

Relative Value of Feedstuffs

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There are many ways to calculate the relative value of feedstuffs for pigs. The 2007 Pork Industry Handbook article “Relative value of feedstuffs for swine” (PIH 07-06-03) is particularly useful for producers. Metabolizable energy, digestible lysine, and available phosphorus are three essential and costly components of pig diets that can be used to determine relative value of alternative feeds. Solving simultaneous equations to estimate the value of metabolizable energy (ME), digestible lysine (dig. Lys), and available phosphorus (Avail P) in three reference feeds with known market prices is one method for calculating the value of an alternative feedstuff.

The basic equation utilized is as follows:

$$(ME)X + (Dig. Lys)Y + (Avail. P)Z = \text{Relative Value, \$/cwt}$$

Where X, Y, and Z are the values for ME, dig. Lys, and Avail. P, respectively. For example, using corn, soybean meal (sbm), and dicalcium phosphate (dical) as the three reference feedstuffs the equations become:

$$(ME, Corn) X + (Dig. Lys, Corn) Y + (Avail. P, Corn) Z = \text{Price Corn, \$/cwt}$$

$$(ME, SBM) X + (Dig. Lys, SBM) Y + (Avail. P, SBM) Z = \text{Price SBM, \$/cwt}$$

$$(ME, Dical) X + (Dig. Lys, Dical) Y + (Avail. P, Dical) Z = \text{Price Dical, \$/cwt}$$

Metabolizable energy, digestible lysine, and available phosphorus for a variety of feedstuffs can be found in the references listed in this publication. Inserting table values into the equations for the three feedstuffs results in the following equations:

$$1551 X + 0.17 Y + 0.04 Z = \text{Price Corn, \$/cwt}$$

$$1442 X + 2.41 Y + 0.20 Z = \text{Price SBM (44\% CP), \$/cwt}$$

$$0 X + 0 Y + 18.5 Z = \text{Price Dical, \$/cwt}$$

The price of feedstuffs should be the most current market price available. If we assume the following prices we can solve for X, Y, and Z in a multiple step process:

$$\text{Corn} = \$3.50 \text{ per bushel or } \$6.25/\text{cwt}$$

$$\text{SBM} = \$220.00 \text{ per ton or } \$11.00/\text{cwt}$$

$$\text{Dical} = \$470.00 \text{ per ton or } \$23.50/\text{cwt}$$

First solve for Z using the equation for dicalcium phosphate.

$$0 X + 0 Y + 18.5 Z = \$23.50$$

$$18.5 Z = 23.50$$

$$Z = 1.27$$

Next plug the value of Z into the equations for corn and soybean meal

$$1551 X + 0.17 Y + (0.04)(1.27) = \text{Price Corn, \$/cwt}$$

$$1551 X + 0.17 Y + 0.05 = 6.25$$

$$1551 X + 0.17 Y = 6.20$$

$$1442 X + 2.41 Y + (0.20)(1.27) = \text{Price SBM (44\% CP), \$/cwt}$$

$$1442 X + 2.41 Y + 0.34 = 11.00$$

$$1442 X + 2.41 Y = 10.66$$

Finally solve the two equations for the two unknowns:

$$1551 X + 0.17 Y = 6.20$$

$$1442 X + 2.41 Y = 10.66$$

$$1551 X + 0.17 Y = 6.20$$

$$1551 X = 6.20 - 0.17 Y$$

$$X = \frac{6.20 - 0.17 Y}{1551}$$

$$1442 X + 2.41 Y = 10.66$$

$$1442 \times \frac{6.20 - 0.17 Y}{1551} + 2.41 Y = 10.66$$

$$5.76 + 0.16 Y + 2.41 Y = 10.66$$

$$2.57 Y = 4.90$$

$$Y = 1.91$$

$$X = \frac{6.20 - 0.17 Y}{1551}$$

$$X = \frac{6.20 - (0.17 \times 1.91)}{1551}$$

$$X = \frac{6.20 - 0.32}{1551}$$

$$X = 0.004$$

Using the reference prices of \$3.50/bu for corn, \$220/ton for soybean meal, and \$470/ton for dicalcium phosphate results in the following values:

$$X = 0.004$$

$$Y = 1.91$$

$$Z = 1.27$$

Once the value of X, Y, and Z have been determined they can be used to determine the value of an alternative feed, as shown for barley:

$$(Barley ME)X + (Barley Dig. Lys)Y + (Barley Avail. P)Z = Value of Barley, \$/cwt$$

$$(1320 \times 0.004) + (0.45 \times 1.91) + (0.11 \times 1.27) = Value of Barley$$

$$5.28 + 0.86 + 0.14 = \$6.28 /cwt Barley$$

From this example we conclude that if barley can be obtained for less than \$6.28 per cwt it is economically advantageous to use barley in the diet. If the price of barley is more than \$6.28 per cwt using purchased barley is not beneficial.

Additional Resources

Iowa State University Extension. 1996. Life Cycle Swine Nutrition. PM-489. Iowa State University. Ames.

National Research Council. 1998. Nutrient Requirements of Swine 10th Edition. National Academy Press. Washington, DC.

Purdue University Extension, 2007. Relative Value of Feedstuffs for Swine, The New Pork Industry Handbook-07-06-03. Purdue University. West Lafayette, IN.