# EVALUATION OF A PORTABLE MIXER AND FEED DELIVERY SYSTEM[1]

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## Summary

An on-farm mixer uniformity study was conducted to determine if feed could be properly mixed and maintained as it went through a bulk bin and conveying equipment over a distance of 180 ft. in a grower-finisher facility. A portable vertical mixer was tested and found to produced a uniformly mixed feed. Uniform feed was then conveyed from a bulk storage bin to feeders inside the facility. Samples were obtained from three different feeders and were tested for uniformity. Results indicate that feed remains uniform as it is conveyed and deposited in feeders over distances of 20, 80, and 180 ft.


(Key Words: On-the-Farm Feed Manufacturing, Portable Mixers.)

## Introduction

Providing uniformly mixed feed to pigs helps assure that they receive nutrients in the correct proportion. On-farm mixer uniformity has become a concern, as more and more swine producers begin to manufacture their own feed. This concern becomes even greater when small inclusion levels of medicated feed additives are used. In the past, the commercial feed manufacturing industry has done most of the work on feed uniformity. Quality feed manufacturers routinely check their mixer to assure that a uniform mixture is being produced. Producers who mix their own feed assume this responsibility, as well as the Good Manufacturing Practices of the Food and Drug Administration when medicated feed additives are used. This study was conducted to determine if a new, portable, on-farm mixer could produce a uniformly mixed feed. In addition, uniformity of feed was examined after it was conveyed from a bulk bin to the feeders over a distance of 180 ft. in a grower-finisher facility.

## Procedures

A field study was performed over 3 consecutive weeks, starting with an empty bulk bin and feeders. A 6500-lb batch of feed was manufactured in a new, portable, grinder-mixer. Ingredients were added to the mixer in the following order: soybean meal, base mix, medicated feed additive, lysine, and sorghum (1/8" screen). Ingredient addition, grinding, and mixing times were recorded (Table 1).

Samples were obtained as the mixer emptied into the bulk bin. Ten samples were obtained at about 500 lb intervals after 1000 lb were removed from the mixer. Ten samples 30 sec apart were obtained at feeders 1, 5, & 11 (20, 80, and 180 ft., respectively; Figure 1) as feed was conveyed from the bulk bin to the feeders by a flex-auger system.

All samples were analyzed for salt content using Quantab[R] Ion strips. A coefficient of variation was calculated for the mixer and each feeder location. Coefficient of variation (CV) = standard deviation/mean X 100. When the Quantab[R] Ion strip test is used, CV's less than 10% indicate a uniformly mixed feed (a CV of

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10% takes into account sampling errors and analytical errors).

## Results and Discussion

The portable vertical mixer produced a uniformly mixed feed (Table 2) each week with the ingredient addition and mixing times used by the producer (Table 1). The ability to produce a uniform mixture depends on equipment condition, ingredient sequence, and particle size. These will vary among producers.

Conveying feed through a 180 ft flex-auger system did not affect the uniformity of feed deposited in the feeders. Salt remained uniformly distributed from the bulk bin to the feeders (Table 2). In the study, the conveying system produced little segregation. One should also bear in mind that conveying systems do not have the capability of mixing an improperly mixed feed; therefore, it is essential to start with a uniform feed in the bulk storage bin. Many factors are involved in obtaining a uniform feed mix, such as type and condition of equipment, mixing/grinding time, particle size, and ingredients. Every producer should develop a feed manufacturing protocol that assures a uniform feed.

The results of this study indicate that a uniformly mixed feed will remain uniform as it is conveyed to feeders in a grower-finisher facility.

**Table 1. Ingredient Addition, Grinding, and Mixing Times (min)**

| Replication | Premix[a] | Grinding | Mixing | Unloading |
|---|---|---|---|---|
| 1 | --- | 12.0 | 4.0 | 6.0 |
| 2 | 3.6 | 12.3 | 3.0 | 6.0 |
| 3 | 2.5 | 12.2 | 3.0 | 6.0 |

[a]Base mix, medicated feed additive, lysine.

**Table 2. Coefficient of Variation (%) Results for the Mixer and Feed Delivery System[a]**

| Replication | Bulk Bin | Feeder #1[b] | Feeder #5 | Feeder #11 |
|---|---|---|---|---|
| 1 | 7.90 | 6.88 | 9.81 | 9.34 |
| 2 | 5.28 | 5.82 | 7.23 | 6.42 |
| 3 | 6.85 | 6.87 | 6.29 | 6.04 |
| Average | 6.68 | 6.52 | 7.78 | 7.27 |

[a]A coefficient of variation less than 10% indicates a uniformly mixed batch of feed.
[b]Feeders 1, 5, and 11 were 20, 80, and 180 ft. from the bulk bin, respectively.

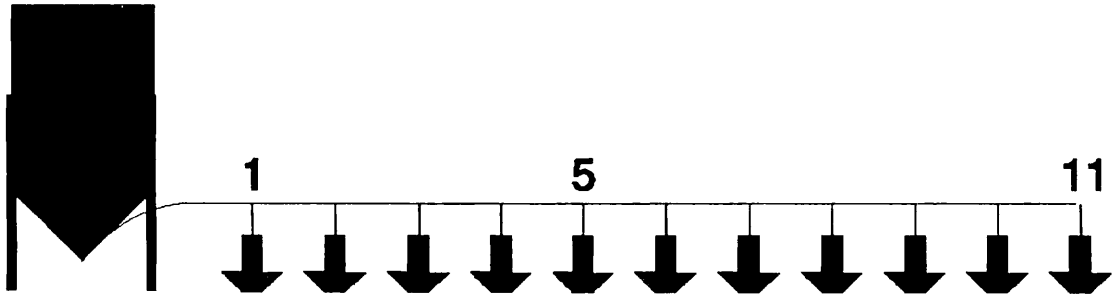


**Figure 1. Bulk Bin and Conveying System.**