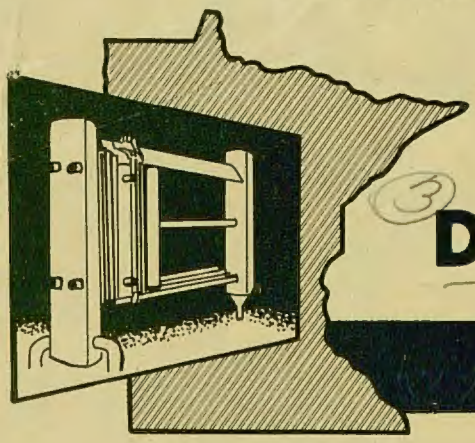


Minnesota

Dairy Products Processor

AGRICULTURAL EXTENSION SERVICE • INSTITUTE OF AGRICULTURE
UNIVERSITY OF MINNESOTA • ST. PAUL, MINNESOTA 55101

Editor - V. S. Packard July 1966 No. 23

PUSHING PENCILS FOR INCREASED SAVINGS

One of our graduate students, Milo Nielsen, has a suggestion for determining the most economical amount of a supply material to order. At first look, the math may seem a little rough. It isn't, though, if you work it out step by step. And it might be well worth your while.

FORMULA METHOD FOR ORDERING SUPPLIES

Below, you'll find a formula. If you work through the math, the answer you get is the quantity of any given supply material to order at one time--the most economical amount to order. Once you know how much to order you can determine how many times a year to order by dividing this amount into your total supply need for the year.

Let's suppose you're considering an order of waxed cartons for packaging butter in 68-pound blocks. (We could just as well be considering ice cream cartons or milk cartons or any other supplies, the same formula applies.) You can determine how many to order at one time to get the lowest cost per unit.

If your plant manufactures 1 million pounds of butter each year, you'll need about 14,700 bulk cartons if all the butter is bulked. The question is: How many do you buy at one time? All of them? Half of them (which will require two orders per year) Or a quarter of them (and make four purchases a year)? This is the question we'll try to answer.

HERE'S THE FORMULA

Don't get scared away--you can work it out. The formula for determining the most economical amount to buy is:

$$\hat{q} = \sqrt{\frac{2AS}{r\ c}}$$

1. $\hat{q}$ = The answer you're looking for--the quantity to buy at one time.

2. $\sqrt{}$ (This bracket means you must take a square root. You can do it with tables; you needn't work it out longhand.)

3. A = cost of placing a purchase order--all you need is a reasonable estimate. Add up such costs as (a) costs of forms used, (b) labor cost (time) for making a purchase order and processing it, (c) cost of obtaining quotations--telephone calls, etc., (d) cost of any followup that may be necessary, (e) costs of transportation, and (f) cost of inspecting. These cost factors will be different for various items handled. That is, the cost of ordering chemicals by phone or through a visiting manufacturer's representative will be different than the cost of placing an order for a truckload of butter cartons.

4. S = annual usage (actual number used per year)

5. c = price per unit of the item.

6. r = a constant (usually between 0.10 and 0.30). This factor may not be readily available. No matter what value you use, it won't make much difference in your final result. The figure takes into account such costs as taxes, insurance, storage space, capital tied-up, risk of spoilage, and materials handling. Large plants commonly use a value of 0.14. For most plants this value will be higher.

   The "A" and "R" terms are "educated guesses." Don't worry about that. If you're off somewhat in your estimate it won't make too much difference. Room for error is "built-in." For example, an error of 100 percent in estimating "A" or "r" will result in only 6 percent error in the final results. You'll be only 6 percent off the optimum value!

AN EXAMPLE OF HOW IT WORKS

Let's try our luck with an example. We're managing a plant handling a million pounds of butter. Most of it is bulked in 68-pound waxed cartons. Our total need will be about 14,700 cartons per year. They cost 17¢ each. Factors in our formula are:

A = $10 (cost of ordering, etc.) We picked this value out of a hat.

S = 14,700 (number of cartons used per year)

r = .20

c = $.17

The formula, then: $\hat{q} = \sqrt{\frac{2\,AS}{r\;c}} = \sqrt{\frac{2 \times 10 \times 14{,}700}{.20 \times .17}}$

$= \sqrt{\frac{294{,}000}{.0340}} = \sqrt{8{,}647{,}058} = 2{,}940$

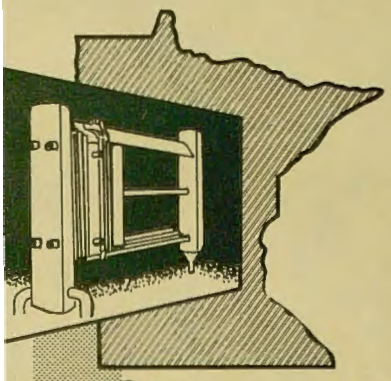
For the cheapest purchase price, then, we should order 2,940 cartons at a time. We need 14,700 per year. Therefore, we must order five times each year (14,700 ÷ 2,940 = 5). Of course, you must have adequate storage facilities for this many cartons.

Quantity discounts can be taken into account. Just substitute the new order quantity and price in the formula. Compare the total cost with discount to total cost without the discount.

TABLES FOR DETERMINING SQUARE ROOTS

You can find square root tables in mathematical handbooks or most high school math books. Remember, a square root is a value which multiplied by itself gives you the number in question. The square root of 100 is 10 (10 x 10 = 100). The square root of 1,000,000 is 1,000 (1,000 x 1,000 = 1,000,000).

The use of a formula such as the one described can be of value. For the time it takes to make the determination, it seems to us well worthwhile.



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Luther J. Pickrel, Director
Cooperative Extension Work
Acts of May 8 and June 30, 1914

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