Formulating Rations with the Pearson Square

*Courtesy: J. Wagner and T.L. Stanton (Colorado State University)*

Quick Facts...

- The Pearson square ration formulation procedure is designed for simple rations.
- In order for the square to work, follow specific directions for its use.
- Nutrient contents of ingredients and nutrient requirements must be expressed on the same basis (i.e., dry-matter or "as-fed").

The Pearson square or box method of balancing rations is a simple procedure that has been used for many years. It is of greatest value when only two ingredients are to be mixed. In taking a close look at the square, several numbers are in and around the square. Probably one of the more important numbers is the number that appears in the middle of the square. This number represents the nutritional requirement of an animal for a specific nutrient. It may be crude protein or TDN, amino acids, minerals or vitamins.

In order to make the square work consistently, there are three very important considerations:

1. The value in the middle of the square must be intermediate between the two values that are used on the left side of the square. For example, the 14 percent crude protein requirement has to be intermediate between the soybean meal that has 45 percent crude protein or the corn that has 10 percent crude protein. If barley is used that has 12 percent crude protein and corn that has 10 percent crude protein, the square calculation method will not work because the 14 percent is outside the range of the values on the left side of the square.

2. Disregard any negative numbers that are generated on the right side of the square. Be concerned only with the numerical differences between the nutrient requirement and the ingredient nutrient values.
3. Subtract the nutrient value from the nutritional requirement on the diagonal and arrive at a numerical value entitled parts. By summing those parts and dividing by the total, you can determine the percent of the ration that each ingredient should represent in order to provide a specific nutrient level. Always subtract on the diagonal within the square in order to determine parts. Always double check calculations to make sure that you did not have a mathematical error. It also is very important to work on a uniform basis. Use a 100-percent dry-matter basis for nutrient composition of ingredients and requirements and then convert to an as-fed basis after the formulation is calculated.
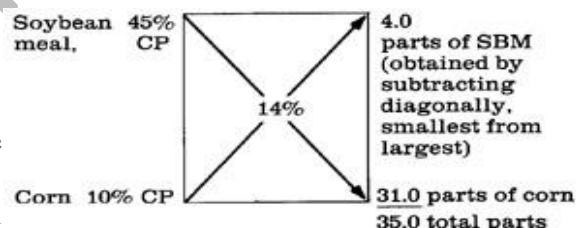
Corn represents (31.0 / 35.00) x 100 of the ration, or 88.57 percent. Soybean meal represents (4.0 / 35.00) x 100 of the ration, or .43 percent

Check of the calculation:

88.57 lb corn x 10.0% CP	=8.86
11.43 lb SBM x 45.0% CP	=5.14
100.00 lb mixture contains	=14.00 lb CP, or 14 percent.