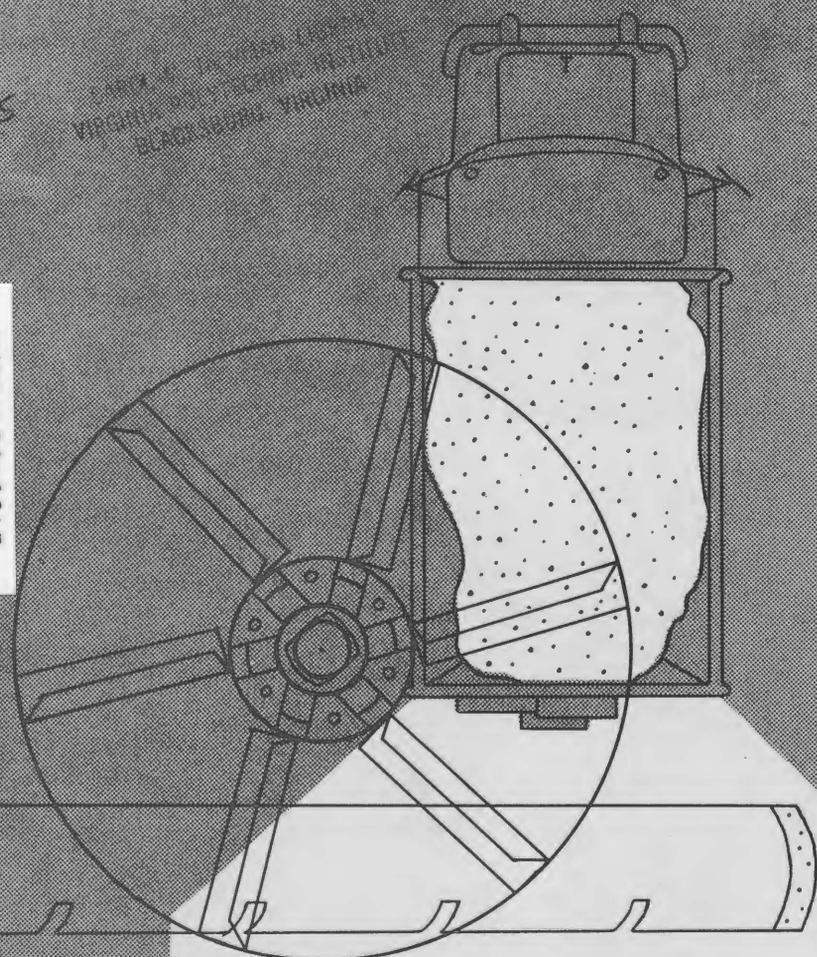


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VIRGINIA POLYTECHNIC INSTITUTE  
BLACKSBURG, VIRGINIA



# Accurate Bulk Fertilizer Spreading

Agricultural Extension Service  
Virginia Polytechnic Institute  
Blacksburg, Virginia

# Accurate Bulk Fertilizer Spreading

Most farmers are aware of the savings in time and labor possible with bulk spreading. However, some are not satisfied with the accuracy of application. With improved accuracy, increased use of bulk fertilizer is expected in the years ahead. This additional business will be handled by the dealers and operators who consistently provide accurate and timely application.

## FOUR STEPS FOR ACCURATE SPREADING

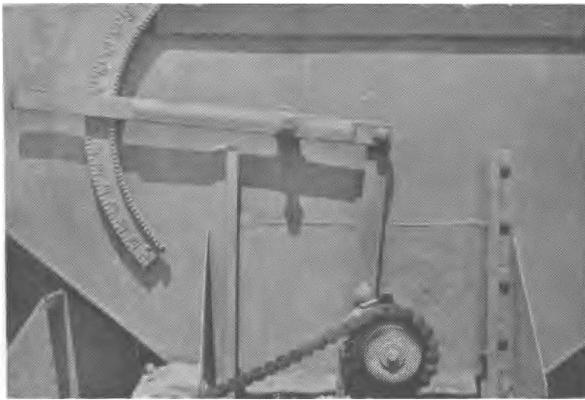
1. **ACCURATE METERING FROM THE TRUCK BED**  
Graduations on the tail-gate and accurate calibration are important.
2. **PROPER DELIVERY OF FERTILIZER TO THE SPINNER OR BOOM UNITS**  
An adequate flow divider or chute is necessary for uniform application, especially on hillsides and in other adverse field conditions.
3. **UNIFORM DISTRIBUTION ACROSS THE SWATH**  
Spinner speed, blade pitch, and delivery-chute position are critical. With boom distributors, slide position and auger speed must be adjusted for uniform spreading of various application rates.
4. **SKILLED OPERATORS**  
Accurate spacing of swaths is essential and requires careful driving. Also, with pto driven spreaders and certain other types, uniform application is possible only when truck speed is held constant. In addition to driving, good operators give particular attention to adjustment, maintenance, and repair.

## THE DETAILS ARE IMPORTANT

What detailed adjustments and equipment features are needed to accomplish each of the four steps essential to accurate spreading? Of course, the adjustments required depend upon the type of spreader. Here are some ideas that can be applied to most types of spreaders.

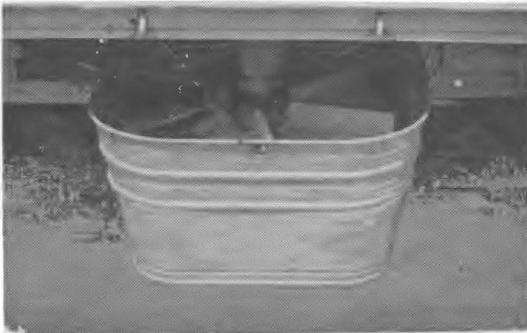
### ACCURATE METERING

Conveyor speed, along with the spreader tail-gate setting, determines the rate at which fertilizer is metered from the truck bed. Stainless-steel-mesh or solid-belt conveyors generally provide steadier flow of fertilizer than slatted, drag-chain conveyors. The pulsations from slats are especially pronounced when the tail-gate is set down close to the conveyor for low application rates. Slowing down the conveyor by changing the spreader transmission setting will sometimes help reduce the pulsation problem. However, slatted conveyors are not generally recommended for rates less than approximately 400 pounds per acre.



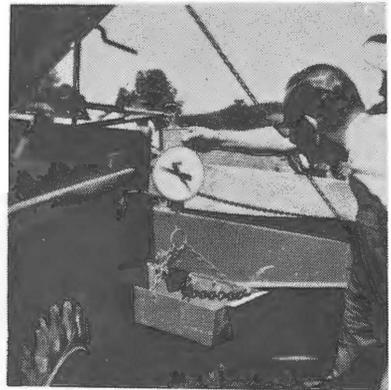
**Graduations aid operators in making correct tail-gate settings.**

Tables or other guides for setting tail-gates are provided by the manufacturers of most bulk spreaders. However, operators are frequently disappointed when the settings do not provide the exact application rates indicated. When manufacturer's specifications for gearing a spreader are followed, the primary cause for discrepancy is a difference in bulk density of the fertilizer used and the bulk density on which the spreader manufacturer based his recommendation. Information on bulk density from the fertilizer manufacturer would help.



**This metering-test arrangement is available as optional equipment from the manufacturer of the spreader.**

**You can use any convenient receptacle to test the accuracy of metering.**



A metering-test arrangement, such as the one shown with the wash tub, overcomes this difficulty. A more refined, but similar arrangement, is available as optional equipment for some spreaders. By testing in some way, especially when new fertilizers are being spread for the first time, experimenting in the field can be avoided. Here's how it's done:

- a. Attach a tub or other convenient receptacle under the delivery chutes.

This is easily done when spreaders are equipped with spinners or booms that are quickly detachable. On others, the spinner may remain mounted, as in the picture, but disengaged by removing a link in the drive chain.

- b. Mark off 200 feet and drive the spreader over the course with the conveyor in gear. Remember to use the same truck and spreader transmission settings that you plan to use in the field. Also, drive at field speed and in the same axle range.
- c. Remove and weigh the contents of the tub. To convert the pounds of fertilizer collected to pounds per acre, multiply the pounds collected by the appropriate number shown below:

<u>Swath Spacing, feet</u>	<u>Multiply pounds collected in 200 feet by</u>
18	12.10
20	10.90
22	9.90
24	9.08
26	8.38
28	7.78
30	7.26

These figures come from the formula:

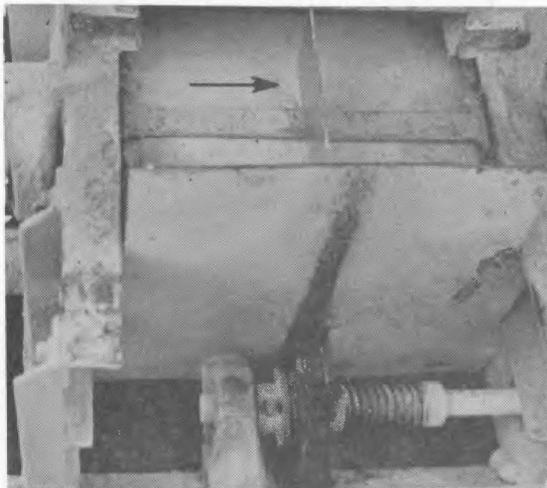
$$\text{Pounds per acre} = \frac{(\text{Pounds collected}) (43,560 \text{ square feet/acre})}{(\text{Swath spacing in feet}) (\text{Length of test run in feet})}$$

On some compartmented spreaders designed to both blend and spread high-analysis granular fertilizer materials, a fluted shaft is used to meter the small amounts of individual materials required. The above procedure can also be used to check the discharge-gate settings for each compartment. As with general-purpose spreaders, it is especially important that the gates be calibrated before a new material is spread for the first time.

#### PROPER DELIVERY OF FERTILIZER TO SPINNER OR BOOM UNITS

On spreaders equipped with either booms or twin-spinners, it is important that left and right units receive equal amounts of fertilizer. Flow dividers that extend all the way up to the tail-gate do the best job. Both single and twin-

**An effective flow divider for twin-spinner and boom distributors is important**



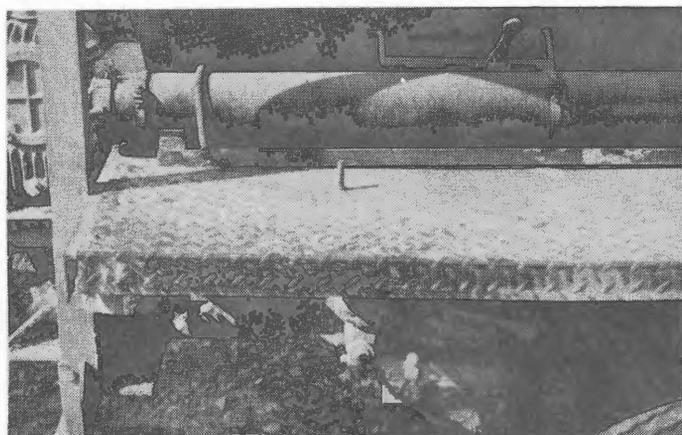
spinner machines give more consistent performance if the chute extends down close to the spinners. With too much space between the chute and the spinners, change of slope in the field also changes the distribution across the swath.

## UNIFORM DISTRIBUTION ACROSS THE SWATH

To secure uniform distribution, both boom and spinner distributors must be adjusted for the fertilizer and sometimes for the rate of application used.

### Auger-boom distributors

The deposit of fertilizer on the ground, or on a strip of canvas, provides a satisfactory indication of the adjustment needed. To obtain a deposit of sufficient size for good observation, first fill the booms or tubes with fertilizer, then move forward a few feet and operate the spreader in the stationary position for 10 seconds with the engine at field speed. If the fertilizer deposited near the outer ends of the booms is light, even after the discharge openings have

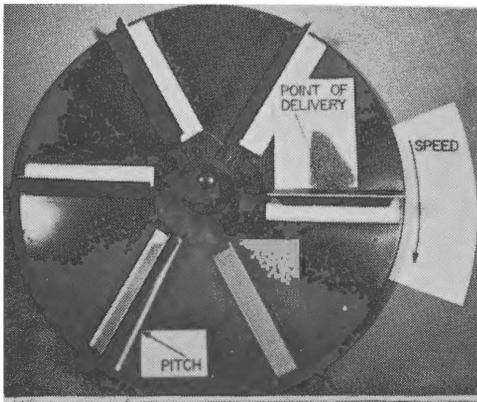


**For uniform  
distribution,  
use proper  
spreader  
transmission  
setting.**

been adjusted to within one-half inch of the fully closed position, decrease spreader speed by changing the spreader transmission to a lower gear with the lever as shown in the picture. This speed change also decreases conveyor speed and therefore necessitates raising the tail-gate to a new position. After this is done, adjust the control slide again until equal discharge from each opening is obtained. Because of the greater width of coverage by the fertilizer discharged from the end of the boom, the amount of end discharge should be approximately double the amount from an individual boom opening. Wind disturbs the distribution of pulverized fertilizer. Boom drops should be used if wind velocity is greater than 4 miles per hour and the fertilizer contains particles smaller than 20-mesh in size.

### Spinner distributors

The three types of adjustment shown in the picture are effective in improving the uniformity of distribution across the swath. Provisions for easily making one or more of these adjustments are available on most bulk spreaders. The deposit of fertilizer on the ground or on a canvas will indicate the nature of adjustment needed. For example if the right half of the pattern from a clockwise-rotating single spinner is heavier than the left half, any of the following adjustments will delay the release of fertilizer from the spinner and correct the pattern:



**Adjustment of point of fertilizer delivery, blade pitch or spinner speed may be necessary for uniform distribution.**

1. Move the chute to shift the point of delivery in a clockwise direction.
2. Move the point of delivery closer to the center of the spinner.
3. Move blade tips forward in the direction of spinner rotation so that the blades are pitched forward.
4. Decrease spinner speed.

If the left half of the pattern is heavier, make the adjustment in a direction opposite to those indicated.

With twin-spinner distributors, the counter-rotating spinners must start unloading at the proper time to provide uniform coverage directly behind the machine. If application directly behind the spreader is too light, earlier release of fertilizer from the spinners will correct the pattern. To do this, make at least one of the following adjustments.

1. Move the chute to shift the points of delivery in a direction opposite to the direction of individual spinner rotation.
2. Shift the points of delivery closer to the periphery of the spinners.
3. Move blade tips back in a direction opposite to the direction of individual spinner rotation.
4. Increase spinner speed.

Even with proper adjustment, not all dry blends of fertilizer materials can be uniformly distributed across the swath. For uniform distribution, without segregation of the ingredient materials, it is important that the particle size and density of the materials be closely matched. Because of the action the distributor is conducive to segregation, this precaution should be observed regardless of whether the materials are blended by a stationary bulk blender or a compartmented blending truck.

### SKILLED OPERATORS

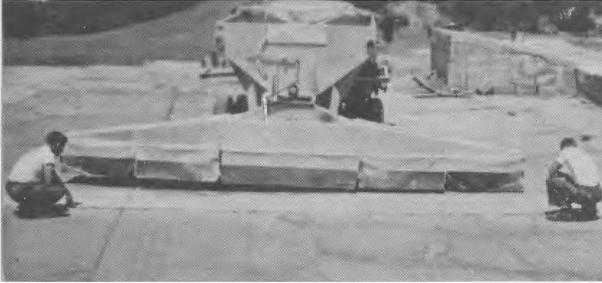
Any operator must know the effective swath width covered by his spreader before he can drive accurately and space swaths correctly in the field. The skilled operator measures the effective swath width covered by his spreader, as shown in the picture, and knows what spacing to use. Some operators guess, and frequently use incorrect spacings.

#### Check effective swath width

With auger-boom distributors the effective swath width is equal to the total span of the mounted booms plus two feet. The additional two feet ac-

count for coverage by the discharge from the ends of the booms. Because no overlapping of swaths is required with this distributor, precise driving is especially important.

The effective swath width covered with spinner distributors is less than the total width that fertilizer is thrown. In measuring the effective swath width,



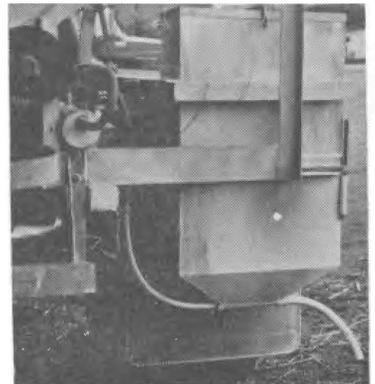
**A canvas aids in measuring the effective swath width.**

start from either edge of the swath at a point where the application is one-half as heavy as the application directly behind the machine. From this point, measure across the swath to the corresponding point on the opposite side. For spinners equipped with full hoods, this effective width is usually close to the total width of the hoods. When spinners are used to distribute pulverized fertilizer, the use of hoods is recommended.

**Control spinner speed** Since swath width tends to increase with higher spinner speeds, it is important that checks be made with the spinner operating at field speed. Also trucks with pto-driven spinners must be operated at constant engine speed in the field if variations in swath width are to be avoided. Properly designed hydraulic drives will provide nearly constant spinner speed over the full range of field speeds. An auxiliary engine also gives the operator flexibility in choice of ground speed.

**Markers aid** Accurate driving in fields where wheel tracks are not plainly visible is difficult, even for a skilled operator. Lime markers have been used

**A lime marker can aid you in spacing swaths accurately.**



with great success and make accurate coverage possible even on dry, closely clipped, or grazed fields.

**Gear shifting** Operators of spreaders with pto-driven conveyors should avoid shifting gears at any point in the truck power train between the ground wheels



**On sloping fields where gear shifting cannot be avoided, special equipment for driving the conveyor is needed.**

and the pto gear box. For many pto-driven spreaders, this includes avoiding both truck-transmission and rear-axle shifting. By observing this recommendation, the ratio of ground speed to conveyor speed is constant through the field, and a constant application rate is possible. If spreading is to be done on rough or sloping fields where frequent shifting is necessary, an auxiliary transmission or a fifth-wheel conveyor drive is needed.

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