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Natural Resources Research Update

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Title: Low phytate corn feed reduces swine slurry P content without affecting crop P availability in slurry applied soils.

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Text: Traditional corn feed contains phosphorus (P) in a form that monogastric animals such as swine and poultry can not use efficiently. Poor use efficiency of feed P requires P supplements be added to the diet and results in manure having a high P content. Land application of this manure, at rates to meet the nitrogen needs of a crop, results in accumulation of P in soils. Elevated soil P concentration increases the potential for environmental contamination. Low phytate corn contains similar amounts of P in a form that can be utilized more efficiently by monogastric animals. Laboratory and field studies were conducted to compare P content and composition, changes in soil properties, and crop availability of land applied P for slurry from swine fed a traditional corn diet to that of slurry from swine fed a low phytate corn diet. Slurry from low phytate corn diets contained 40% less total P and had a higher N:P ratio (4.5 vs. 3.3) than slurry from traditional corn diets. A sequential extraction procedure determined that the composition of P in the two slurries was similar (Wienhold and Miller, 2004). Land application of these two slurry types improved soil properties affecting crop production. When applied at rates to meet crop N requirements soil P accumulation was lower for low phytate slurry than for traditional slurry (Wienhold, 2005). Surface application of these two slurry types resulted in availability of 70% of applied N and 100% of applied P while incorporation of the slurry reduced availability to 40% of applied N and 60% of applied P (Paschold et al., 2008a). No-tillage, rainfed sorghum and conventionally tilled, irrigated corn grain P utilization was similar for inorganic fertilizer and the two manure sources (Paschold et al., 2008b). Availability and crop N and P utilization from low phytate slurry and traditional slurry was similar and nutrient guidelines developed for traditional slurry should also apply for low phytate slurry. Use of low phytate feed is a technology that swine producers can use to reduce the P content of slurry. Reducing the P content of slurry will slow the rate of P accumulation in slurry applied soils and reduce the amount of land needed for slurry

disposal. Availability and crop utilization of P in low phytate slurry is similar to that for traditional slurry and nutrient management guidelines for traditional slurry should be followed.

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Paschold, J.S., B.J. Wienhold, R.B. Ferguson, and D.L. McCallister. 2008a. Soil N and P Availability is Similar for Field Applied Slurry from Swine Fed Traditional and Low Phytate Corn Diets. Soil Science Society of America Journal. Soil Science Society of America Journal 72:1096-1101.

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Wienhold, B.J. and P.S. Miller. 2004. Phosphorus Fractionation in Manure from Swine Fed Traditional and Low-Phytate Corn Diets. Journal of Environmental Quality 33:389-393.

Wienhold, B.J. 2005. Changes in soil attributes following low phosphorus swine slurry application to no-tillage sorghum. Soil Science Society of America Journal 69:206-214.

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