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Phosphorus supplementation for grazing beef cattle

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This issue examines how phosphorus deficiency limits grazing cattle performance and how to set targets, improve supplement intake, and protect vulnerable animals.

Green pasture does not always provide everything cattle need. On phosphorus-deficient soils, grass can supply enough protein and energy to support production while providing insufficient phosphorus. Deficiency depresses appetite: cattle eat less pasture and therefore consume less of its other nutrients. Growth, milk production, and reproductive performance may suffer before skeletal problems appear. A range can look capable of supporting better performance than its cattle achieve.

Consider the whole grazing herd: breeding cows and bulls, suckling calves, weaners, replacement heifers, and cattle growing toward feedlot entry or finishing on pasture. Their requirements differ, but each needs enough phosphorus daily. Once deficiency is established, putting out a supplement is only the beginning. Which animals consume it, and how much phosphorus do they receive? Pasture, production, and access change throughout the year. In breeding herds, depressed pasture intake can carry consequences through lactation and into the next mating opportunity. The numerical examples here come from northern Australian guidance and are benchmarks for deficient grazing country, not universal requirements. Local pasture supply and animal performance must determine the program.

Confirm where phosphorus is deficient

Start with land types and soil information because phosphorus supply varies across a pasture. Assess performance alongside blood testing and diet quality. To test pasture supply, select appropriate cattle during active growth when protein and energy are adequate, and account for supplementation history. Testing supplemented cattle may assess the program, but not the unsupplemented pasture. Interpret plasma inorganic phosphorus by animal class and nutritional conditions; it is no stand-alone diagnosis. Poor growth or breeder performance warrants checking phosphorus alongside forage, protein, energy, disease, and other limitations.

Set a daily phosphorus target

On deficient northern Australian pastures during the wet growing season, starting targets are at least 6 g supplemental phosphorus daily for young growing cattle and about 10 g for breeders. These are additions to pasture supply, not total requirements. A 400 kg steer or heifer gaining 0.9 kg daily may need 6 g on deficient country and 9 g on acutely deficient country. Suckling calves also obtain phosphorus from milk; do not automatically assign them the growing-cattle figure. Assess bulls by weight, growth, and diet rather than using the cow allowance.

Match supplementation to the season

Phosphorus gives its greatest response when pasture protein and energy support growth and milk production. In the tropical systems behind these benchmarks, that generally means the wet growing season. As grass dries, those nutrients increasingly constrain performance; phosphorus cannot overcome their shortage. Typical dry-season programs provide 2–5 g supplemental phosphorus daily while addressing protein, but late-pregnant or lactating cows may need more. Adjust the program to pasture quality and animal demand, not a calendar date.

Reach cattle missing the supplement

Average supplement use can conceal cattle consuming little or none, as research with grazing cows and calves demonstrates. I would investigate coverage before raising phosphorus concentration. Add feeding points near grazing areas and separate vulnerable groups where practical. After rain, surface water may draw cattle away from supplements near established watering points. Check access, palatability, weather damage, and wastage. An empty trough proves disappearance, not that every animal received its share.

Adjust concentration to actual intake

A supplement containing 10% phosphorus supplies 10 g at 100 g daily intake, but only 5 g at 50 g. Raising concentration may reduce palatability. In experiments with grazing heifers offered molasses-based supplements, higher urea concentrations reduced supplement and phosphorus intake. Recheck delivery when the carrier or intake-control ingredients change. Record the amount offered, leftovers, cattle numbers, and days between refills to estimate average phosphorus disappearance per head. Compare feed-grade sources by available phosphorus delivered and cost, allowing for wastage. Correct access and palatability, adjust the mix, and measure consumption again.

Anticipate periods of greater risk

First-calf cows deserve attention because growth overlaps with pregnancy and lactation. Rapidly growing weaners and pasture finishers also need performance-based allowances. Cows that drew on skeletal phosphorus during lactation need recovery after weaning. In a study of mature, pregnant *Bos indicus*-cross cows, depleted animals replenished reserves with adequate phosphorus, faster when dietary energy was also high. I would plan suitable pasture and supplementation for these cows after weaning. Better body condition alone does not prove skeletal recovery.

In Brief, effective range phosphorus supplementation requires a daily intake target, reliable access, and a supplement cattle will consume. Assess each grazing class according to growth, milk intake, pregnancy, and lactation. Find cattle missing their allowance, adjust delivery using measured consumption, and anticipate periods when demand rises or access changes.

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