**Animal Nutrition**
Calculate feed recipes

Protein is one of the 6 essential nutrients (carbohydrates, protein, fat, vitamins, minerals and water) in an animal's diet. Proteins are composed of various combinations of up to 22 amino acids. Amino acids are the building blocks of proteins and are classified as either essential or nonessential in an animal's diet. Most animals can synthesize the nonessential amino acids. However, the essential amino acids cannot be synthesized and must be supplied to animals in their diet. Animals must consume protein to help grow new tissues, such as muscle, as well as to repair old tissues. Proteins also help animals with weight gain, gestation, milk production, growth, and overall wellness. Soybean meal is an important source of vegetable protein in most livestock diets with its high crude protein content of 44 to 50% and balanced essential amino acid composition.
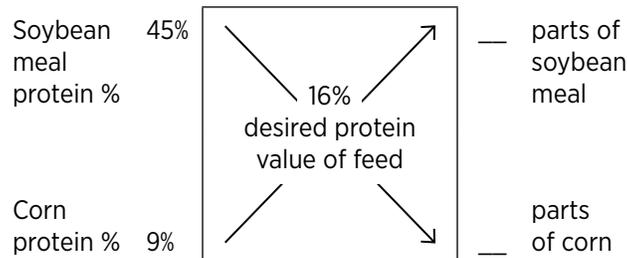
Make a feed recipe by blending different ingredients together to create a 16% protein feed ration. It is important to know the right ratio of ingredients required for the feed. For example, soybean meal is 45% protein and corn is 9% protein. Calculate the amounts of each ingredient needed to get a 16% protein ration by using the Pearson square below.

1. To use the Pearson square to determine the parts of each ingredient, find the difference in the desired protein value of the feed to be created from the chosen ingredients. In this example, to determine the parts of corn to be used in the recipe, find the difference of the desired protein value from the soybean meal protein value. Place your answer in the chart below.

    Answer: (Soybean Meal Protein %) 45 – (Desired Protein %) 16 = 29 parts of corn

2. To determine the parts of soybean meal, find the difference in protein value of the desired feed from the corn protein value. Place your answer in the chart below.

    Answer: (Desired Protein %) 16 – (Corn Protein %) 9 = 7 parts of soybean meal

3. Calculate how many parts you will need in your feed mix by adding up the parts of soybean meal and corn for your feed recipe that you just determined.

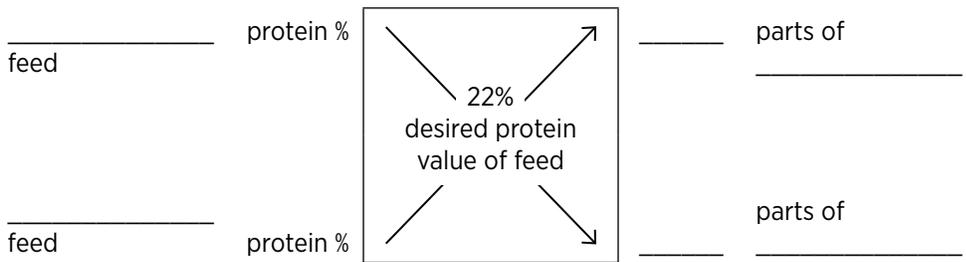   ***Answer: 29 + 7 = 36 parts***

    Animals will also need a vitamin and mineral mix added to their feed. Calculate it as 1 part of the feed ration to be added to the corn and soybean meal parts to complete your feed ration.

Ingredient	Protein value	Volume (equal parts)	Volume (%)
Soybean meal	45%	***7***	***19%***
Corn	9%	***29***	***78%***
Vitamins & minerals	0%	1	***3%***

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4. What are the percentages of soybean meal and corn in this feed recipe used to create a 16% feed ration?

   Corn = 78%
   Soybean Meal = 19%

5. Create a 22% desired protein feed ration using the Pearson Square method below. Choose between the following possible ingredients to create your feed recipe. Fill in the the Pearson Square and the chart below to demonstrate your work.

_____ protein %   ╲   ╱↗   _____ parts of
feed   _____
                              22%
                       desired protein
                        value of feed

_____   ╱   ╲↘   parts of
feed   protein %   _____ _____

Possible feed ingredient options:
- Corn (9%)
- Alfalfa (22%)
- Distiller's grains (25%)
- Soybean meal (45%)
- Soybean hulls (12%)
- Barley (14%)
- Wheat middlings (16%)
- Cottonseed (21%)
- Oats (12%)

Ingredient	Protein value	Volume (equal parts)	Volume (%)
Vitamins and minerals	0%	1	

Possible answers include:
- *Corn (9% Protein), 13, 35% + Soybean Meal (45% Protein), 23, 62% + Minerals (0%), 1, 3%*
- *Soybean Meal (45% Protein), 23, 72% + Barley (14% Protein), 8, 25% + Minerals (0% Protein), 1, 3%*
- *Distiller's Grains (25%), 3, 22% + Soybean Hulls (12% Protein), 10, 71% + Minerals (0% Protein), 1, 7%*
- *Soybean Meal (45% Protein), 23, 68% + Oats (12% Protein), 10, 29% + Minerals (0% Protein), 1, 3%*