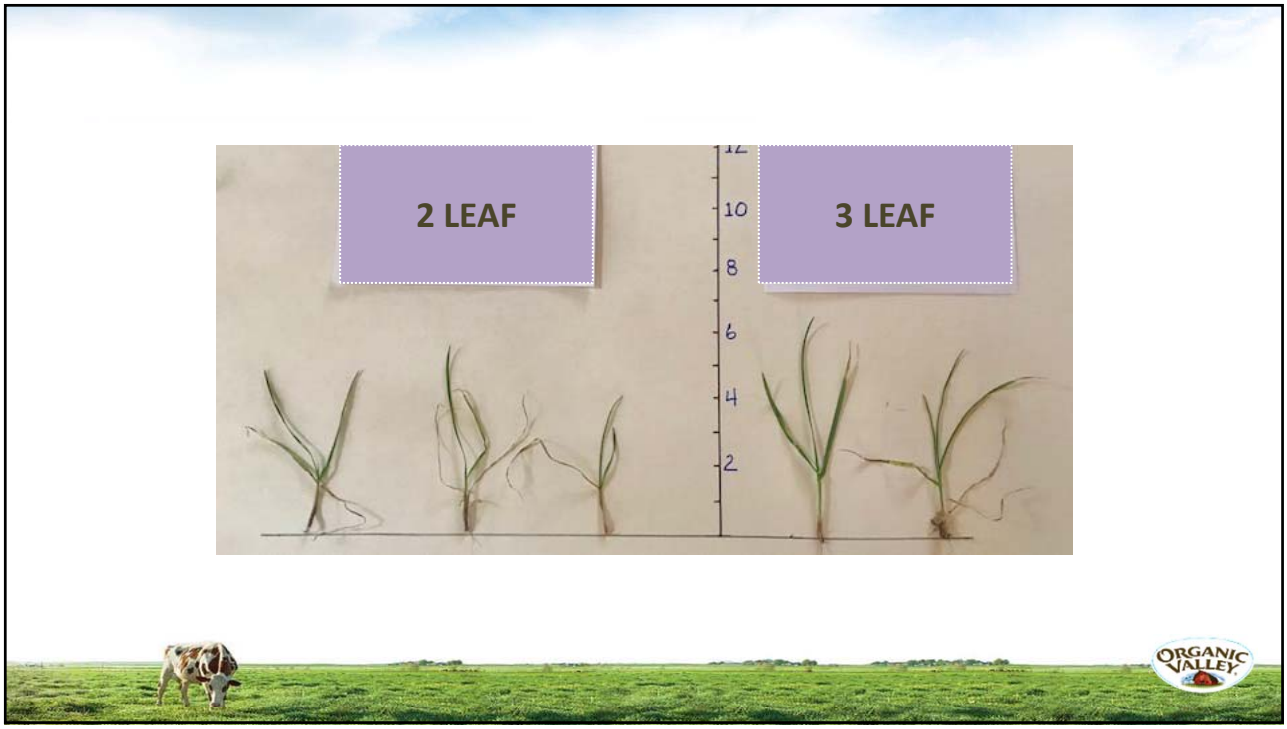
Figure 1. The leaf stages of well-utilised perennial ryegrass pasture as it regrows.



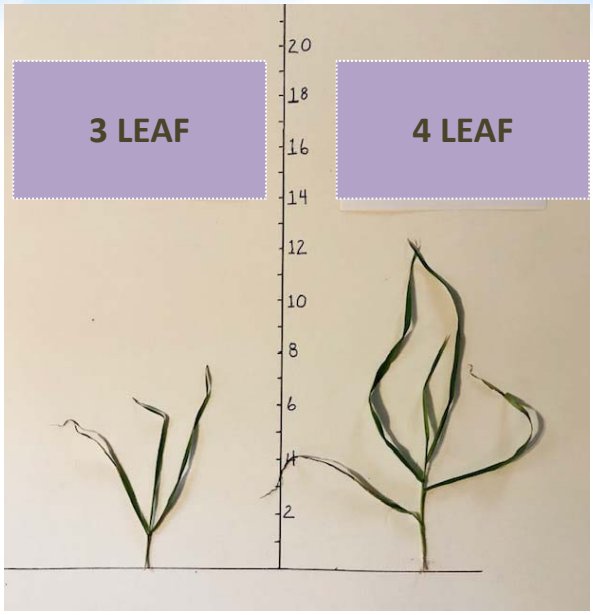

3 LEAF


3 LEAF


14
12
10
8
6
4
2
3 LEAF


2 LEAF
10
8
6
4
2
3 LEAF

2 LEAF



Yellow or dying leaves

DAIRYLAND LABORATORIES, INC.
Stratford, WI 54484
Telephone 715-687-9997

[redacted]

TO: CASH SALE

PRODUCT: residual grass leave (1B - CL)

Moisture	%	75.65%
Dry Matter	%	24.35%

		Dry Basis	Average	Normal Range
Crude Protein	%DM	13.82%	9.91	2.91 - 16.91
ADF	%DM	40.68%	41.70	28.20 - 55.20
aNDF	%DM	64.52%	63.31	46.37 - 80.25
aNDFom	%DM	62.15%	61.92	45.91 - 78.30
NDFD 30	%NDF	41.53%	48.50	31.00 - 66.50
uNDFom30	%DM	36.34%	31.00	11.00 - 52.00
ND-ICP est w/ SS	%DM	2.21%	2.53	0.56 - 6.42
NFC	%	14.04%		
RFV		82.49		

		ADF
TDN 1x	%DM	57.21
Nel 3x	Mcal/cwt	58.33
Neg	Mcal/cwt	26.23
Nem	Mcal/cwt	51.59

Improving % Milk Fat on Pasture

1. Preventing "milk fat depression" by keeping the rumen healthy, grazing at the right stage, minimizing heat stress.

2. Feeding a high quality forage ration which keeps grain feeding low.

Aim for pasture and forages with fiber digestibility over 55%

- Low-quality forages provide few nutrients to the rumen microbes, reducing high-value microbial protein.

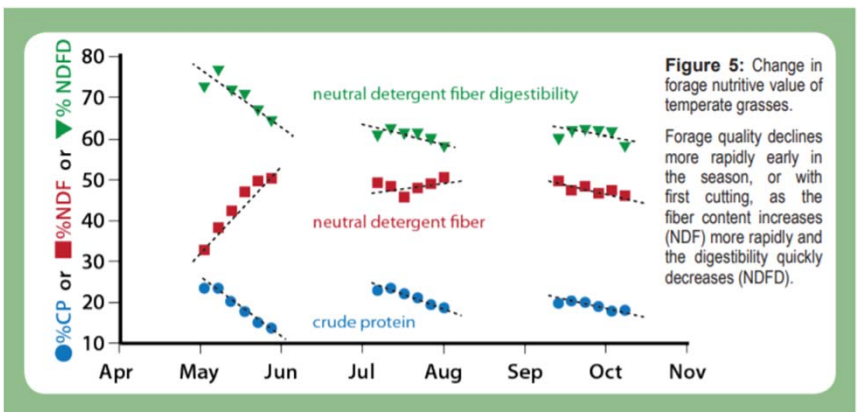


Figure 5: Change in forage nutritive value of temperate grasses.

Forage quality declines more rapidly early in the season, or with first cutting, as the fiber content increases (NDF) more rapidly and the digestibility quickly decreases (NDFD).

Treat pasture as an ingredient of the ration.

Pasture supplementation strategy

If goal is <50% DMI from pasture:

If goal is >50% DMI from pasture:

Corn Silage is ½ Grain : ½ Forage

MUN Range : 8 - 15

Sorting!

Reducing heat stress

Table 6. Feeding recommendations

Buffer	*% Grain Mixture*	*% of Total Ration*	*lbs/day*
Bicarb	1.0-1.5	.6-.8	.25-.5
MgO	.4-0.8	.2-.4	.10-.2
Bicarb + MgO (3:1)	1.0-1.5	.6-.8	.25-.5
Bentonite	3.0-5.0	1.5-2.5	1.50-2.2
Limestone	1.0-1.5	.5- .8	.25- .4

Effect of forage level and buffer addition on milk composition

Diet	Rumen pH	Duodenal TFA, g/d	Milk TFA, %	Milk TFA, g/d	Milk Fat, %
60% forage, no buffer	6.13	61	3.1	33	4.09
60% forage, buffer	6.15	57	2.9	33	4.22
25% forage, no buffer	5.83	120	5.8	56	3.42
25% forage, buffer	6.02	66	2.9	33	3.91

Rules of Thumb in Creating Pasture Rations

- High forage ration 80% forage/ 20% grain
- Minimum pasture maturity : 3 leaves / tiller
- Maximum pasture maturity : boot stage
- Conservative DMI estimate : 1.3% of body weight as NDF
- Protein : rumen degradable protein ≤ 2.2 lbs over default recommendations
- Energy : non-structural carbohydrate (NSC) ≥ 3.0 lbs under default recommendations
- Default values for pasture are often not accurate. Assume NSC = 20-25% and NDF = 45-50% for well-managed grass dominant pastures.
- Minimum quality for supplemental hay/dry baleage : NEL ≥ .68 mcal/lb, NDFD ≥ 55%
- Grass hay/dry baleage works best as pasture supplement to avoid excess protein.
- Monitor manure quality and MUN in evaluating ration and pasture.
- Force feed buffers
- Wet chemistry forage tests on all stored forages.

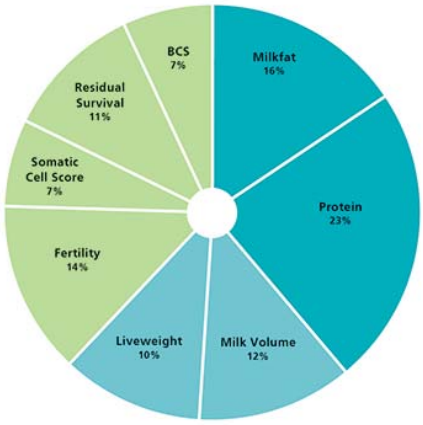
Genetics

- Genetic difference accounts for **50%** of fat variability.

Hereditability: higher for fat than for yield!

Trait	Holstein h2	Holstein SD1	Jersey h2	Jersey SD1
Fat %	0.58	0.23	0.55	0.28
Protein %	0.51	0.14	0.55	0.20
Fat, lb.	.30	52	0.35	50
Protein, lb.	.30	37	.35	36
Milk, lb.	.30	1444	.35	1204

Changes to NZ bull evaluation due to fat value



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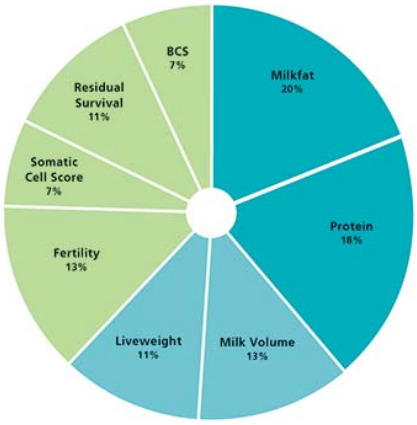

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