

Fat Feeding

Some slides adapted from Dairy Nutrition & Management (ANSCI 200/492), University of Illinois at Urbana-Champaign, Dr. Jim Drackley & Mike Hutjens

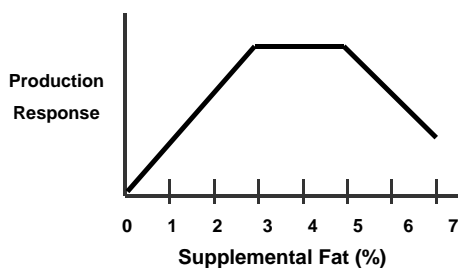
Base ration components (forages and grains) will average about 3% fat.

Use Supplemental Fats

1. Increase diet energy density while maintaining adequate fiber content
2. Improve energetic efficiency
3. Improve energy balance
4. Improve reproduction

	<u>Ground Corn</u>	<u>Fat</u>	<u>Fat/Corn</u>
	(Mcal/lb)		
Gross energy	1.90	4.30	2.25
Digestible energy	1.70	3.31	1.95
Metabolizable energy	1.52	3.31	2.18
Net energy	0.89	2.70	3.00

Production Responses to Supplemental Fat



DIETARY FAT AND MILK COMPOSITION

- *Milk fat:*
 - Dietary fat may increase 0.1 to 0.3%
 - (If rumen fermentation is not disrupted)
 - Yield often increased
- *Milk protein:*
 - Dietary fat may decrease 0.1%
 - Yield usually unchanged
 - dilution of protein production as milk yield increases

Sources of Fat in Diets for Dairy Cows

1. Basal ingredients (forages, grains)
2. High-fat by-product feeds
3. Oilseeds
4. Animal fats
5. Granular (inert) fats

Diet

Fatty acid		Alfalfa hay	Grass pasture	Soybean (seed)	Corn (seed)
(Weight %)					
Myristic	C _{14:0}	0.9	1.1
Palmitic	C _{16:0}	33.9	15.9	12.4	14.3
Palmitoleic	C _{16:1}	1.2	2.5	...	0.1
Stearic	C _{18:0}	3.8	2.0	3.7	1.9
Oleic	C _{18:1}	3.0	3.4	25.4	39.0
Linoleic	C _{18:2}	24.0	13.2	50.6	43.5
Linolenic	C _{18:3}	31.0	61.3	7.9	1.1

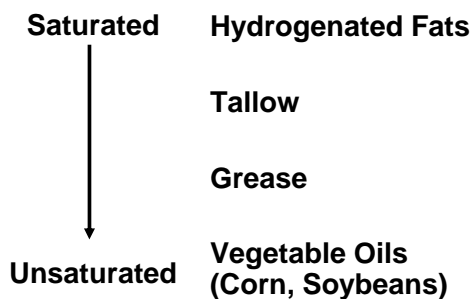
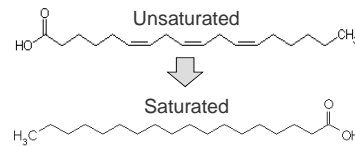
(Palmquist and Jenkins, 1980)

Properties of Fat that Need to be Considered

- Digestibility
 - Post-ruminal digestion and absorption
- Palatability and effects on intake
- Ruminal inertness
 - Saturated vs. unsaturated

Biohydrogenation

- Reduction of double bonds
- Result: fatty acids that are more saturated with hydrogen



Fatty Acid Content

- High energy component of fat
- 5 – 8 common fatty acids
- Energy content is ~9.4 kcal/g
- Amount of fatty acids in fat supplement is important in determining energy value of supplement

Fat Supplements

Advantages of Oilseeds

1. Provide other key nutrients (protein, digestible fiber)
2. Economical
3. Ease of handling (except cottonseed)
4. Slow release of oil in rumen

Fat Content and Feeding Rates of Oilseeds

Type	Fat content	Maximum lb to feed daily
Cottonseed	18 - 20%	4 to 6
Soybeans	18 - 20%	3 to 5
Canola	40 - 55%	2 to 3
Sunflower	38 - 50%	2 to 3
High oil corn	6.5 - 10%	-----

Types of Feed-Grade Fats

- Tallow
- Choice white grease
- Yellow grease
- Blended animal and vegetable fats

Feed-grade Commodity Fats

Advantages:

1. Generally lower cost
2. High-quality fats are acceptably inert in rumen and are highly digestible

Disadvantages:

1. Handling and mixing difficult
2. Quality control - variable
3. Low-quality fats can disrupt fiber digestion, decrease intake, decrease milk fat percentage

Quality Standards for Tallow

- The more saturated, the better
 - Iodine value (IV) < 50
 - prefer 38 to 45

Fat Source	IV
Tallow	38-50
Partially hydrogenated tallow	14-31
Yellow grease	72
Corn oil	126
Soybean oil	131

- Free fatty acids < 5%

Commercial Granular Fats

- **Advantages:**

1. Easy to handle and mix
2. Quality control
3. Few effects in rumen
4. High digestibility (>80%)

- **Disadvantages:**

1. Higher cost
2. Some are less digestible

Choose Fat Sources on the Basis of:

1. Cost
2. Convenience
3. Characteristics of fat

How Much Fat Should Be Fed?

Thumb rule #1:

Total fat fed = milk fat produced

Example:

90 lbs milk, 3.5% fat = 3.15 lbs fat

50 lbs feed DM, 3% fat = 1.5 lbs basal fat

So, could supplement 1.5 to 1.65 lbs fat

How Much Fat Should Be Fed?

Other thumb rules for maximums:

- up to 8% total fat in diet DM
- up to 5% supplemental fat
- 1 pound commodity fat, 0.5 to 1 pound of granular (inert) fat

What is an Economical Amount of Fat to Feed?

- Up to 3% of total diet DM or 1.5 pounds per cow daily
- If high corn silage, up to 2.5% of total DM or 1.25 pounds

Other Considerations

- Depending on the source
 - Reproduction improvements
 - Milk fat depression
 - Consumer health

Reproduction

- Provide specific omega-6 and omega-3 fatty acids to ↑ conception and pregnancy rates
- ↓ days open
- Provide additional energy?
- Energy independent response
 - PUFA used in prostaglandin synthesis

Milk Fat Depression

