

Math Diversion 957

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December 9, 2025

Dear Algebra, stop asking us to find your X,
she's not coming back.
— Woody Paige

Source: <https://www.algebra.com/algebra>
Title: Question 835994
Presenter: Patrick

1 Problem

To produce sausage formulations, packers normally use lean beef, pork belly, and soy concentrate. The manufacturer uses 3 percent soy in final sausage mass. Water is added to the formulation as ice. The final sausage must contain: 15 percent protein, 60 percent moisture, and 25 percent fat. The ingredients contain the following:

- lean beef -- 20% protein, 67% moisture, 13% fat
- pork belly -- 10% protein, 40% moisture, 50% fat
- soy -- 90% protein, 7% moisture, 3% fat

How much of each ingredient should be combined to make 600 kg of sausage emulsion?

Note: The value of the fat content in the soy was written as 0%, but that didn't make 100% when adding up all three components, so I changed it accordingly.

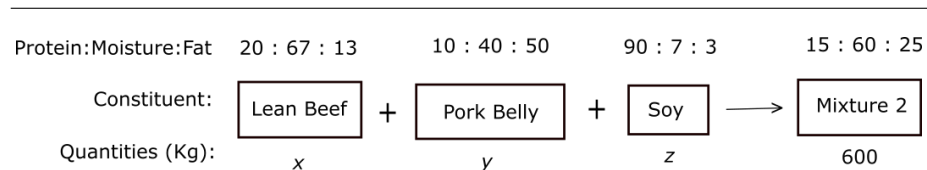


Figure 1. Is there a solution for x , y , and z ?

2 Solution

We begin by making use of the information that 3% of the total mix is the soy content (in the 'after' state). Therefore,

$$z = (.03)(600) = 18. \quad (1)$$

So, the soy-reduced mass equation becomes

$$x + y = 582. \quad (2a)$$

We need only one more equation to solve for x and y . Let's choose balancing on protein:

$$(.20)x + (.10)y + (.90)(18) = (.15)600. \quad (2b)$$

Wolframalpha.com gives as solutions for (2a) and (2b) as $x = 156$ and $y = 426$.