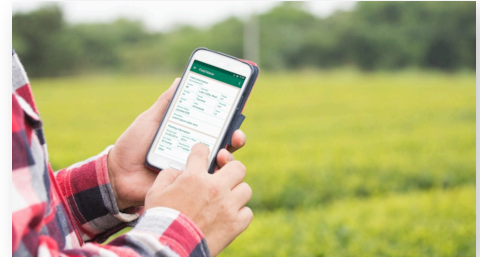


Investing in Planter Technology Calculator

The goal of this calculator is to help decision making when considering investing in planting technology.

It includes the calculation of economic value and return on investment of these two technologies:



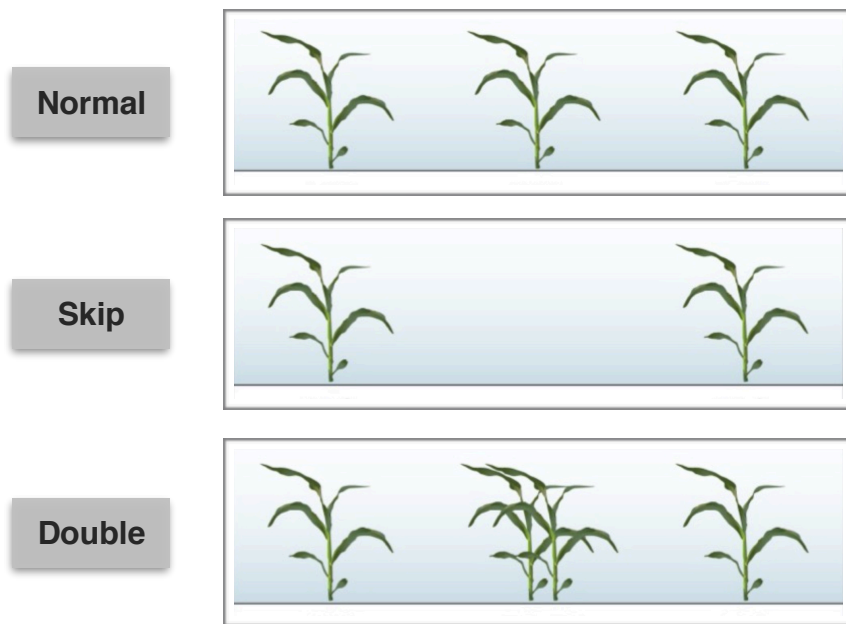
- ✓ **High efficiency vacuum seed meter**
- ✓ **Row by row automatic swath control**

1. High efficiency vacuum seed meter

Mechanical and traditional vacuum meters have two main problems:

- **Low efficiency.** We define efficiency, in this context, as the number of meter disc holes that carry **one** seed. For example, 96% efficiency indicates that every 100 disc holes, 96 threw one seed. The remaining 4 threw a singulation "error", that can be a **skip** (a hole without seed) or a **double** (a hole with two seeds).
- **Need for adjusting.** When getting a planter ready to work, one of the critical points to pay attention to is the proper setting of the seed meters. This will depend on the seed and shape of the seed that you will plant. This process includes, for mechanical and traditional vacuum meters, finger plate tension, disc selection, singulator/s adjusting, and vacuum setting.

High efficiency vacuum meters, on the contrary, provide an excellent singulation efficiency without the need of these kind of adjustments.



We define that a seed meter is high efficiency when:

- ✓ it can maintain a minimum of 99% efficiency
- ✓ during 90% of the time, minimum
- ✓ for any size and shape of corn seed at any planting speed (within reasonable parameters)

In the economic value analysis, we will not take into account the benefits of not having to regulate, since it is a factor more than anything related to saving time, reducing risk and improving operability.

We will concentrate on evaluating the impact of the high efficiency meter versus the traditional ones (mechanical and vacuum).

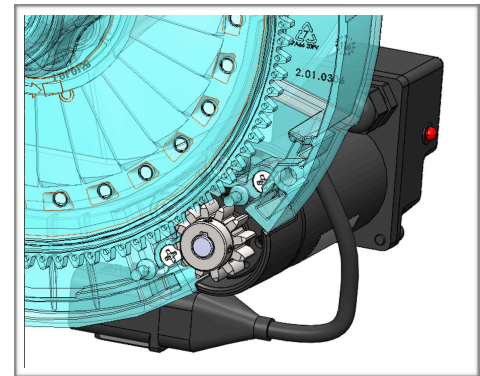
Calculation of the benefit of the high efficiency meter:

The convenience of placing each plant right in its place is easy to understand: each plant will emerge and grow normally and produce an appropriately sized ear.

A *skip* means that a plant will not grow where it should and consequently there will be no ear. The neighbors will make up for this lack, but not totally.

A *double* (two seeds together) will generate competition between the plants and the result will be two ears, but in general, the sum of the two will not produce the grain weight of two normal ears.

There are numerous studies and recommendations about how much the loss is in either case.



In this analysis we consider that each 1% of skips generates a 0.8% decrease in grain yield, and each 1% of doubles generates a decrease of 0.45% (source: "Planting Outcome Effects on Corn Yields - Doerge et. al)

For the calculation of savings as a consequence of the use of a high efficiency seed meter, the calculator considers the current levels of skips and doubles (entered by the user) and compares them with the typical minimum performance of a high efficiency meter: 0.5% of failures and 0.5% doubles.

2. Row by row automatic swath control

Depending on the width of the planter, the size and shape of the fields, and the skill of the operator when lifting and lowering the planter in the headlands, all the fields that are planted with a planter with a single drive (or one per module) generate some overlap percentage at the moment of planting (double pass).

This not only represents an extra expense in seed, but also, depending on the hybrid, planting date, and other environmental conditions, it can generate a decrease in yield due to excess polulation.

The row by row electrical drive technology not only simplifies the operation of the planter (there are no control wheels, axles, gearboxes, or chains), but also allows automatic cutting row by row, bringing the overlap effect to 0% .

In addition, it offers the possibility of variable rate planting, maximizing yields and inputs use for each environment.

In this analysis, only the effects of seed savings and the avoidance of yield losses due to overlapping are considered.

In summary, these are the benefits and advantages of investing in high efficiency seed meters driven by electrical row by row control.:

Benefits (considered in this calculations):

- ✓ Improves spatial distribution of seeds
 - => Increase in grain yield
- ✓ Prevents seed overlapping
 - => Seed savings
 - => Avoids yield loss due to double population

Additional advantages (not considered in this calculations):

- ✓ No need for meter adjustments (disc selection, singulator adjustment, or vacuum setting) depending on seed size and shape.
- ✓ Planting population can be set from the cab.
- ✓ Variable rate
- ✓ No mechanical parts to drive the meter (gearboxes, shaft, chains, sprockets, etc.)

Instructions for using the calculator:

The first step is the introduction of specific data according to the user's situation:

Planted area per season (acres)* 1000	Expected Yield (bu/ac)* 180
Corn Price (\$/bu)* 3.2	Seed Cost (\$/ac)* 200
Population (seeds/ac)* 33000	Planter rows* 16
Skips (%)* 2	Doubles (%)* 2
Overlap (%)* 5	Yield loss due to overlap (%) 20

Once the data has been entered, the calculator computes the economic result derived from savings in seed, the improvement in yield, and the sum of both (Total Savings), expressed in \$ per year, and the calculation of profitability based on the initial investment and the residual value.

Economic Results: (\$/Yr)		
Seed Savings 4,125.00	Yield Benefit 16,957.44	Total Benefits 21,082.44
Return on Investment (3 years)		
Initial Investment (\$) 50,000	Salvage Value (%) 50	ROI (% - annual) 32.4%

Note: This document and the related application (*Investing in Planting Technology Calculator*) were designed for educational purposes, and to provide useful information about planting technology investment analysis. The author is not offering them as financial or agronomic advice, and does not guarantee the accuracy or completeness of the content included in this document and in the application. Although they have been made with the best effort to represent a typical reality, each financial and productive situation of each user is unique, and the recommendations described here may or may not fit the user's particular case.

Likewise, the author reserves the right to update, modify or delete the information contained in this document and in the application, as well as their configuration or presentation.

No material contained in this document and in the application may be reproduced, copied or published without the author's written consent. © Tecnosem 2020. More information: info@tecnosem.com.ar.