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BEEF NUTRITION MADE SIMPLE

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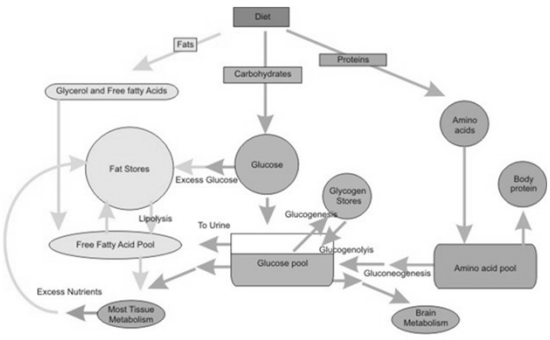
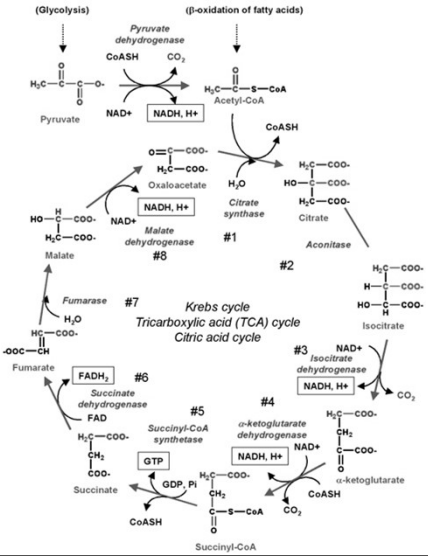
Simplest way to drive someone away from nutrition



Metabolism Summary



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Nutritionists are good

- **At complicating nutrition**
- **An interesting thing about nutrition:**
  - **It is intriguing because**
    - **Human nutrition represents a personal interest**
      - Caring for self and family
- **Like many other things in life**
  - **Logic makes nutrition simple**

N EXTENSION

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The alternative—visuals and logic

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What to focus on?

- Energy
  - What is energy?
- Protein
- Vitamins
- Minerals
- We will not cover minerals and vitamins
  - Please plan on working with your nutritionist to have a year around vitamin and mineral supplementation program

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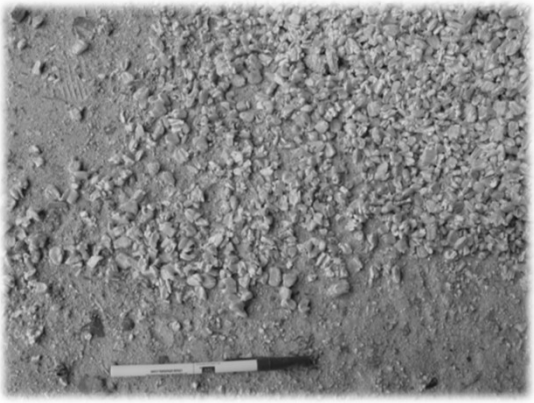
Which of these two feeds has more energy?



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Why? A look at stover and corn grain

50% Digestibility 90%

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Digestibility of corn silage?

- Stover is 50% digestible
- Corn grain is 90% digestible
  - *Most feeds fit within this range*
- What about corn silage?
  - Proportion of stover
  - Proportion of corn grain

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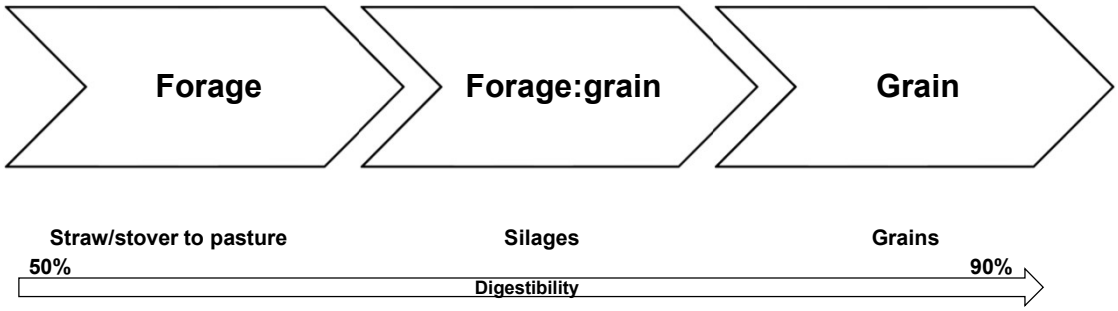
Applying this to other feeds



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What about oilseeds?

- Not a grain but close, right?
- Digestibility similar to grains
- What's the main difference?
  - Oil
  - Protein

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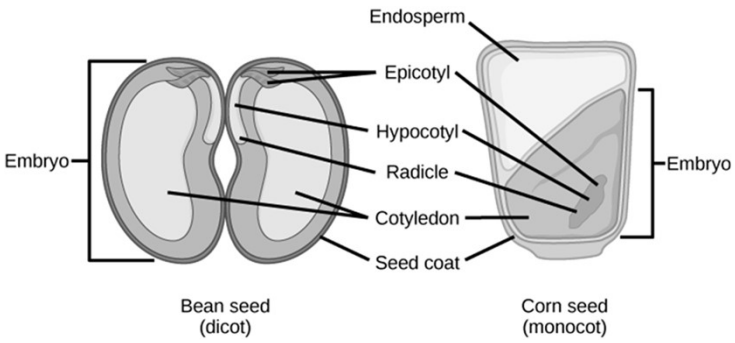

Corn vs oilseed

Coating, bran or hulls

Endosperm, starch

Cotyledon, protein and oil

Corn, low protein, high energy

Soybean, high protein, high energy

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Which is more digestible? Corn bran or stover?

EXTENSION

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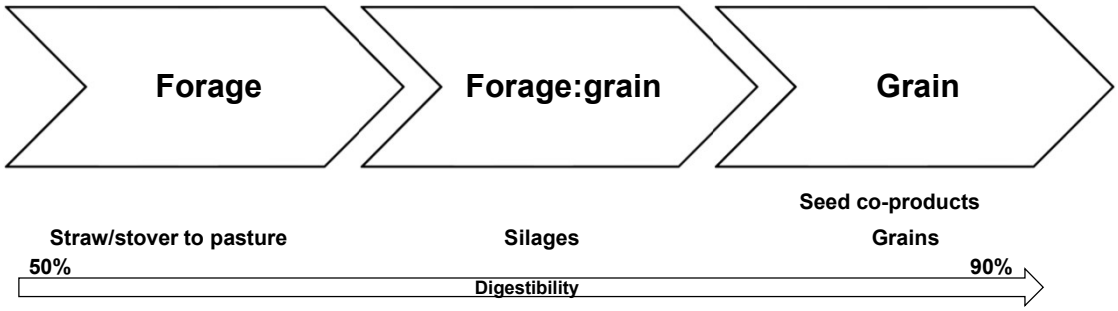
Applying this to other feeds



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Small grains vs corn grain

EXTENSION

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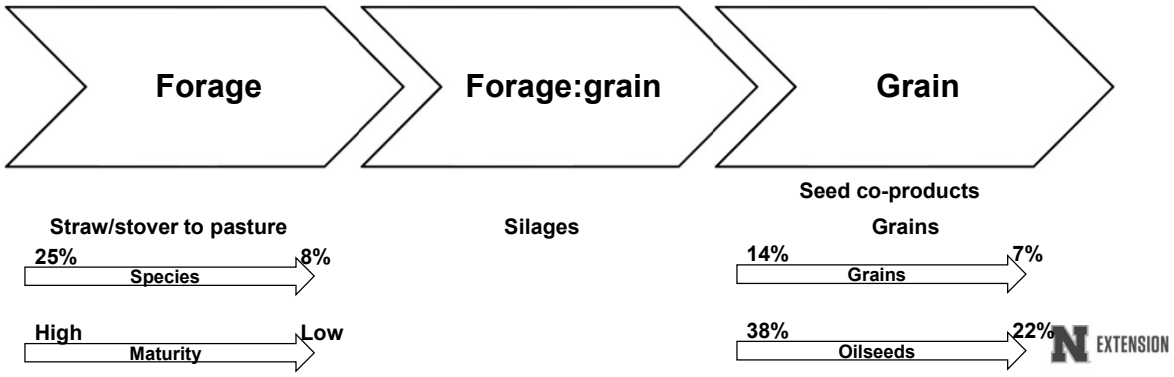
What about protein?



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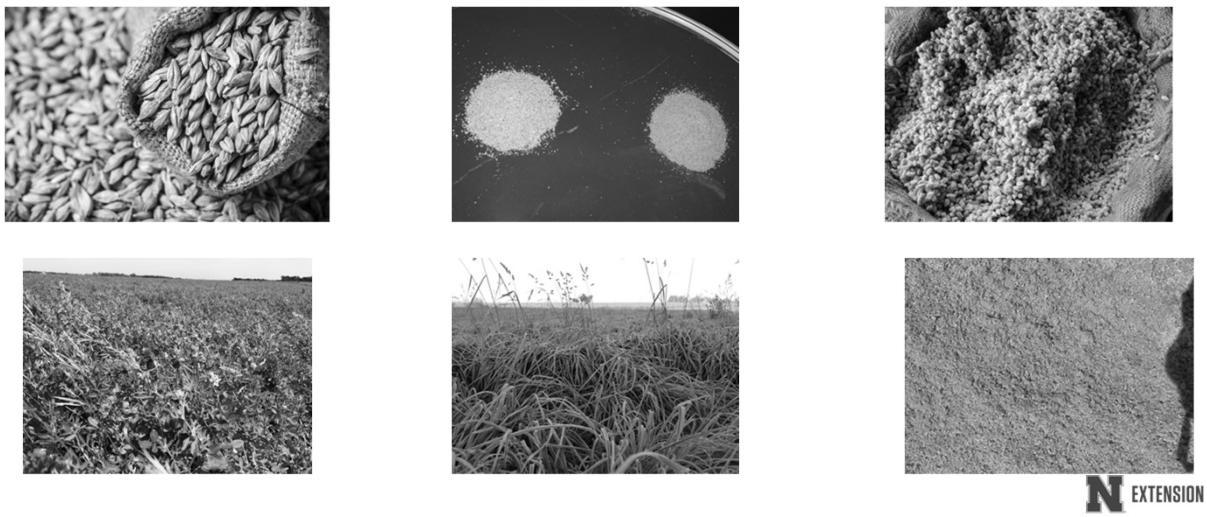
Other examples



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Which cow has the greatest energy and protein requirement?

Protein requirements of beef cattle are low: weaned cow, 8%; lactating cow, 12%; growing calf, 12%

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Activity

- There are several feeds on the table representing feeds that might be available to you locally
- Based on what you have learned so far, enter feed name on worksheet according to your appraisal of its energy and protein content:
  - High protein, moderate to high energy
  - High energy, low protein
  - High energy, high protein
  - Low energy, moderate to low protein
- For each production stage listed below, enter name of feed(s) you might use to formulate a diet
  - Growing calves pre-weaning (suckling on grass)
  - Growing calves in a drylot
  - Growing calves in the feedlot
  - Cows at and after weaning
  - Cows at and after calving

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Chicken breast and tenderloin roast

EXTENSION

19

Chicken breast and tenderloin roast

Air-chilled boneless chicken breasts, Omaha steaks

Nutrition Facts

4 servings per container
Serving size **5 oz (142g)**

Amount per serving
Calories **150**

	% Daily Value*
Total Fat 4g	**5%**
Saturated Fat 0g	**0%**
Trans Fat 0g	
Cholesterol 70mg	**23%**
Sodium 230mg	**10%**
Total Carbohydrate 0g	**0%**
Dietary Fiber 0g	**0%**
Total Sugars 0g	
Includes 0g Added Sugars	**0%**
Protein 28g	
Vitamin D 0mcg	0%
Calcium 0mg	0%
Iron 0mg	0%
Potassium 0mg	0%

*The % Daily Value tells you how much a nutrient in a serving of food contributes to a daily diet. 2,000 calories a day is used for general nutrition advice.

Nutrition Facts

Serving Size 4 oz (112g)
Servings Per Container 7

Amount Per Serving

Calories 160	Calories from Fat 60
	% Daily Value*
Total Fat 7g	**11%**
Saturated Fat 2.5g	**13%**
Trans Fat 0g	
Cholesterol 70mg	**23%**
Sodium 280mg	**12%**
Total Carbohydrate 0g	**0%**
Dietary Fiber 0g	**0%**
Sugars 0g	
Protein 24g	
Vitamin A 0%	• Vitamin C 0%
Calcium 2%	• Iron 15%

*Percent Daily Values are based on a 2,000 calorie diet. Your daily values may be higher or lower depending on your calorie needs:

		Calories:	2,000	2,500
Total Fat	Less than		65g	80g
Saturated Fat	Less than		20g	25g
Cholesterol	Less than		300mg	300mg
Sodium	Less than		2,400mg	2,400mg
Total Carbohydrate			300g	375g
Dietary Fiber			25g	30g

Fully cooked beef tenderloin, Omaha steaks

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Energy determination

Nutrition Facts
Serving Size 4 oz (112g)
Servings Per Container 7

Amount Per Serving	
Calories 160	Calories from Fat 60
	% Daily Value*
Total Fat 7g	11%
Saturated Fat 2.5g	13%
Trans Fat 0g	
Cholesterol 70mg	23%
Sodium 280mg	12%
Total Carbohydrate 0g	0%
Dietary Fiber 0g	0%
Sugars 0g	
Protein 24g	

Vitamin A 0% • Vitamin C 0%
Calcium 2% • Iron 15%

*Percent Daily Values are based on a 2,000 calorie diet. Your daily values may be higher or lower depending on your calorie needs:

	Calories:	2,000	2,500
Total Fat	Less than	65g	80g
Saturated Fat	Less than	20g	25g
Cholesterol	Less than	300mg	300mg
Sodium	Less than	2,400mg	2,400mg
Total Carbohydrate		300g	375g
Dietary Fiber		25g	30g

- **Fat contains 9 kcal/g**
- **Protein contains 4 kcal/g**
  - **Really, it is 5 kcal/g**
  - **But we use 4**
  - **Why?**
- **Carbohydrates contain 4 kcal/g**
- **Calculations,**
  - **Fat, 7 g x 9 kcal/g = 63 kcal**
  - **Protein, 24 g x 4 kcal/g = 96 kcal**
  - **Total energy = 159 kcal**

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Activity

- **Choose a snack you would like to consume from the basket**
  - **You may eat it now, if you wish, or save for later**
- **Record grams of carbohydrate, protein and fat**
  - **Calculate energy supplied by each nutrient using Atwater factors**
  - **Tally energy supplied by each nutrient to determine energy content**
  - **Compare to the total calories listed on the nutrient content label**
- **You now know how to calculate gross energy of a food or feed**
- **You can apply this to human or cattle nutrition**
  - **Human nutrition, this is as far as you go**
  - **Cattle nutrition, you need to determine an additional step**

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Once a feed is consumed by cattle

- Digestibility of feeds varies
  - Corn grain, 4 kcal/g * ?
  - Corn silage, 4 kcal/g * ?
  - Corn stover, 4 kcal/g * ?
- Remember our limits from 50% to 90%
- Digestibility = TDN
  - Corn grain, 90%
  - Corn silage, 72%
  - Corn stover, 50%
- We can formulate based on TDN

N EXTENSION

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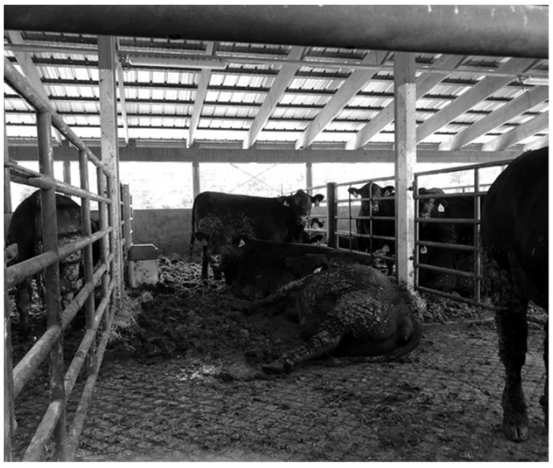
Or use the net energy system

- Digestible energy
  - Gross minus fecal
  - Corn, 4.4 * 0.90 = 4.0
  - Corn silage, 4.4 * 0.72 = 3.2
  - Corn stover, 4.4 * 0.50 = 2.2
- Metabolizable energy
  - DE * 0.82
  - Corn, 4.0 * 0.82 = 3.28
  - Corn silage, 3.2 * 0.82 = 2.62
  - Corn stover, 2.2 * 0.82 = 1.80



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Net energy

- **Maintenance**
  - **ME * 0.70**
  - **Corn grain, 3.28 * 0.70 = 2.30**
  - **Corn silage, 2.62 * 0.65 = 1.70**
  - **Corn stover, 1.80 * 0.60 = 1.26**
- **Gain**
  - **NEm * 0.70**
  - **Corn grain, 2.30 *0.70 = 1.61**
  - **Corn silage, 1.83 * 0.65 = 1.11**
  - **Corn stover, 1.26 * 0.60 = 0.76**
- **NEm, Mcal/lb**
  - **Corn grain, 1.61/2.205 = 0.73**
  - **Corn silage, 1.11/2.205 = 0.50**
  - **Corn stover, 0.76/2.205 = 0.34**

N EXTENSION

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A closer look at these!

- **Lighten the foods you love**
  - Lower calorie versions
- **Eat fruits**
  - No high impact on blood sugar
- **Stop drinking soda**

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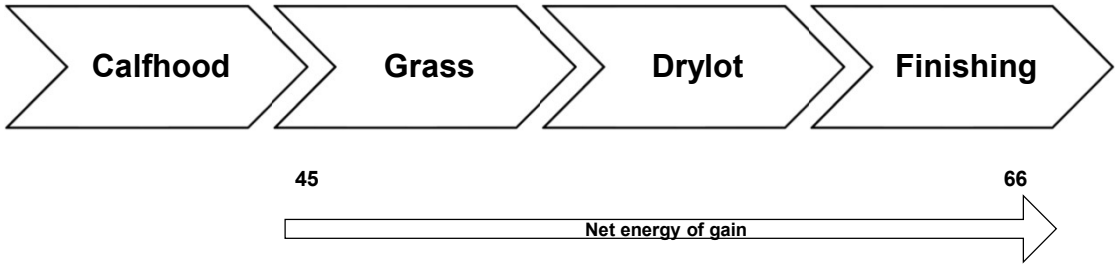
Net energy of gain as cattle grow



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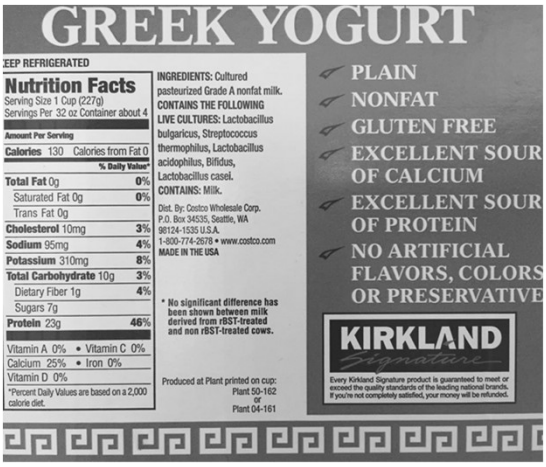
Lighten the foods you love



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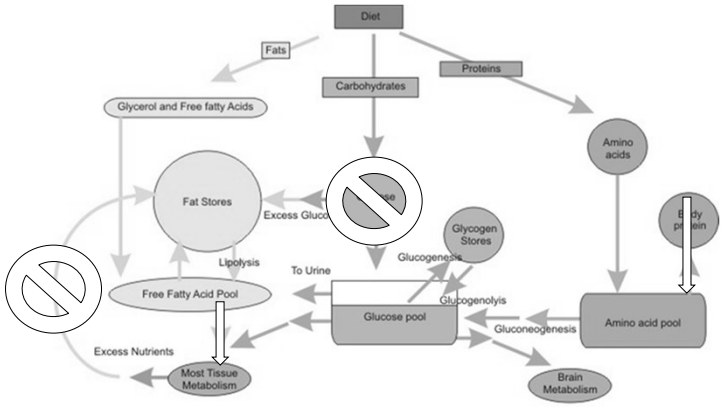
Protein consumed at requirements with low carb intake—fat cannot develop from fat consumed



Metabolism Summary

Energy intake (Fat = 100%) ≥ required: ↑ glucagon ⇔ insulin
Energy intake = 0: ↑ glucagon ⇔ insulin

N EXTENSION

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Why do you think one is healthier than the other?

RICE CAKES white cheddar

Nutrition Facts
Serving Size 1 Cake (11g)
Servings Per Container About 14

Amount Per Serving	
Calories 45	Calories from Fat 10
	% Daily Value*
Total Fat 1g	1%
Sodium 100mg	4%
Total Carbohydrate 8g	3%
Sugars Less than 1 g	
Protein 1g	

Not a significant source of saturated fat, trans fat, cholesterol, dietary fiber, sugars, vitamin A, vitamin C, calcium and iron.
*Percent Daily Values are based on a 2,000 calorie diet.

INGREDIENTS: Whole grain brown rice, degerminated milled corn, nonfat dry milk, buttermilk powder, salt, cheddar cheese (cultured milk, salt, enzymes), butter (cream, salt), whey, sunflower oil with natural tocopherol added to preserve freshness, corn syrup solids, maltodextrin, natural and artificial flavor, modified food starch, citric acid, yeast extract, potassium chloride, lactic acid, milk fat, onion powder.
CONTAINS MILK AND SOY INGREDIENTS.
(16909-18)
Partially Produced with Genetic Engineering.

RICE CAKES caramel corn

Nutrition Facts
Serving Size 1 Cake (13g)
Servings Per Container About 14

Amount Per Serving	
Calories 50	
	% Daily Value*
Total Fat 0g	0%
Sodium 30mg	1%
Total Carbohydrate 11g	4%
Sugars 3g	
Protein less than 1 gram	

Not a significant source of Calories from Fat, Saturated Fat, Trans Fat, Cholesterol, Dietary Fiber, Vitamin A, Vitamin C, Calcium, Iron.
*Percent Daily Values are based on a 2,000 calorie diet.

INGREDIENTS: Whole grain brown rice corn (with germ removed), sugar, fructose, maltodextrin, caramel color, natural flavor, salt, soy lecithin.
CONTAINS SOY INGREDIENTS.
(16910-17)
Partially Produced with Genetic Engineering.

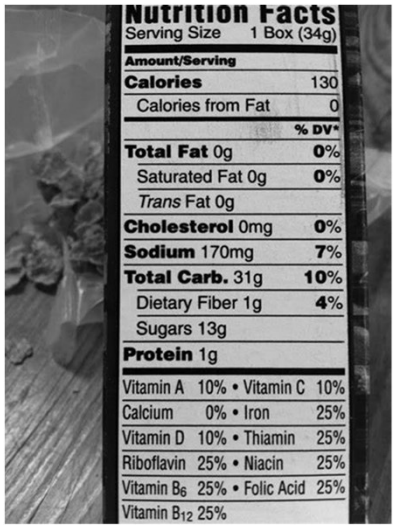
RICE CAKES apple cinnamon

Nutrition Facts
Serving Size 1 Cake (13g)
Servings Per Container About 14

Amount Per Serving	
Calories 50	
	% Daily Value*
Total Fat 0g	0%
Sodium 0mg	0%
Total Carbohydrate 11g	4%
Sugars 3g	
Protein less than 1 gram	

Not a significant source of Calories from Fat, Saturated Fat, Trans Fat, Cholesterol, Dietary Fiber, Vitamin A, Vitamin C, Calcium, Iron.
*Percent Daily Values are based on a 2,000 calorie diet.

INGREDIENTS: Whole grain brown rice, sugar, fructose, maltodextrin, natural flavor, cinnamon, soy lecithin.
CONTAINS SOY INGREDIENTS.
(16900-11)
Partially Produced with Genetic Engineering.



Nutrition Facts
Serving Size 1 Box (34g)

Amount/Serving	
Calories	130
Calories from Fat	0
	% DV*
Total Fat 0g	0%
Saturated Fat 0g	0%
Trans Fat 0g	
Cholesterol 0mg	0%
Sodium 170mg	7%
Total Carb. 31g	10%
Dietary Fiber 1g	4%
Sugars 13g	
Protein 1g	

Vitamin A	10%	• Vitamin C	10%
Calcium	0%	• Iron	25%
Vitamin D	10%	• Thiamin	25%
Riboflavin	25%	• Niacin	25%
Vitamin B_6	25%	• Folic Acid	25%
Vitamin B_{12}	25%		

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Glycemic index—a measure of glucose response to food intake

High-carbohydrate foods		Breakfast cereals		Fruit and fruit products		Vegetables	
White wheat bread‡	75 ± 2	Cornflakes	81 ± 6	Apple, raw‡	36 ± 2	Potato, boiled	78 ± 4
Whole wheat/whole meal bread	74 ± 2	Wheat flake biscuits	69 ± 2	Orange, raw‡	43 ± 3	Potato, instant mash	87 ± 3
Specialty grain bread	53 ± 2	Porridge, rolled oats	55 ± 2	Banana, raw‡	51 ± 3	Potato, french fries	63 ± 5
Unleavened wheat bread	70 ± 5	Instant oat porridge	79 ± 3	Pineapple, raw	59 ± 8	Carrots, boiled	39 ± 4
Wheat roti	62 ± 3	Rice porridge/congee	78 ± 9	Mango, raw‡	51 ± 5	Sweet potato, boiled	63 ± 6
Chapatti	52 ± 4	Millet porridge	67 ± 5	Watermelon, raw	76 ± 4	Pumpkin, boiled	64 ± 7
Corn tortilla	46 ± 4	Muesli	57 ± 2	Dates, raw	42 ± 4	Plantain/green banana	55 ± 6
White rice, boiled‡	73 ± 4			Peaches, canned‡	43 ± 5	Taro, boiled	53 ± 2
Brown rice, boiled	68 ± 4			Strawberry jam/jelly	49 ± 3	Vegetable soup	48 ± 5
Barley	28 ± 2			Apple juice	41 ± 2		
Sweet corn	52 ± 5			Orange juice	50 ± 2		

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Glycemic index

Dairy products and alternatives		Legumes		Snack products		Sugars	
Milk, full fat	39 ± 3	Chickpeas	28 ± 9	Chocolate	40 ± 3	Fructose	15 ± 4
Milk, skim	37 ± 4	Kidney beans	24 ± 4	Popcorn	65 ± 5	Sucrose	65 ± 4
Ice cream	51 ± 3	Lentils	32 ± 5	Potato crisps	56 ± 3	Glucose	103 ± 3
Yogurt, fruit	41 ± 2	Soya beans	16 ± 1	Soft drink/soda	59 ± 3	Honey	61 ± 3
Soy milk	34 ± 4			Rice crackers/crisps	87 ± 2		
Rice milk	86 ± 7						

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Caloric intake would be similar, glycemic index different? Why? They both contain fructose

EXTENSION

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What I see

- Labels are not consistent from product to product
  - Serving size varies
- Calories are calories
  - Differences in digesting or metabolizing one food over another are small
- There are three nutrients that contribute to caloric intake
  - Carbohydrates, protein, fat
  - At same total caloric intake, reducing one will increase the other
- Avoiding fat will increase hunger
- Carbohydrates and protein easily contribute to fat deposition

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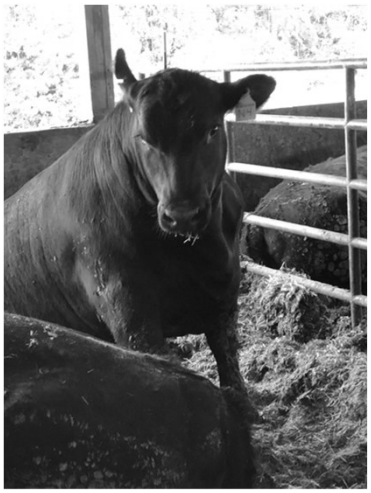
Back to beef cattle nutrition!



- Feeding beef cows
  - At weaning, lowest needs
  - Late gestation, next lowest
  - Early lactation, highest need
  - Mid-lactation, next highest
- Feeding growing calves after weaning
  - Heifers
  - Backgrounding
  - Finishing

EXTENSION

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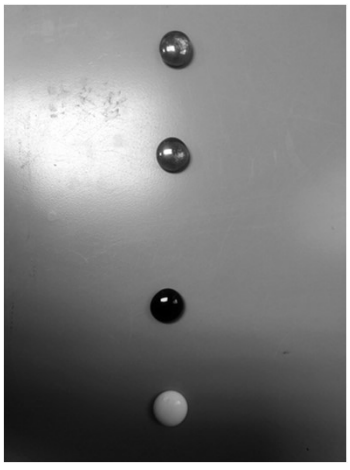
Feed ingredient currency, each is worth 5 pct units

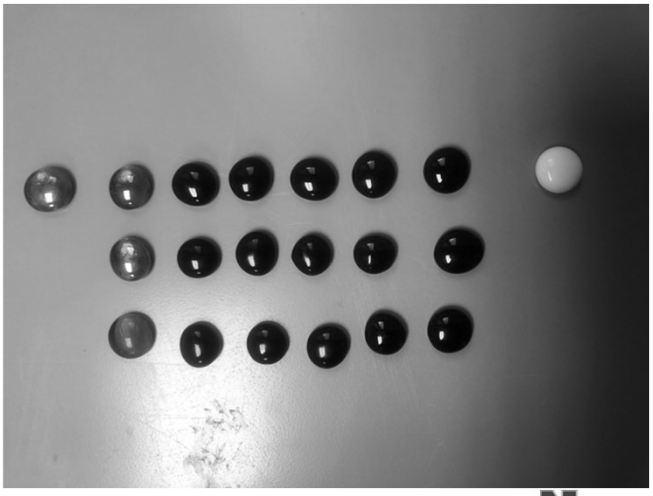
Hay, stover or grass

Silages

Grain

Supplement





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Activity—formulate three diets: weaned calf, backgrounding calf and dry cow

EXTENSION

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