TECHNICAL BULLETIN
Report 08-1

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Particle Size Of Free-Choice Minerals — Its Effect On Nutrient Availability

In Technical Bulletin 07-7 "Ingredient Particle Size and Nutrient Availability In Free-Choice Minerals," the importance of particle size in free-choice minerals was discussed. As outlined in the bulletin, Vigortone minerals are formulated with a specific particle size and density for maximum nutrient availability to the animal.

In order for calcium or phosphorus to be made available to the animal, it must first react with acid in the digestive tract. Ingredient particles that are too large not only cause separation within the formula but also are not as available for digestion as smaller particles.

Dr. Craig Coon of the University of Minnesota developed an assay intended to mimic acid digestion in the digestive tract. In this assay a mineral formula is reacted with acid just as it would be in the digestive tract. After 10 minutes the amount of acid the mineral reacts with is measured as an indicator of digestibility.

Vigortone conducted two experiments in which mineral samples were submitted to the acid solubility assay in comparison to competitor minerals.

Experiment 1.

Vigortone submitted two "blind" samples to the independent lab that conducts this assay. Sample "A" was **Vigortone 3V2 S** and sample "B" was a well-known, red colored, granulated, or prilled mineral. The reactivity with acid is shown in the graph.

Sample A (3V2 S) neutralized 25% of the acid within 10 minutes. Sample B basically did not react within the allotted time of the assay. This strongly suggests the well-known sample B is not as available to cattle as is sample A (3V2 S).

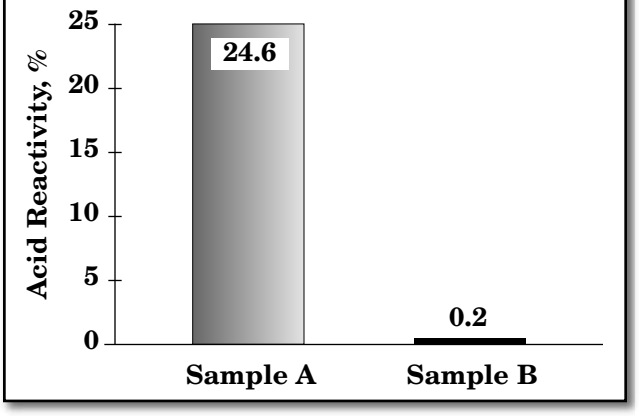
Comments by the lab technician after the assay were:

"The B sample just didn't react basically."

"When dropped in the acid solution, sample B simply fell to the bottom of the beakers."

"It certainly suggests that mineral A is more predictably available in calcium, plus maybe other nutrients."

Figure 1. Acid Reactivity 3V2 S Relative To Competitor's Mineral (Experiment 1)



(continued)

Experiment 2.

A total of seven blind samples were submitted for the acid solubility assay. Four samples were standard separate Vigortone minerals (V-A, V-B, V-C, V-D) and three samples were well known competitor minerals (C-E, C-F, C-G).

As shown in Figure 2, solubility of the four Vigortone minerals far exceeded the three competitor samples, suggesting greater nutrient availability. In fact, competitor sample C-G had a nutrient profile almost identical to that of **Vigortone 3V2 S**.

Figure 2. Acid Reactivity (Experiment 2)

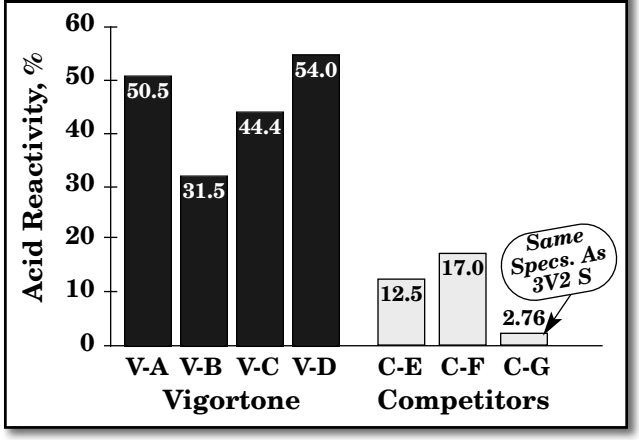
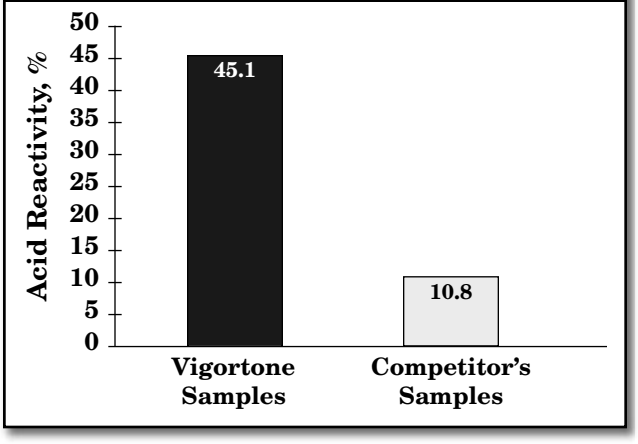


Figure 3 shows the overall average of acid solubility of the four Vigortone minerals compared to the three competitors.

Figure 3. Average Acid Reactivity – Vigortone vs. Competitors (Experiment 2)



Many try to copy what is on Vigortone tags but are puzzled when they do not see the same intakes and results. These assay results give some insight into one of the reasons producers have come to expect results from a Vigortone mineral program.