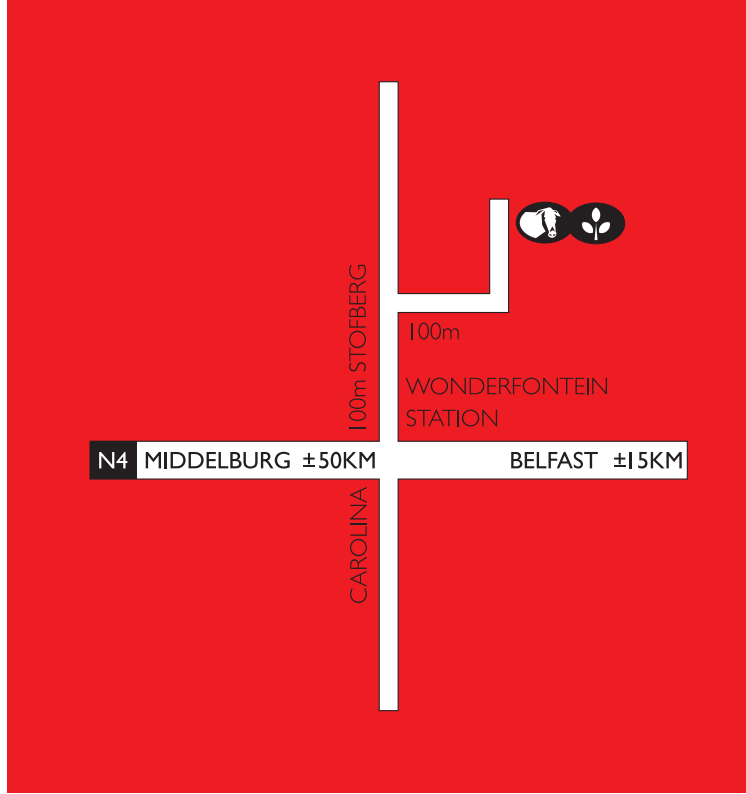


P21 BIOFOS P21 SPECIFICATIONS

SA registration	VI4065 Act 36/1947
Namibia registration	N-FF 1224 Act 36/1947
Chemical formula	Ca(H ₂ PO ₄) H ₂ O (Monocalcium Phosphate) and CaH PO ₄ (Dicalcium Phosphate) in a 1:1 ratio
Density	1 000kg/m ³ to 1 200 kg/m ³
Specification	
Phosphorous as P	210 g/kg min
Calcium as Ca	210 g/kg max
Fluorine as F	13 g/kg max
Aluminium as Al	20 g/kg max
Free moisture	20 g/kg max
Other specification	
Arsenic as As	10 mg/kg max
Lead as Pb	30 mg/kg max
Cadmium as Cd	10.5 mg/kg max
Packaging	50kg bags or Bulk bags
Granule size	100% 2.1mm
Storage	Biofos P21 must be stored under cover in dry conditions



SAVE ON TRANSPORT - COLLECT AT THE FACTORY.

All the Phosphate products are available at the factory in Wonderfontein or at a local distributor.

FACTORY ORDERS

■ PO Box 21 Wonderfontein 1101
 Tel +27 13 246 7451
 Fax +27 86 581 9601
 Factory cell +27 82 904 6422
 E-mail admin@biominerale.co.za
 Web www.biominerale.co.za

TECHNICAL QUERIES

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 Tel +27 12 654 3495

REPRESENTATIVE

■ Johan Engelbrecht
 Cell +27 82 928 3732
 E-mail johan.engelbrecht@biominerale.co.za

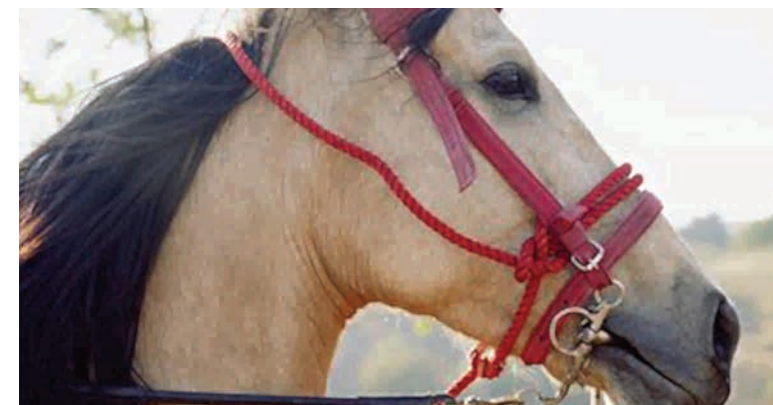


BIOMINERALE

PHOSPHATES AND LICKS



ISO 9001:2000
 BIO-MINERALE (EDMS) BPK



BIO-MINERALE

Bio-Minerele have been manufacturing mono-dicalcium phosphates (MDCP) since 1996. The factory, located at Wonderfontein (Mpumalanga), is easily accessible from the N4 and is hence geographically well placed to provide South Africa and other African countries with its high quality products.

We are justly proud of the quality of both our products and our prompt service. Our ability to consistently produce products of high quality was recognized recently when we were certified as an ISO 9000:2000 company.

MANUFACTURING & QUALITY CONTROL

Bio-Minerele use the two basic raw materials, phosphoric acid and lime, to manufacture MDCP. The process is controlled by a "Program Logic Controller" (PLC), enabling us to keep accurate record of the quantities of raw materials used for every batch. The PLC also monitors parameters such as temperature continuously to ensure consistency of quality.

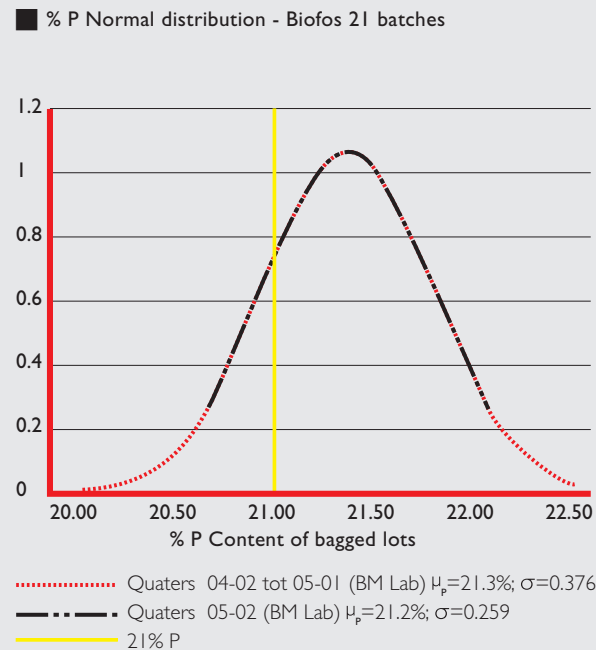


Every batch is analyzed in our own laboratory to ensure that it meets our requirements. Having passed this test, 3 – 4 batches are then mixed to produce a consignment ready for dispatch. A sample is taken from every bag to produce a composite sample which is again analyzed in our laboratory. A unique lot number is assigned to each bag so as to enable us to trace the composition of every bag dispatched from the factory. Quarterly quality reports are drawn up, giving the following typical results:

	Bio-Minerele Laboratory		External Laboratory	
	P	CS*	P	% Ca
Average μ_p	21.24%	95.52%	21.84%	21.26%
Std deviation σ	0.259	2.469	1.032	0.713

* Citric Acid Solubility

The following graph shows the %P contents of MDCP over a quarter:



P AVAILABILITY

PHOSPHOROUS AVAILABILITY

Many experiments have been carried out to establish the PA of various phosphates and also to determine whether monocalcium phosphates (MCP) are more advantageous in animal feeds than dicalcium phosphates (DCP), or vice versa. In some of these experiments the solubility of the product in citric acid and water were commonly used as indicators of PA and the MCP:DCP ratio. However, biological tests to determine PA are for the most reliable.

In biological tests carried out at the University of Pretoria, Biofos P21 and other sources of MDCP were compared to establish both growth and the mineral contents in the bone structure of chickens. The results of these tests proved beyond doubt that the PA of Biofos P21 is as good as that of the products on the market.

FURTHER RESEARCH

Current research into the phosphorus requirements of monogastric animals is dynamic. This research has been driven largely by an awareness of the environmental threat posed by animal effluent high in phosphorus, but as with all aspects of intensive animal production, cost has also proved to be a great motivator.

The first aspect that has been investigated is that of the absolute level of phosphorus required by animals in commercial production systems. It has been found that many of the older values that we have been using, the NRC for example, in our diets overestimate the phosphorus requirements.

It is known that between 70% and 90% of the phosphorus contained in feed ingredients of plant origin is in the form of inositol phosphate which is only available to animals to a limited degree. Older animals are better able to utilise this material. In addition, a range of synthetic (microbial) phytase enzymes are available which have been shown to be effective in both pigs and poultry diets, and it has been shown that available phosphorus specifications can be reduced by 1 g/kg when the correct level of phytase is added.

This is a dynamic area of nutrition, and it is an area which Bio-Minerele keeps abreast of in order to best advise our clients as to how best to use our products.