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Calibrating Forage Seeding Equipment

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Forage Seeder Calibration at a Glance

- Planting too much seed increases establishment costs.
- Planting too little seed results in thin stands, increased weeds, and lower yields.
- Seeding charts can vary greatly from actual seeding rate.
- Seeders should be calibrated under field conditions whenever possible.
- The area covered and amount of seed dispensed must be known for calibration.
- **Seeding rate = amount of seed ÷ area covered**
- **Area covered (acres) = seeder width (ft) x distance traveled (ft) ÷ 43,560:**
- Determining amount of seed (always tare scale for weighing container):

  Collection: Seed is collected for a known area.

  Difference: The difference between the original amount of seed in the seeder and the amount remaining for a known area.

  Run out: Seeder is run until known quantity of seed runs out and area is determined. This is the least precise method.

Introduction

Successful forage establishment requires that seed be planted at the recommended density. Planting lower than the required rate will result in thin stands with increased weed problems and lower yields. On the other hand, planting at a higher than recommended seed rate will significantly increase seeding costs. Calibration becomes more important as the cost of the seed increases.

Calibration charts can be found on most seeding equipment and they provide a good starting point. However, variations in seed size, weight, purity, and coatings, and performance of seeding equipment can cause large discrepancies between chart settings and actual seeding rates. Therefore, it is critical to know how much seed is actually being metered out for any given combination of variety, seeder, and field condition.

Calibration Procedures

To calibrate forage seeding equipment, two things must be known: (1) the area covered, and (2) the amount of seed metered out. Seeding rate is calculated using the following equation:

Seeding rate = amount of seed ÷ area covered

Determining Seeding Area

Measure effective seeding width of equipment. Effective seeding width is determined by measuring the

Figure 1. A cultipack seeder is a type of drop seeder that consists of two offset corrugated rollers with a metering box between them. The first roller firms the soil, the seed is dropped between the rollers by the metering box, and the second roller presses the seed in contact with the soil.

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width that seed is actually being dropped for drop-type seeders such as a Brillion or Gandy (figure 1). For grain drills (figure 2), the distance between disk openers can be measured and then multiplied by the number of disk openers plus (+) 1. Spreading width for spinner- and pendulum-type seeders (figure 3) varies with seed type. Consult the owner's manual for effective seeding width for specified materials.

Figure 2. No-till grain drills are commonly used to establish small-seeded forages. They consist of a no-till coulter (some drills) that cuts a slit into the soil, followed by disc opener that places the seed in the soil, and a press wheel that establishes good soil-to-seed contact.

Figure 3. A spinner- or pendulum-type spreader can be used to broadcast seed. The pendulum spreader above is equipped with a special attachment that allows broadcast seed to be collected in a bucket and weighed during calibration.

Determining Distance

Depending on the seeding equipment, distances for calibration can vary. Use the following equation to calculate the area covered for an arbitrary distance:

$$\textbf{Area covered (acres)} = \frac{\textbf{seeder width (ft) x travel distance (ft)}}{\textbf{43,560 (sq ft/acre)}}$$

In some cases it is desirable to calibrate equipment based on a fraction of an acre. This allows the seeding rate to be calculated by multiplying the seed collected by a constant factor. Table 1 provides equations for calculating the distance that must be traveled for 1/10 acre, 1/25 acre, 1/50 acre, and 1/100 acre.

Determining Seed Amount

Collection: Place containers under seed drops and collect seed for a known distance, traveling at the same speed you will travel in the field to be seeded. Special collection containers can be purchased or fabricated. For grain drills, seed tubes can be disconnected and plastic bags held in place by rubber bands to catch seed (figure 4). If possible, calibrate the seeder in the field that will be seeded. This will take into account any variation due to seedbed conditions.

Figure 4. Seed tubes on a grain drill can be disconnected and a plastic bag placed on the seed tube to collect the seed during calibration.

Table 1. Calculating the distance that must be traveled for fractions of an acre.

Fraction of an acre	Equation	Multiplication factor
1/10	Travel distance = 4,356 sq ft ÷ seeding width (ft)	10
1/25	Travel distance = 1,724 sq ft ÷ seeding width (ft)	25
1/50	Travel distance = 871 sq ft ÷ seeding width (ft)	50
1/100	Travel distance = 436 sq ft ÷ seeding width (ft)	100

Difference: Place a known amount of seed in the seeder and travel a known distance at the same speed you will travel in the field to be seeded. Weigh the remaining seed. The seed distributed will equal the starting amount minus the amount remaining. Seed can easily be removed from seeding equipment with a shop vacuum. Make sure to clean out the vacuum before and after use.

Run out: Place a known amount of seed in the seeder and travel at the same speed you will travel in the field to be seeded until the seed has run out. Multiply this distance by the seeder width. This method assumes even distribution of seed within the seed box and consistent feed out as the seed runs out. Of the three methods for determining the amount of seed used, this is the least precise and should only be used for larger areas.

Note: When weighing the seed, always tare the scale for weighing container OR subtract out the weight of the weighing container.

Determining Seeding Rate: Calibration Examples

1. A spinner-type seeder has an effective seeding width of 15 ft. In 200 ft, the seeder dispenses 0.56 lb of clover seed. What is the seeding rate?

   Area covered (acres) = (15 ft x 200 ft) ÷ 43,560 sq ft (1 acre) = 0.069 acre
   Seeding rate = 0.56 lb ÷ 0.069 acre = <u>8.12 lb/acre</u>

2. A grain drill has an effective seeding width of 10 ft. In 100 ft, it drops 3.22 lb of cereal rye seed. What is the seeding rate?

   Area covered (acres) = (10 ft x 100 ft) ÷ 43,560 sq ft (1 acre) = 0.023 acre
   Seeding rate = 3.22 lb ÷ 0.023 acre = <u>140 lb/acre</u>

3. Ten lb of alfalfa seed is placed in an 8-ft Brillion seeder. After traveling 650 ft, it is determined that 7.5 lb of seed remains in the seed box. What is the seeding rate?

   Area covered (acres) = (8 ft x 650 ft) ÷ 43,560 sq ft (1 acre) = 0.12 acre
   Seeding rate = (10 – 7.5) ÷ 0.12 acre = <u>20.83 lb/acre</u>

4. A grain drill has an effective seeding width of 12 ft. Calculate the distance it must be driven to cover 1/10 acre. In this distance, 10 lb of wheat is caught. What is the seeding rate?

   Travel distance (ft) = 4,356 sq ft (1/10 acre) ÷ 12 ft = <u>363 ft</u>
   Seeding rate = 10 lb x 10 (multiplication factor) = <u>100 lb/acre</u>

5. A 12-ft grain drill is loaded with 15 lb of annual ryegrass. The drill is pulled across a field until the seed runs out (1,195 ft). What is the seeding rate?

   Area covered (acres) = (12 ft x 1,195 ft) ÷ 43,560 sq ft (1 acre) = 0.33 acre
   Seeding rate = 15 lb ÷ 0.33 acre = <u>45.45 lb/acre</u>

6. In some cases, it is desirable to calibrate seeding equipment in a stationary position (figure 5). In these cases, the drive wheel needs to be turned a given number of revolutions for the desired coverage area (figure 6). This example shows how to calculate the number of times to turn the drive wheel. A 10-ft grain drill has a drive wheel diameter of 2.5 ft and an effective seeding width of 10 ft. How many times does the wheel need to be turned to seed 0.10 acres? If 1.2 lb of red clover seed is collected, what is your seeding rate?

   Wheel circumference = 2.5 ft x 3.1416 = 7.85 ft (It can also be measured)
   Wheel turns to equal 0.10 acres = 4,356 sq ft (0.10 acre) ÷ (7.85 ft x 10 ft) = <u>55.5 turns</u>
   Seeding rate = 1.2 lb ÷ 0.10 acre = <u>12 lb/acre</u>

7. A Gandy drop spreader has an effective seeding width of 12 ft. What is the distance it must be driven to cover 1/50 acre? If the spreader dropped 0.7 lb of tall fescue seed in this distance, what is the seeding rate?

   Travel distance = 871 sq ft (1/50 acre) ÷ 12 ft = <u>72.6 ft</u>
   Seeding rate = 0.7 lb x 50 (multiplication factor) = <u>35 lb/acre</u>

Figure 5. The drive wheel on a grain drill can be jacked up off the ground and turned a given number of times to obtain the desired coverage area.

Figure 6. During stationary calibration, the drive wheel is turned and the seed is caught and weighed.

Useful Conversions and Formulas

1 pound (lb)	=	16 ounces (oz)
	=	454 grams (g)
1 kilogram (kg)	=	1,000 grams (g)
	=	2.205 pounds (lb)
1 foot (ft)	=	0.3048 meter (m)
1 yard (yd)	=	3 feet (ft)
	=	0.9144 meters (m)
1 acre (A)	=	43,560 square feet (sq ft)
	=	4,840 square yards (sq yd)
	=	0.405 hectare (ha)
1 hectare (ha)	=	10,000 square meters (sq m)
	=	2.47 acres (A)

Circumference of a circle = diameter x 3.1416 (π)

Area of a square or rectangle = length x width

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