

Balancing a Ration

Once a producer has determined the nutritional needs of an animal and the nutrient content of feeds, the next step is balancing a ration. A balanced ration provides the needed nutrients for the animal by including the necessary amounts of the proper feeds.

Importance of Balanced Rations

A balanced ration provides the proper levels of nutrients for an animal. The objective of balancing a ration is to meet the animal's nutritional needs with feed that supplies each nutrient in the proper amount and proportion. See Figure 5.1.

Providing animals with balanced rations is important. Balancing rations will allow a producer to meet an animal's nutritional needs for health and the specific nutrient requirements of each life stage—maintenance, conception and gestation, lactation, and growth and development. By balancing rations, nutritional deficiencies that can harm the animal can be prevented. In addition, growth and production can be maximized.

Balancing Rations

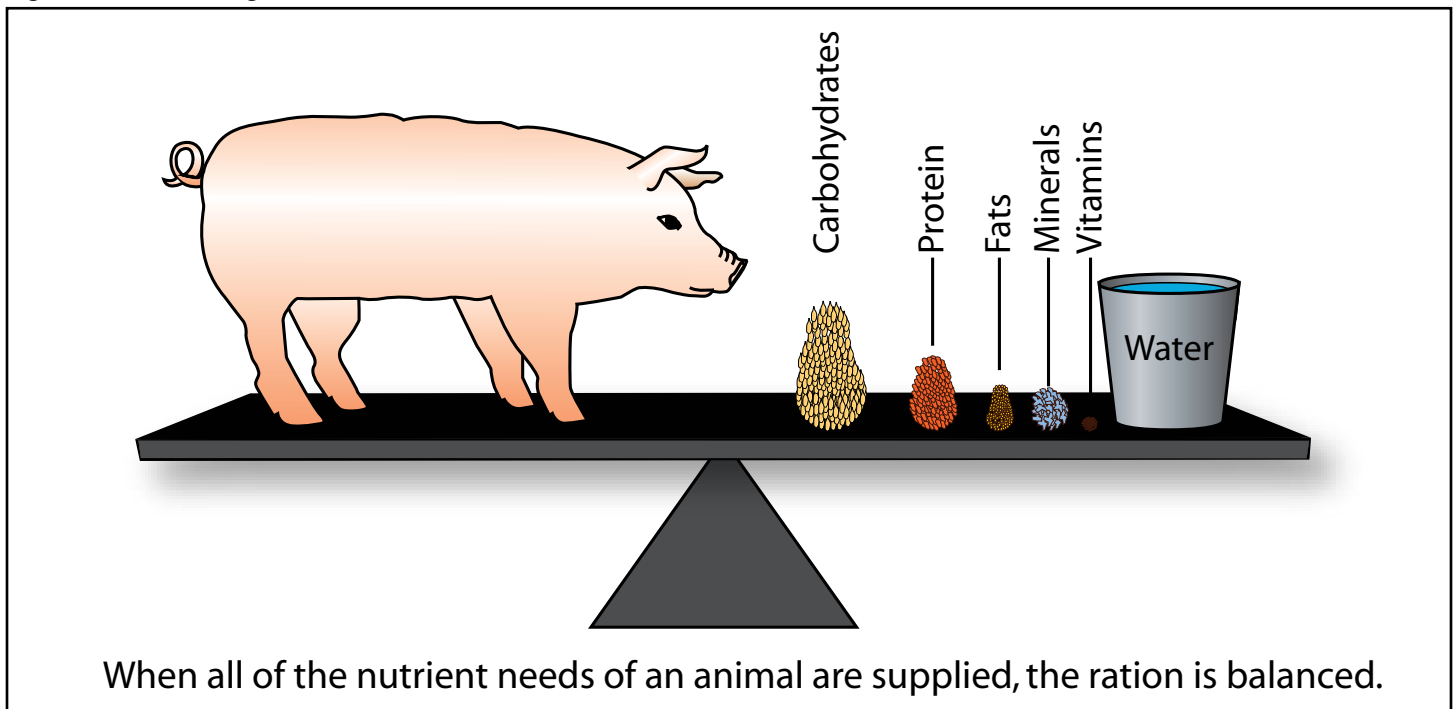
Several methods may be used to balance a ration. Special computer programs, trial and error, and the Pearson

square method may all be utilized by the producer when balancing a ration. In addition to these common methods, many other methods are available to producers.

Today, computers are widely used when balancing rations. Local feed dealers, cooperatives, companies, and producers may balance a ration using computers. Special programs have been designed to check that the feeds included in a ration meet all of the animal's nutrient requirements by making sure they are balanced. The computer does the figuring with the information provided about the animal and the type and amount of feed. It therefore requires complete information for accurate results. When this data is entered, the program will indicate whether the ration is balanced, the animal needs more of a certain nutrient or nutrients, or the ration is exceeding the animal's needs. If the ration is not balanced, the person using the program must alter the ration and enter the new information to allow the computer to check it. The operator of the program must therefore be knowledgeable about nutrition for accurate results. A general knowledge of nutrition is necessary because even if a ration balances, an animal will not eat it if it is not palatable.

Another method for balancing rations is referred to as the trial and error method. To use this method, a combination of feeds is selected that the producer believes will meet

Figure 5.1 - Balancing Nutrients in Rations



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nutritional needs. The nutrient content of the diet is calculated and compared to the nutritional requirements of the animal. If the diet does not meet those requirements, a different combination of feeds must be selected and the process repeated. The producer attempts to meet all the animal's nutrient needs with this method.

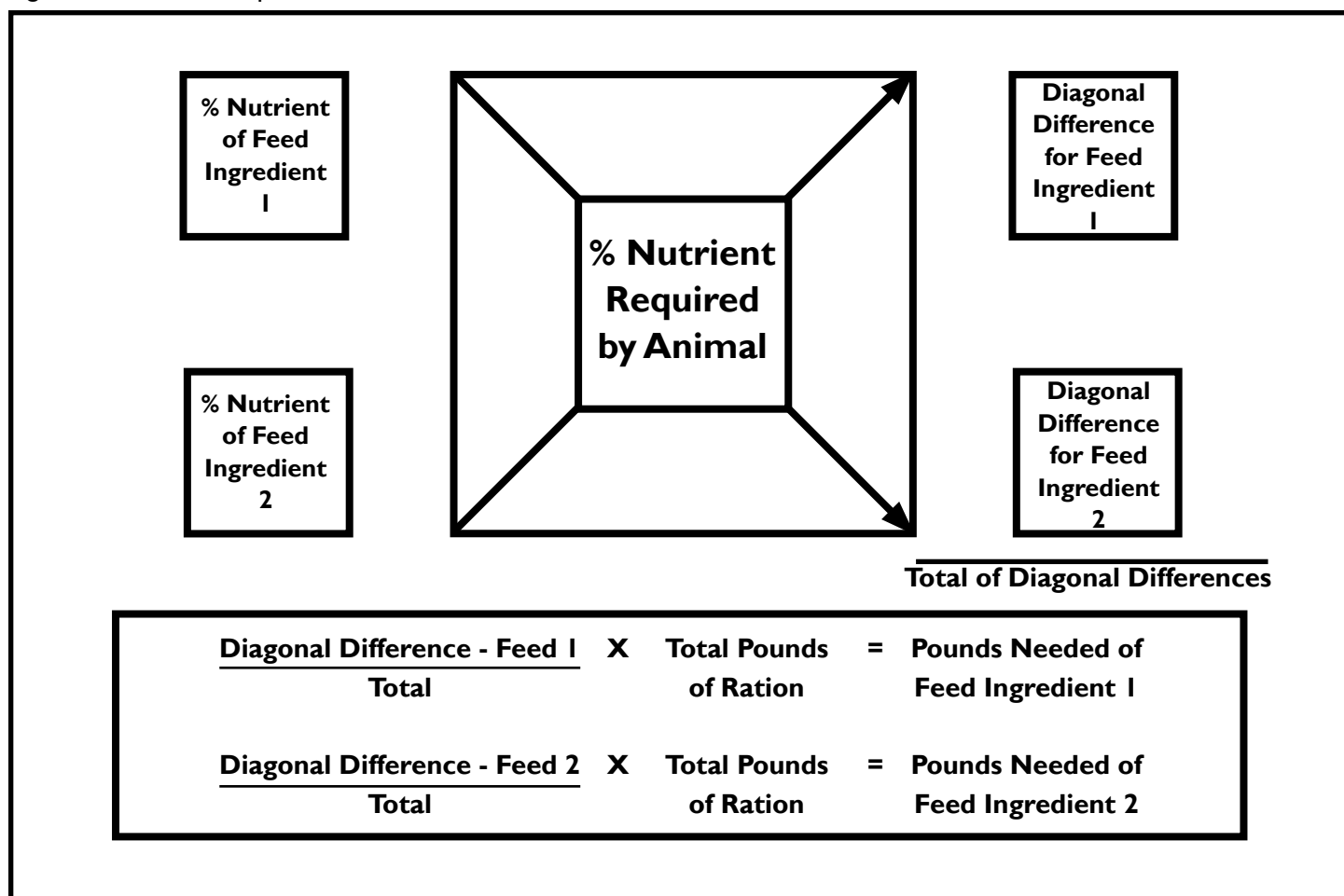
A third method, the Pearson Square method, can also be used to balance rations. This method balances for only one nutrient at a time; it is most often used for crude protein. In order to balance for other nutrients, a new Pearson square must be constructed. This method is sometimes utilized by a producer engaged in limited production. It is a good way to start learning how to balance rations.

The process for using the Pearson Square is quite simple. First, draw a square similar to that in Figure 5.2. Write the percent of the nutrient required by the animal in its

diet in the middle of the square. Next, assign each of two feed ingredients its own corner on the left side and write down the percent of the nutrient required found in that ingredient. Find the difference by subtracting diagonally through the square; always subtract the smaller number from the larger number. Write the results on the right corners of the square. The answer in the upper right corner represents the proportion of the ingredient in the upper left corner that will be included in the ration, while the answer in the lower right corresponds to the proportion of the ingredient on the lower left that is included. Next add the numbers in the right-hand corners and place a total at the bottom.

Once the square has been completed, some additional calculations must be done to determine the amounts and proportions of feeds needed. First, a percentage is found for the ingredients by taking the diagonal difference for

Figure 5.2 - Pearson Square Method



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each ingredient and dividing it by the total. This number is the percentage of that ingredient needed in the ration in order for the ration to balance. After the percentage of each feed ingredient is found, the number of pounds of feed can be determined by multiplying the percentage by the total number of pounds in the ration. After the ration is balanced for one nutrient using this method, the producer must still check to ensure that the proper amounts of other nutrients are supplied to the animal.

Figure 5.3 shows an example of the use of the Pearson Square method. Suppose that 12 percent crude protein is needed in a concentrate mix for steers. The producer has to determine how many pounds of corn, which has 9 percent crude protein, and how many pounds of a protein supplement that has 40 percent crude protein are needed for a 100 pound ration.

The producer first constructs a square showing the percentages. He or she then subtracts the smaller number from the larger and adds the two remainders; the calculations show that there are 28 pounds of corn and 3 pounds of supplement in 31 pounds of feed. The amounts of the two ingredients in a hundred pound ration are determined by dividing the number of pounds of each ingredient by 31 and multiplying the result by 100. The producer determines that 90.3 pounds of corn and 9.7 pounds of supplement should be included in the ration.

Factors Influencing Ration Ingredients

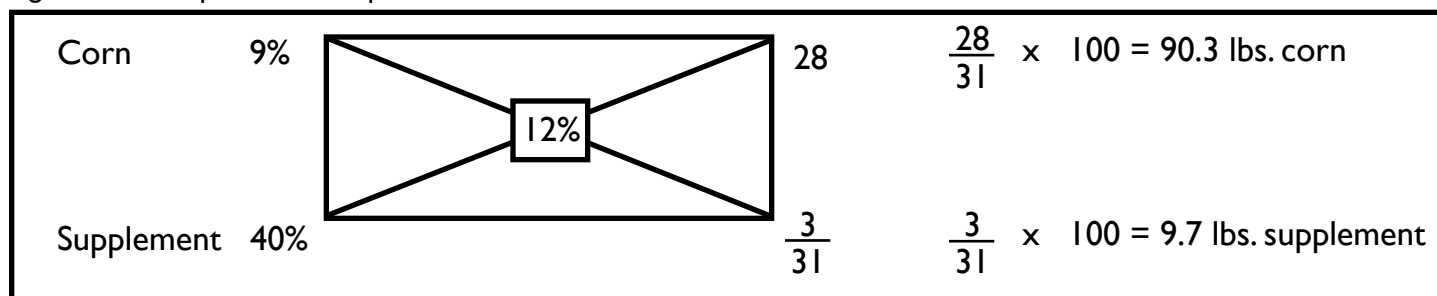
Many different feeds can be used to meet an animal's nutritional requirements. A combination of feeds can also be used. The selection of a feed or combination of feeds for the animal is influenced by two factors, least cost and ingredient availability.

The term "least cost" refers to getting the desired performance at the least cost to the producer. The type of nutrients needed by the animal cannot be ignored on the basis of cost, however. Suppose corn is \$2 a bushel, while wheat can be bought for \$4 a bushel. Which one should be fed? If the corn is chosen because it is cheaper and corn does not meet the nutritional needs of the animal, then in the long run costs may actually be greater, since growth and production are not maximized.

The process for determining least cost is not complicated. First, each feed ingredient in a ration has to be balanced. Once the amount of the particular feed ingredient is known, the total cost of the ration can be calculated by multiplying the quantity of each feed by its price and then adding to find total cost. The costs of balanced rations using different feed ingredients can then be compared. Choosing one ration over another ration that supplies the same nutrients to the animal will depend on which ration has the least cost.

The other factor that influences feed selection is ingredient availability. The availability of a particular feed depends on the geographical area. Areas vary in the types of feeds that are available. For example, in places where grains are grown extensively, corn will be more available as a feed ingredient. Areas with an abundance of good grazing, on the other hand, will utilize forages for feed. In addition, different types of manufacturing may produce byproducts that are available as feed to animals. Manufacturing byproducts that are fed to animals include items such as fish meal, blood meal, brewer's grains, whole cottonseeds, and soyhulls. Ingredient availability therefore depends on what is grown or manufactured in a certain area.

Figure 5.3 - Sample Pearson Square Calculation



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Summary

A balanced ration provides the animal the proper amounts and proportions of nutrients. It is important to balance a ration to keep an animal healthy and provide the necessary nutrients for each life stage, to prevent nutritional deficiencies, and to promote maximum growth and production. A ration may be balanced using a variety of methods, such as computer programs, trial and error, and the Pearson Square method. Least cost and ingredient availability are factors to consider when choosing the ingredients of a ration.

Credits

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