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Swine phosphorus nutrition with expensive phosphates

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This issue examines how rising feed phosphate prices change swine formulation decisions and argues that phosphorus nutrition must be managed as a calcium–phosphorus–phytase system.

Inorganic phosphates remain expensive. But, phosphorus nutrition cannot be reduced to a simple question of how much monocalcium or dicalcium phosphate can be removed to control feed cost – a common formulation practice.

The commercial risk of such practice is two-sided. Overfeeding phosphorus definitely wastes money and increases manure phosphorus. Underfeeding phosphorus reduces growth, weakens bone, increases lameness risk, and damages breeding-animal longevity. The solution is not to keep old safety margins unchanged, nor to remove phosphate aggressively. The solution is to understand where the real margin exists.

Requirements do not disappear
Current requirement systems remain a reasonable starting point when phosphorus is expressed correctly. Expensive phosphate does not make pigs need less phosphorus. It only makes overformulation more costly. The first discipline is therefore to formulate to digestible phosphorus, not total phosphorus. Once diets are already near requirement, further reductions should be made only with clear knowledge of ingredient phosphorus, phytase matrix values, calcium level, and animal class.

Phytase value depends on the diet
Phytase is most valuable when there is enough phytate substrate to release phosphorus and when the diet allows that release to be used. Ingredient selection matters. Corn-soy diets, wheat-based diets, DDGS, wheat middlings, rice bran, and other coproducts differ in digestible phosphorus, phytate phosphorus, calcium contamination, fiber, and mineral interactions. Double-dosing phytase may be economical in some diets, but not automatically in all diets. It is also risky to apply aggressive phosphorus, calcium, amino acid, and energy matrices at the same time without checking whether the diet still has enough biological margin. Phytase saves money only when its matrix is real.

Calcium control is phosphorus control
Many phosphorus problems are actually calcium problems. Excess calcium can reduce phosphorus availability and blunt phytase response, especially when diets contain high fat, variable limestone, excessive mineral premix contribution, or inaccurate batching. Limestone is cheap, but cheap calcium can become expensive if it binds phosphorus or forces more phosphate into the formula. Calcium should therefore be monitored as carefully as phosphorus when phosphate is removed. The calcium-to-digestible-phosphorus relationship matters more than either nutrient alone. In low-phosphate diets, uncontrolled calcium is one of the fastest ways to lose the benefit of phytase.

Breeding animals need more margin
Finishing pigs can often be formulated closer to the economic edge than replacement gilts, sows, and boars.

Breeding animals must maintain skeletal integrity, feet and legs, locomotion, reproductive performance, and productive life. A small mineral deficiency in replacement gilts may become lameness, early culling, poor body recovery, or reduced longevity in a sow herd. Replacement gilts are especially important because the skeleton being developed before first service must support several parities. When phosphate prices rise, breeding-animal diets are not the first place to remove margins.

Finishing diets can be tighter

Many finishing diets require little or no added inorganic phosphate when ingredient phosphorus, phytase, and calcium are managed correctly. This is especially true in later finishing phases, where feed intake is high and skeletal growth is proportionally less dominant than in young pigs. But, "little or no added phosphate" is not the same as "little or no phosphorus control." Heavy finishing pigs still need adequate digestible phosphorus, and longer days on feed increase exposure to small formulation errors. Heavier carcass weights may justify retaining some phosphate, depending on ingredient mix, phytase matrix, calcium level, and the economic value of final weight and soundness.

Tight programs need tighter monitoring

Reducing phosphate safely requires better control than simply changing the formula. Complete feed should be checked for calcium and phosphorus, especially after major mineral or phytase adjustments. Ingredient databases should be updated, not copied from old formulation files. Phytase source, dose, heat stability, premix handling, and feed-processing conditions should be verified. In the barn, nutritionists should watch for changes in gain, feed efficiency, locomotion, broken bones, lameness, gilt development, sow retention, and unexplained fallout after reformulation. A low-phosphate program can work very well, but it gives less room for sloppy calcium control, poor mixing, or optimistic matrices.

In brief, rising phosphate prices make phosphorus nutrition more important, not less. The correct response is not simply to remove inorganic phosphate and hope phytase covers the difference. Phosphorus must be managed through realistic digestible phosphorus values, realistic phytase matrices, calcium control, ingredient selection, and animal-class priorities. Finishing diets may often be formulated with little or no added phosphate, especially when phytase and ingredients provide sufficient digestible phosphorus. Breeding animals deserve more protection because bone integrity, locomotion, longevity, and lifetime productivity are at stake. When phosphate becomes expensive, the cheapest formula is not always the best formula. The best formula is the one that removes waste without removing biological safety.

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