

Phosphorus supplementation for grazing ruminants

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Phosphorus is one of the key minerals that must be supplemented in grazing animals. More than 90% of South Africa's soil is phosphorus deficient, and pastures therefore don't contain enough phosphorus to meet animals' requirements.

Phosphorus plays a key role in some of the body's most essential functions, such as the transfer of energy and pH regulation. It is also an essential component of the animal's skeleton, teeth and all cell membranes.

In ruminants, phosphorus also plays a crucial role in the rumen – rumen microbes utilise phosphorus for normal functioning, thereby making it essential for the digestion of crude fibre and microbial protein synthesis. Rumen microbes also produce the enzyme phytase, thus releasing the bound phosphorus in plant material so the animal can utilise it.

Phosphorus deficiency

Ruminants draw phosphorus reserves from their bones and circulate it via the saliva throughout their body, making phosphorus supplementation necessary. Phosphorus is absorbed mainly in the small intestine, and excess phosphorus is then excreted in the manure. A skeletal phosphorus deficiency therefore leads to less phosphorus being circulated to the rumen via the saliva, which in turn leads to lower fibre digestibility, feed intake, supply of energy and proteins, and subsequent substandard growth and reproduction.

The phosphorus levels in the blood can be measured to determine whether animals are phosphorus deficient. A blood serum phosphorus level of less than 1,3mmol is indicative of a deficiency; however, this method is not very accurate as animals can still transfer phosphorus from their skeleton to the blood in times of deficiency. Taking a rib bone sample is the best method of determining whether an animal is deficient or not. Rib bone samples can be taken from live animals without any serious consequences. A level



Phosphorus has a positive effect on calving percentage and supports heavier weaning weights.

of less than 100mg phosphorus/cm² bone is indicative a long-term deficiency.

A phosphorus deficiency leads to suppressed appetite, reduced growth and lowered fertility. Animals will also often present with pica – a disorder that involves chewing and even ingesting foreign materials such as bones (rotten carcasses), poles, wires, stones and soil.

How much is needed?

The phosphorus levels in pastures are directly dependent on the phosphorus levels in the soil; it is also correlated with the protein content of the pasture – a lower protein content leads to a lower phosphorus content. Veld grass contains 0,3 to 1,5g/kg of phosphorus, while fertilised hay contains 1 to 2g/kg of

phosphorus. The animal can utilise some 65% of this phosphorus.

A 450kg beef cow needs 7g of phosphorus per day for maintenance, 3g for foetal growth, and 1g/l of milk produced. If the phosphorus contained in natural veld grazing, and the animal's utilisation of it, is taken into account and compared to the cow's requirements, calculations show that dry and early pregnant cows need around 6g of phosphorus per day, and late pregnant and lactating cows around 9 to 12g/day.

Year-round supplementation

Giving a phosphorus supplement to producing cows throughout the year, and not just during the green season, is highly recommended. Research carried



Phosphorus supplementation is as important for small stock as it is for cattle. The phosphorus requirement of small stock varies between 1 to 3g/day, depending on the season and their production stage.

out at Potchefstroom found that cows that received no phosphorus supplementation in the dry season extracted 44% of their total phosphorus reserves from the skeleton in the first year – this will likely lead to conception problems in the following season.

Follow-up research at Nooitgedacht near Ermelo showed that cows that received no phosphorus during winter exhibited a decline in reproduction by the third year.

Phosphorus supplementation is as important in small stock as it is in cattle. Although small stock typically graze more selectively, they still require supplementary phosphorus of between 1 to 3g/day, depending on the season and their production stage.

Small stock produce more than one lamb per year and wool sheep also require phosphorus for wool production. Small stock production has intensified in the last few decades, with more than one lambing season per year and a higher number of ewes carrying multiples. Ewes are therefore

constantly subjected to stress, resulting in a higher phosphorus requirement.

Economic considerations

Due to various factors, including Covid-19 and the Russia/Ukraine conflict, the price of phosphorus has skyrocketed worldwide. The price of the most common source of phosphorus in animal feed, namely monocalcium phosphate (MCP), has more than doubled in the last two years. Producers might therefore wonder if supplementing phosphorus is still worthwhile.

A producing beef cow requires some 3kg of supplementary phosphorus per year, equalling around 15kg of MCP. At the current (August 2022) MCP price of approximately R21/kg, this amounts to an investment of around R315/cow/year (i.e. R31 500 per 100 cows). At R8 000 per weaned calf, a 4% increase in the calving percentage pays for the cow's total phosphorus supplement for the year!

Phosphorus plays an integral role in fertility and growth, and according to

research, supplementation throughout the year has a much greater positive effect on calving percentage and leads to heavier weaning weights.

A high-producing ewe needs around 0,55kg of phosphorus per year, which amounts to around 2,6kg of MCP per year. It therefore costs approximately R55/year to supplement enough phosphorus per ewe (i.e. R5 500 per 100 ewes). If the lambing percentage increases by 4%, the cost of supplementing phosphorus is covered. Again, phosphorus supplementation throughout the year will have a much greater positive effect on fertility.

It is therefore evident that phosphorus supplementation in both large and small stock is still one of the best investments a livestock producer can make in his herd or flock. Phosphorus plays a decisive role in the profitability of all livestock farming branches, as it promotes production and reproduction. Skimping on the supplementation of this crucial mineral therefore makes no economic sense. **SF**

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