Beef Skillathon Study Series: Feedstuffs
Supplemental Activities

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The below activities are designed as supplemental activities to the Feedstuffs video that is part of the Beef Skillathon Study Series located at https://animalscience.tennessee.edu/youth-resources/. Youth should watch the video and then complete these activities. Keys for all activities are provided at the end of this packet.

Flashcards

Digital flashcards are available at https://quizlet.com/_8hd354?x=1jqt&i=1i1f80. Index cards and #8163 mailing labels are needed to construct flashcards for the below activities.

Feedstuffs Concentration Game

1. Print feed pictures and names (pages 2-4 of this packet) using #8163 mailing labels.
2. Peel off each sticker and place on a separate index card (26 index cards needed).
3. Shuffle all of the cards up and place them face down.
4. Flip over 2 cards.
5. If the 2 cards match (correct feed name with picture) keep them.
6. If the 2 cards do not match (2 pictures, 2 feed names or the wrong feed name and picture combination) place them back down and try again.
7. Keep going until all pictures are correctly identified with their names.

Feedstuff Flashcards

1. Print feed pictures and names (pages 2-4 of this packet) using #8163 mailing labels.
2. Place the correct feed picture and name on the front and back of the same index card to make traditional flash cards (13 index cards needed). These cards will not work to play the concentration game.
3. Practice with flashcards to learn about common feedstuffs used in beef production.

Ration Formulation

Review Activity 2: How to Formulate Rations with Pearson's Square and then complete the activity by formulating rations and answering question for the Ration Formulation Scenarios.

Programs in agriculture and natural resources, 4-H youth development, family and consumer sciences, and resource development.
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WHOLE SHELLED CORN

CORN GLUTEN FEED

DISTILLERS GRAIN

WHOLE SOYBEANS

SOYBEAN MEAL

SOYBEAN HULLS

WHOLE COTTONSEED

COTTONSEED MEAL

COTTONSEED HULLS

WHITE SALT

TRACE-MINERALIZED
SALT

LIMESTONE

UREA

Activity 2: How to Formulate Rations with Pearson's Square

What you need to know:
- Target nutrient level of final ration (crude protein, total digestible nutrients, etc.)
  - Pearson's Square will only work with one nutrient
- Feedstuffs that are available to use
  - Pearson's Square will only work with two feedstuffs
- Nutrient content of the two feedstuffs for the desired nutrient, plus level of dry matter

Procedure:
1. Place target nutrient content for finished ration in the center of the square
2. Place the feedstuffs along with their nutrient level on the left side of the square
3. Ensure that both are on expressed on a dry matter basis
4. Subtract across the diagonal to determine how many parts of each feedstuff will be in the final ration
5. Add the parts together to get the total amount of parts in the final ration
6. Divide the amount of parts of each feedstuff by the total amount of parts in the finished ration to determine the percentage of each feedstuff in the final ration

NOTE: When completing Pearson's Square, make sure the nutrient content percentage for each feedstuff is on the same basis (As-Fed or Dry Matter). It is typically preferred to have the feedstuffs on a Dry Matter Basis. An easy way to remember is that the percent value for a specific nutrient will always be larger on a Dry Matter Basis. This is because once the water is removed, that nutrient is a larger percentage of the total.

As-Fed Basis to Dry Matter Basis
- Formula: Nutrient level on As-Fed / (%DM/100) = Nutrient level on Dry Matter
- Corn CP Example: 7.5% / (86/100) = 8.7% CP

Dry Matter Basis to As-Fed Basis
- Formula: Nutrient level on Dry Matter X (%DM/100) = Nutrient level on As-Fed
- Corn CP Example: 8.7% X (86/100) = 7.5%

Example:
You are in the process of finishing a steer. You want to create a ration that is 14% crude protein. The feedstuff you plan to use are corn (8.7% CP) and soybean meal (54.5% CP). What ratio of corn to soybean meal should you mix?

Step 1: Place 14% (target CP) in the center of the square.
Step 2: Place 8.7% (CP of Corn) and 54.5% (CP of Soybean Meal) on the left side of the square.
Step 3: Subtract diagonally to determine how many parts of corn and soybean meal your ration will contain.
- 54.5 – 14 = 40.5

- 14 – 8.7 = 5.3

Step 4: Add the parts together to determine total parts of the ration.

- 40.5 parts corn + 5.3 parts soybean meal = 45.8 total parts

Step 5: Divide the parts of corn and the parts of soybean meal by the total parts to determine the percentage of each feedstuff your ration will contain.

- Corn: 40.5 parts corn / 45.8 total parts = 88.4% corn
- Soybean Meal: 5.3 parts soybean meal / 45.8 total parts = 11.6% soybean meal

Corn – 8.7%

$$\frac{40.5}{45.8}$$

88.4% – Corn

14%

Soybean Meal – 54.5%

$$\frac{5.3}{45.8}$$

11.6% – Soybean Meal
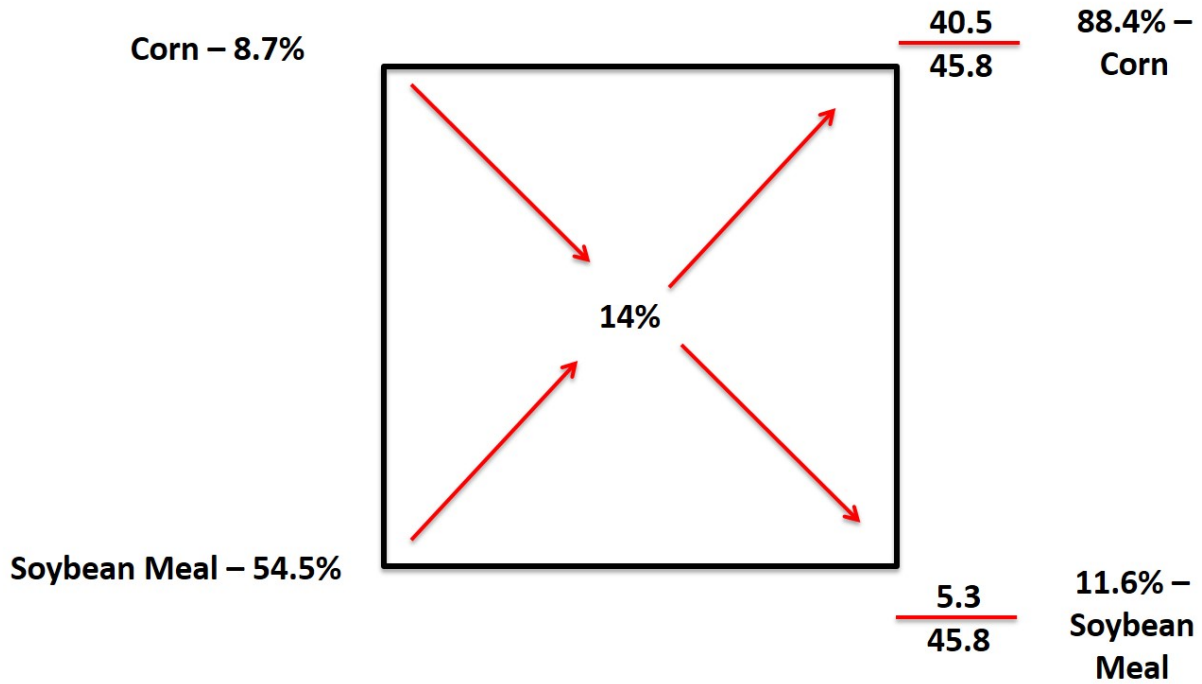
Ration Formulation Scenarios

Use the below example square to complete the Ration Formulation Scenarios using the Pearson's Square method.
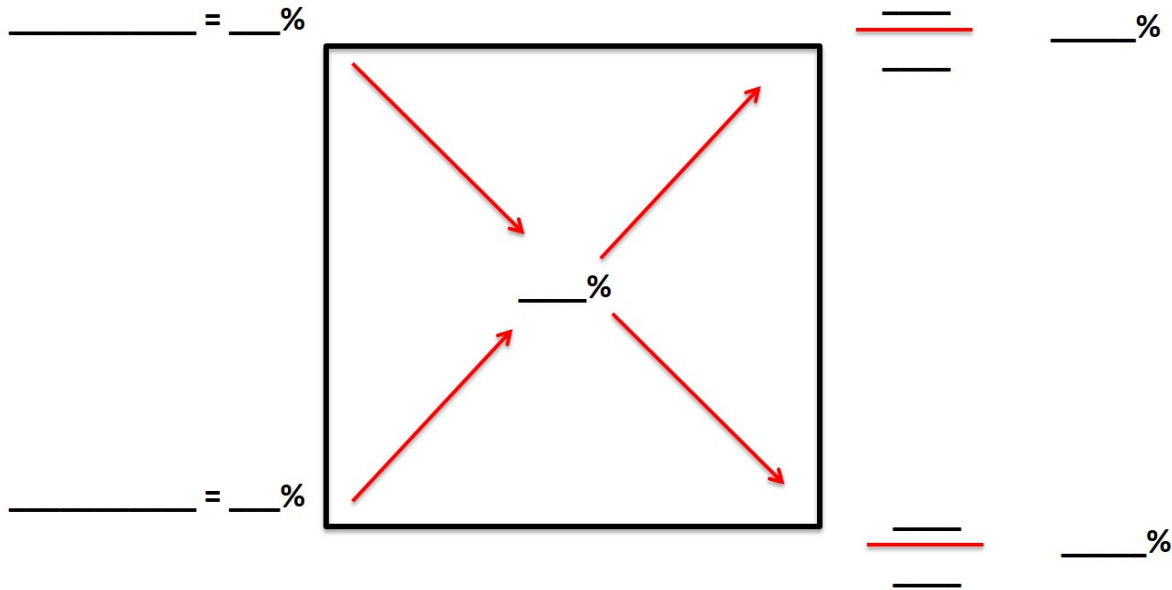
_____ = ___% $\frac{\_\_\_\_}{\_\_\_\_}$ _____%

____%

_____ = ___% $\frac{\_\_\_\_}{\_\_\_\_}$ _____%

1. You want to create a feed ration for your stocker calves to help them gain weight faster. The available feedstuffs are Corn Gluten Feed (23.9% CP) and Soybean Hulls (12.1% CP). In increase weight gains for stockers, you want to create an 18% crude protein ration. What percentage of Corn Gluten Feed and Soybean Hulls will make up this ration?

2. You are currently feeding 20 pounds per day of Feed A that contains 15% moisture and 85% dry matter. The next "batch" of feed (Feed B) contains 19% moisture and 81% dry matter. How many pounds of Feed B do you need to feed in order to provide the same amount of dry matter as you were in Feed A?

3. Using Cottonseed Hulls (47.8% CF) and Corn Gluten Feed (11.4% CF), develop a ration that is 21% CF. It will be fed to cattle for a short period in a dry lot situation where forages are not available. What percentage of Corn Gluten Feed and Cottonseed Hulls will make up this ration?

4. Using Corn (8.7% CP) and Soybean Meal (54.5% CP) you want to create a feed ration for your cattle that is 15% crude protein. If you mix a 150 pound batch of this feed ration, how many pounds of Corn and Soybean Meal will be in this 150-pound batch?

5. Using Soybean Hulls (71.4% TDN) and Distillers Grain (89.1% TDN), develop a ration that is 84% TDN that will be fed to weaned calves for improved gains prior to marketing. How many pounds of Soybean Hulls and Distillers Grains would be in a ton mixture?

Activity 1: Feedstuffs Concentration Game - KEY

Whole Shelled Corn

- Energy concentrate
- Commonly processed into other version (cracked corn)

Corn Gluten Feed

- Protein supplement
- Also high in energy
- By-product of corn milling industry

Distillers Grain

- Protein supplement
- Also high in energy
- By-product of distilling industry

Whole Soybeans

- Protein supplement
- Also high in energy

Soybean Meal

- Protein supplement
- Also high in energy
- By-product of oil extraction from soybeans

Soybean Hulls

- Energy concentrate
- By-product of soybean processing

Whole Cottonseed

- Protein supplement
- Also high in energy and fiber

Cottonseed Meal

- Protein supplement
- Also high in energy
- By-product of cotton ginning

Cottonseed Hulls

- Roughage/Fiber source
- By-product of cotton de-hulling process

White Salt

- Mineral supplement
- Source of sodium and chloride

Trace-Mineralized Salt

- Mineral supplement
- Source of low level of micro-minerals

**Limestone**

- Mineral supplement
- Source of calcium

Urea

- Non-protein nitrogen
- Can be used by ruminants to produce microbial protein

Ration Formulation Scenarios – KEY

1. You want to create a feed ration for your stocker calves to help them gain weight faster. The available feedstuffs are Corn Gluten Feed (23.9% CP) and Soybean Hulls (12.1% CP). In increase weight gains for stockers, you want to create an 18% crude protein ration. What percentage of Corn Gluten Feed and Soybean Hulls will make up this ration?

CGF ____ = 23.9 %

$\frac{5.9}{11.7}$ $\frac{50.4}{CGF}$ %

18 % CP

SBH ____ = 12.1 %

$\frac{5.8}{11.7}$ $\frac{49.6}{SBH}$ %
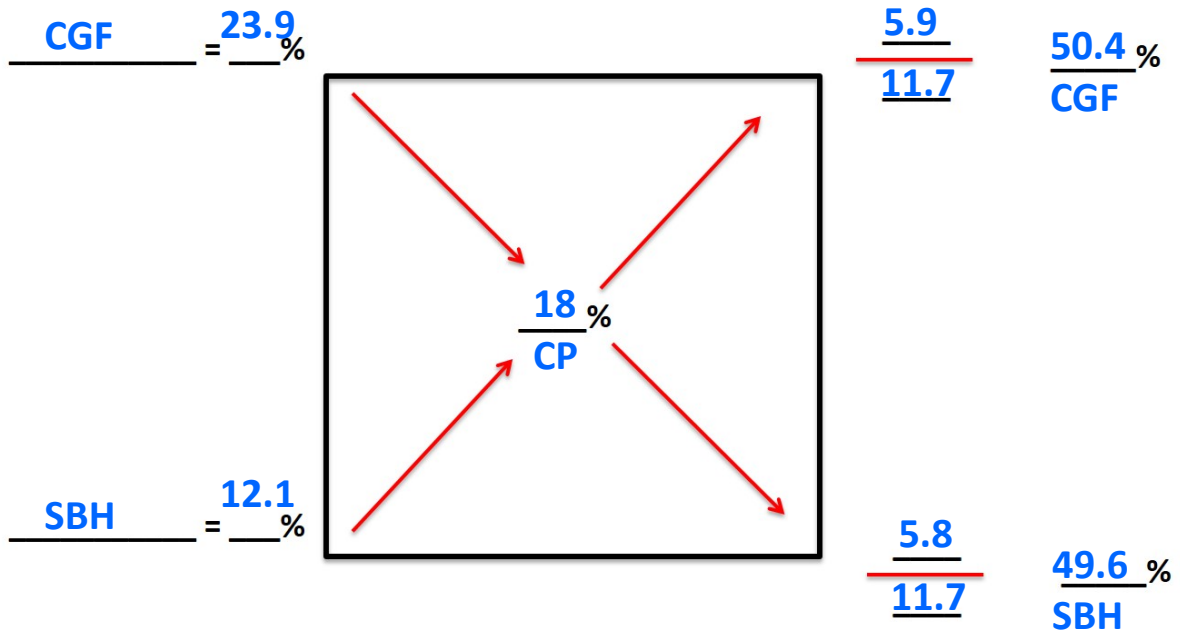
Corn Gluten Feed = 50.4%
Soybean Hulls = 49.6%

2. You are currently feeding 20 pounds per day of Feed A that contains 15% moisture and 85% dry matter. The next "batch" of feed (Feed B) contains 19% moisture and 81% dry matter. How many pounds of Feed B do you need to feed in order to provide the same amount of dry matter as you were in Feed A?

Feed A
- **20 pounds of feed on As-Fed Basis = 17 pounds of feed on Dry Matter Basis**
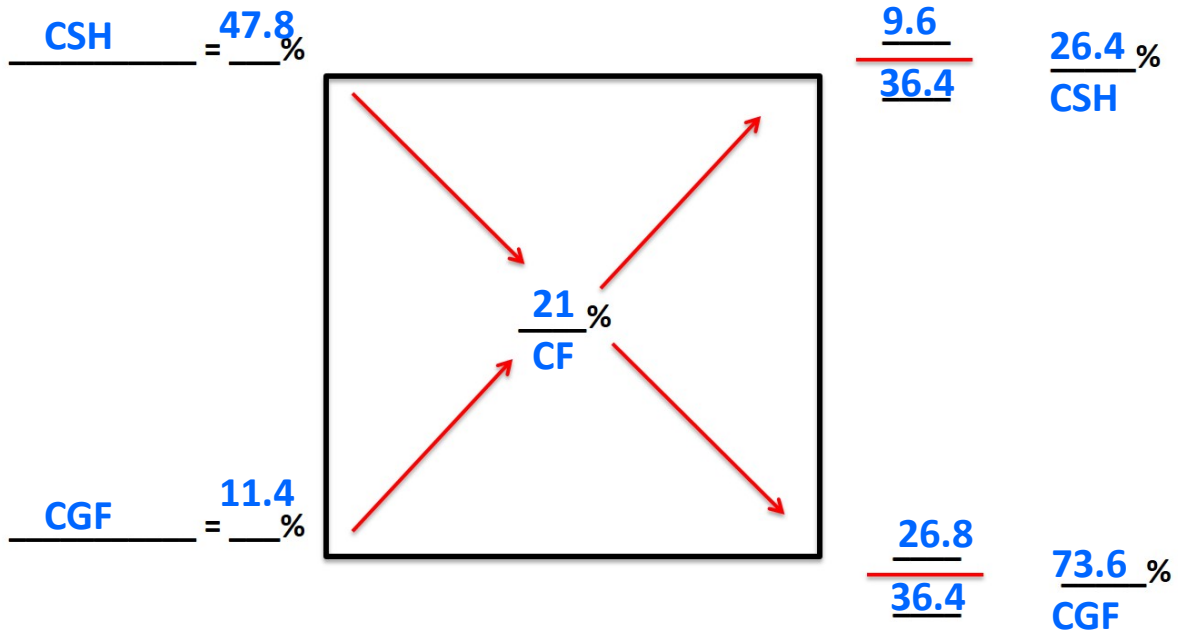- **20 X 0.85 = 17 pounds**

Feed B
- **20 pounds of feed on As-Fed Basis = 16.2 pounds of feed on Dry Matter Basis**
- **20 X 0.81 = 16.2 pounds**

17 – 16.2 = 0.8 pounds of dry matter (Difference between Feed A and Feed B)
Pounds of DM needed / (%DM/100) = pounds of Feed B (As-Fed) needed to get 0.8 pounds of DM
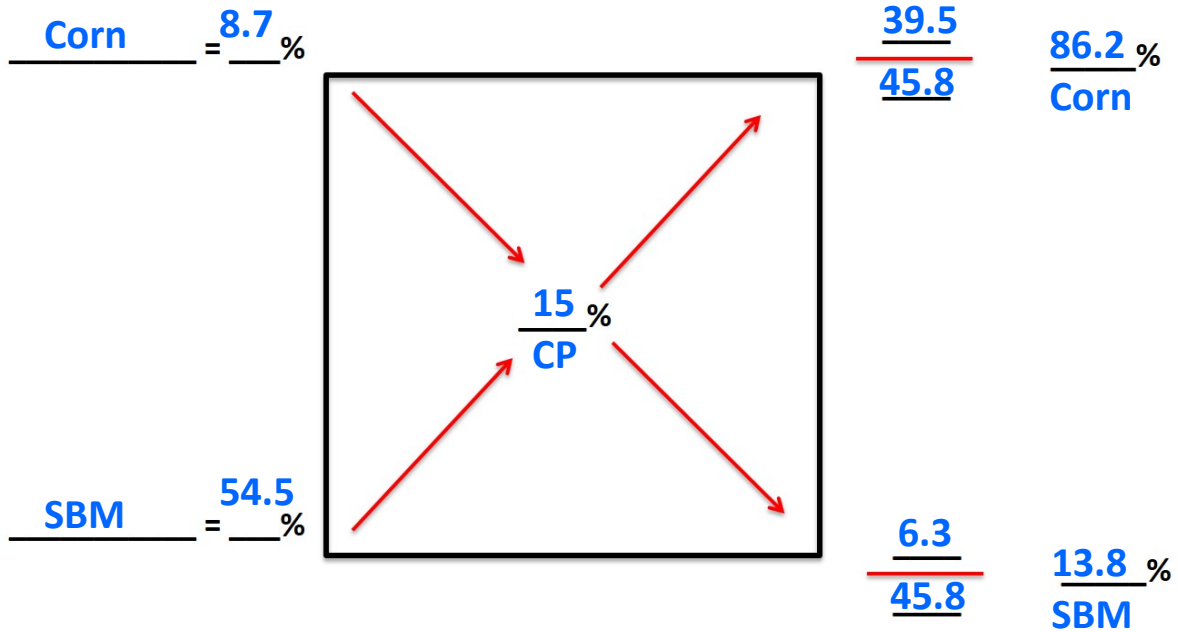**0.8 / 0.81 = 1.0**
20 + 1 = 21 pounds of Feed B needed to be fed to equal DM provided by Feed A

3. Using Cottonseed Hulls (47.8% CF) and Corn Gluten Feed (11.4% CF), develop a ration that is 21% CF. It will be fed to cattle for a short period in a dry lot situation where forages are not available. What percentage of Corn Gluten Feed and Cottonseed Hulls will make up this ration?

CSH ___ = 47.8 ___%

$\dfrac{9.6}{36.4}$ $\dfrac{26.4}{CSH}$ %

$\dfrac{21}{CF}$ %

CGF ___ = 11.4 ___%

$\dfrac{26.8}{36.4}$ $\dfrac{73.6}{CGF}$ %

Cottonseed Hulls = 26.4%
Corn Gluten Feed = 73.6%

4. Using Corn (8.7% CP) and Soybean Meal (54.5% CP) you want to create a feed ration for your cattle that is 15% crude protein. If you mix a 150 pound batch of this feed ration, how many pounds of Corn and Soybean Meal will be in this 150-pound batch?

Corn $= \dfrac{8.7}{\quad}$%

$\dfrac{39.5}{45.8}$ $\dfrac{86.2}{\text{Corn}}$ %

$\dfrac{15}{\text{CP}}$ %

SBM $= \dfrac{54.5}{\quad}$%

$\dfrac{6.3}{45.8}$ $\dfrac{13.8}{\text{SBM}}$ %

Corn = 150-pound batch X 0.862 = 129.3 pounds of Corn
Soybean Meal = 150-pound batch X 0.138 = 20.7 pounds of Soybean Meal

5. Using Soybean Hulls (71.4% TDN) and Distillers Grain (89.1% TDN), develop a ration that is 84% TDN that will be fed to weaned calves for improved gains prior to marketing. How many pounds of Soybean Hulls and Distillers Grains would be in a ton mixture?

SBH _____ = 71.4 ___%

$\dfrac{5.1}{17.7}$ 28.8 % SBH

84 % TDN

Distillers _____ = 89.1 ___%

$\dfrac{12.6}{17.7}$ 71.2 % Distillers
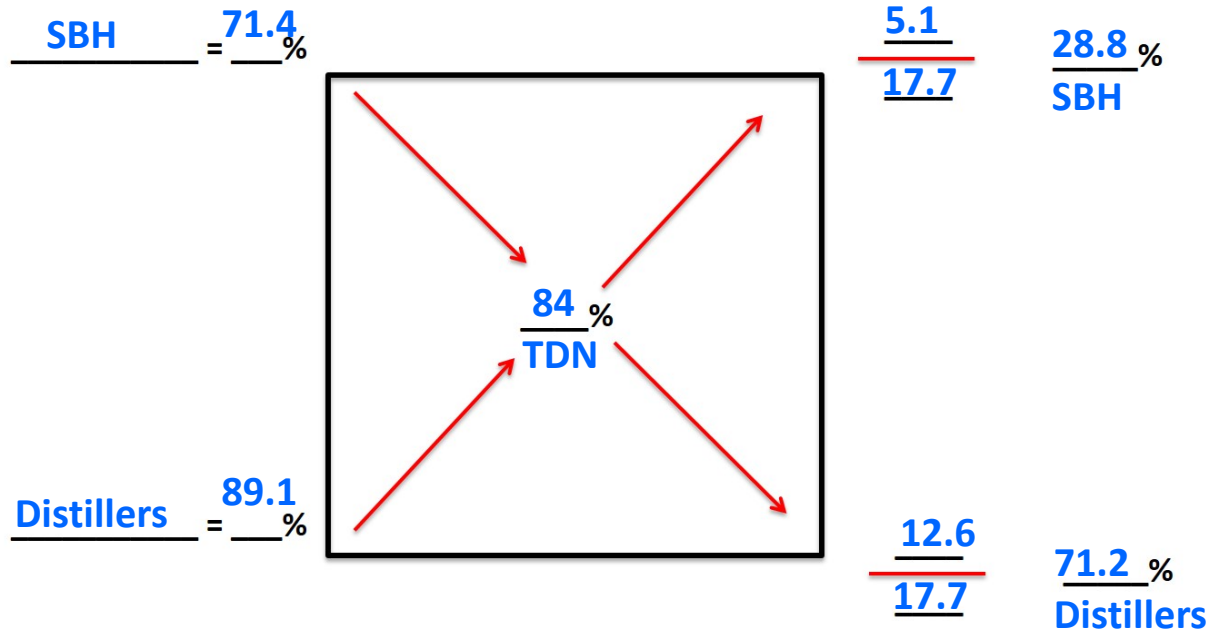
Soybean Hulls = 2000-pound batch X 0.288 = 576 pounds of Soybean Hulls
Distillers Grain = 2000-pound batch X 0.712 = 1424 pounds of Distillers Grain