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# Evaluation of Particle Size Impact on Small Farm Economic Viability

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**Evaluation of Particle Size Impact on Small Farm Economic Viability**

**Hannah West**

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in partial fulfillment of the requirements for the  
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## **Introduction**

Modern livestock production is reliant upon efficiency gains to improve productivity and potential profitability. Feed costs represent ~70% of overall costs for a finisher, hence improving the efficiency of feed utilization is imperative. Grinding corn for use in finisher diets increases surface area and digestibility of field peas (Montoya et al., 2011), barley (Brunsgaard, 1998), and corn (Healy et al., 1994; Wondra et al., 1995; Kim et al., 2002). Goodband et al. (2002) reported that reducing micron size of ground corn or sorghum in swine diets from 1,100 microns to 700 microns would improve feed conversion by 5%. As a major source of cost, improving feed conversion in finishing pigs will improve overall profitability and efficiency.

## **Research Objective**

The objective of this study was to evaluate the impact of corn-soybean meal diets that were created at the SIU Feed Mill utilizing corn that was either ground coarsely or finely, and the resultant impact on growth performance parameters in finisher pigs.

## **Materials & Methods**

This study utilized 48 finishing pigs in 12 pens to evaluate the impact of feed particle size on growth performance (average daily gain, average daily feed intake, and feed efficiency) through the last 2 growth periods of production (42 d). Period one began when pigs averaged 68.7 kg and lasted 18 d (avg. ending wt. 89.3 kg) and period 2 continued for 24 d until pigs reached market weight (117 kg). Diets within the two phases were formulated to meet or exceed current nutrient requirement estimates for high lean accretion rates (NRC, 2012), using corn and soybean meal. The corn utilized was ground either course (1595 microns) or fine (857 microns) and analyzed by the Kansas State University Swine laboratory; rations were iso-nitrogenous, iso-caloric and contained all the same components except different particle size corn.

Pigs were placed into pens at the SIU Swine Center and allotted to treatments based upon gender, genetic ancestry and initial bodyweight. Pigs were allowed ad libitum access to feed and water for the duration of the trial. Feeders were manually adjusted daily to ensure feed wastage remained consistent among the treatments. Pen was considered the experimental unit. Pig bodyweights were collected initially, and at 2-wk intervals until they reached market weight. Feed disappearance was calculated by weighing feeders at the time of bodyweight determination and feed efficiency was calculated. Data were analyzed using the Proc Mixed function of SAS (1994) and difference among dietary treatments were discerned using the P-Diff function.

### **Results & Discussion**

Table 1. Data for Growth Phase One

	Finely-Ground Corn	Coarsely-Ground Corn	Pooled SE	P Value
ADG, gm	1136.05	1173.88	41.62	0.54
ADFI, kg	3.48	3.48	0.12	0.99
Gain: Feed gm:kg	326.70	337.40	6.03	0.24

Table 2. Data for Growth Phase Two

	Finely-Ground Corn	Coarsely-Ground Corn	Pooled SE	P Value
ADG, gm	1205.15	1090.07	51.88	0.15
ADFI, kg	3.53	3.49	0.10	0.78
Gain: Feed gm:kg	341.90	311.10	12.91	0.12

In phase one of the trial, pigs fed the coarsely-ground ration had higher average daily gain and feed efficiency than those fed the finely-ground ration. In phase two, pigs fed the finely-ground ration had higher average daily gain, average daily feed intake, and feed efficiency. The Proc Mixed function of SAS (1994) showed that the results were not statistically significant.

### **Conclusion**

Results did not show any significance to support the hypothesis. However, it was not disproved. Mean scores of gain: feed for the finely-ground ration were higher than that of the coarsely-ground ration in phase two which was the expected outcome.

A possible explanation for the lack of statistically significant results could be the low number of experimental units. A larger number of pens may have resulted with a significant difference in growth performance. Also, using a more finely-ground ration may have proved to show a larger increase in growth performance.

By analyzing the results from this trial, roughly illustrates the impact that the difference in micron size has on growth performance of finisher pigs. Because growth performance directly influences the costs and profit of the SIU Swine Center, it is critical to utilize these data to increase profitability and overall efficiency. Additionally, these data allow a better understanding of swine nutrition and diet digestibility.

This study suggests feed efficiency should continue to improve as the corn is ground more finely. Other benefits from grinding corn include more uniform mixing and prevention of sorting by the pig (Jergens & Bregendahl, 2007). Future research using a larger number of pigs and smaller micron size of corn,  $\leq 700$  microns, (Goodband et al., 2002), may produce statistically significant results.

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