PHOSPHATE FEED SUPPLEMENTS PRODUCED FROM LITHUANIAN DOLOMITE

kaunas university of technology
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Introduction

The inorganic phosphate supplements play an important role in the animal feed industry. Calcium phosphates, the most widely used phosphate supplements, supply essential minerals for the development. The skeletal stores of calcium and phosphorus are used to meet dietary inadequacies. Magnesium is a building material for bones and teeth, and is a significant part of various enzymes and plays an important part in metabolism. Along with calcium, magnesium ensures normal functioning of the nervous and muscular systems (muscles contains more magnesium than calcium). Powder phosphates are not suitable for use because they are dusty, hygroscopic and by long store, they lost powdery. Therefore, the aim of this work was to select the proper method of granulation of feed phosphates.

Materials and Methods

The calcium and magnesium phosphates ($Ca/Mg/PO_4$) using potassium (K) and microelements (ME) additives were produced of Lithuanian calcined dolomite by decomposition with phosphoric acid. Phosphate supplements were granulated using a drum granulator (DG) and a fluid bed granulator (FBG) (Fig. 1).

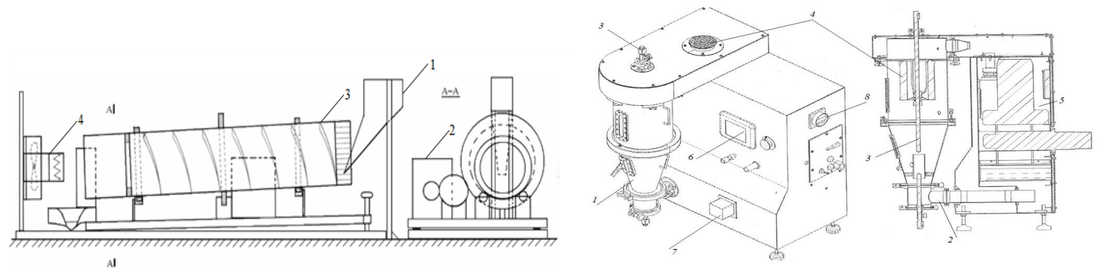

Fig. 1. Drum granulator and a fluid bed granulator

Results

Using a FBG were produced smaller and more drier granules then using a DG. In the case of the DG product, the particle size distribution is more dependent on the moisture content of the initial granulated material than in the case of the FBG product (Fig. 2).

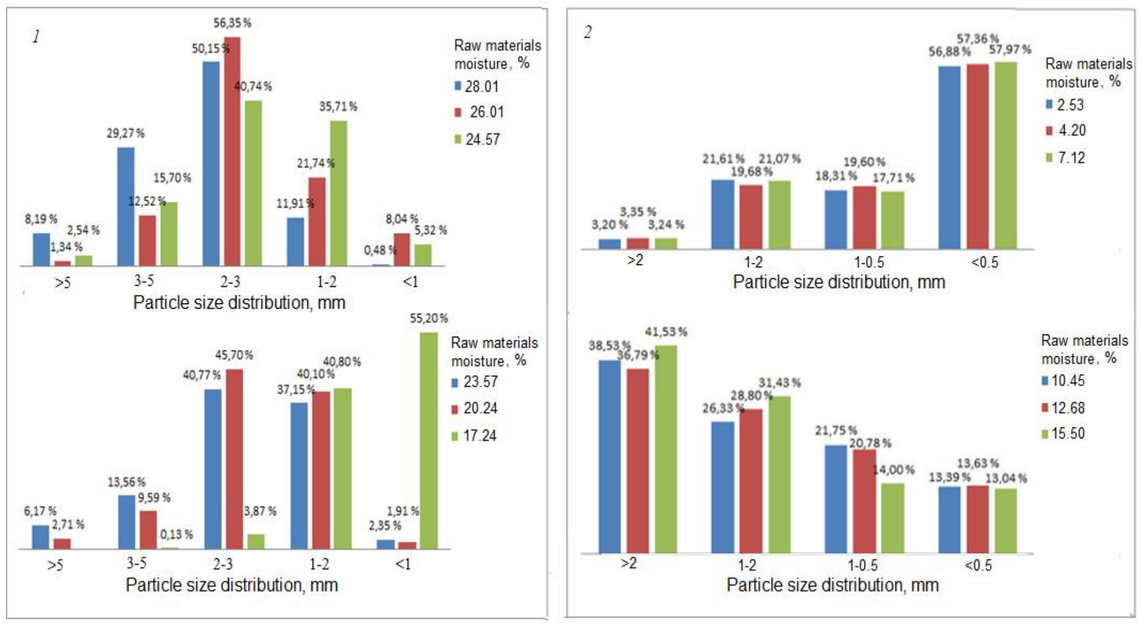

Fig. 2. Dependence of $Ca/Mg/PO_4$ with K and ME additives particle size distribution on raw material moisture: *1* – DG; *2* – FBG

The product granulated using FBG is slightly drier and less hygroscopic (Fig. 3) than granulated with BG.

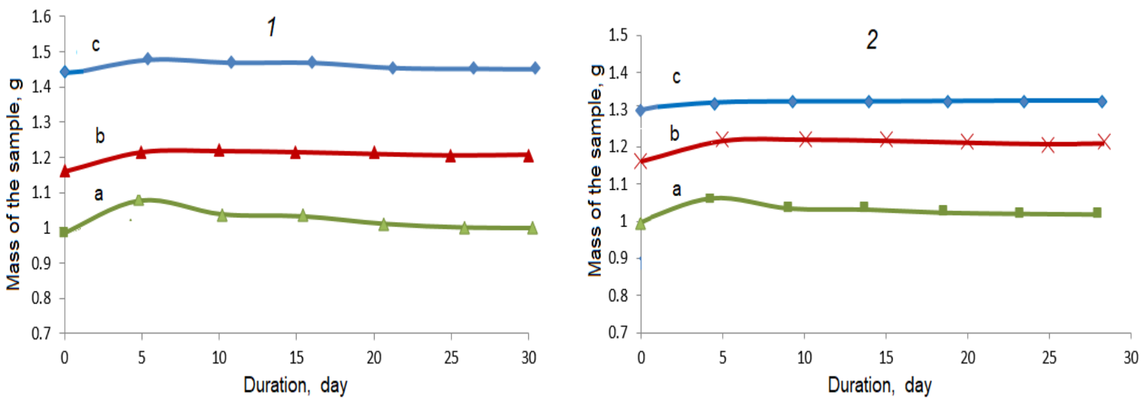

Fig. 3. Change of mass of $Ca/Mg/PO_4$ due to absorbed moisture.
1: a – not granulated; b – DG granulated with dry K and ME additive; c – DG granulated with K and ME aqueous solution additive;
2: a – not granulated; b – FBG granulated with dry K and ME additive; c – FBG granulated with K and ME aqueous solution additive

Conclusions

Comparing these two methods of $Ca/Mg/PO_4$ granulation (drum granulator and fluid bed granulator), and evaluating the properties of the product, it can be stated that both methods are suitable. This notwithstanding the granulated product of the fluid bed granulator has slightly better properties.

The results of X-ray analysis (Fig.4) show that the chemical composition of granular phosphate supplements is independent of the granulation method.

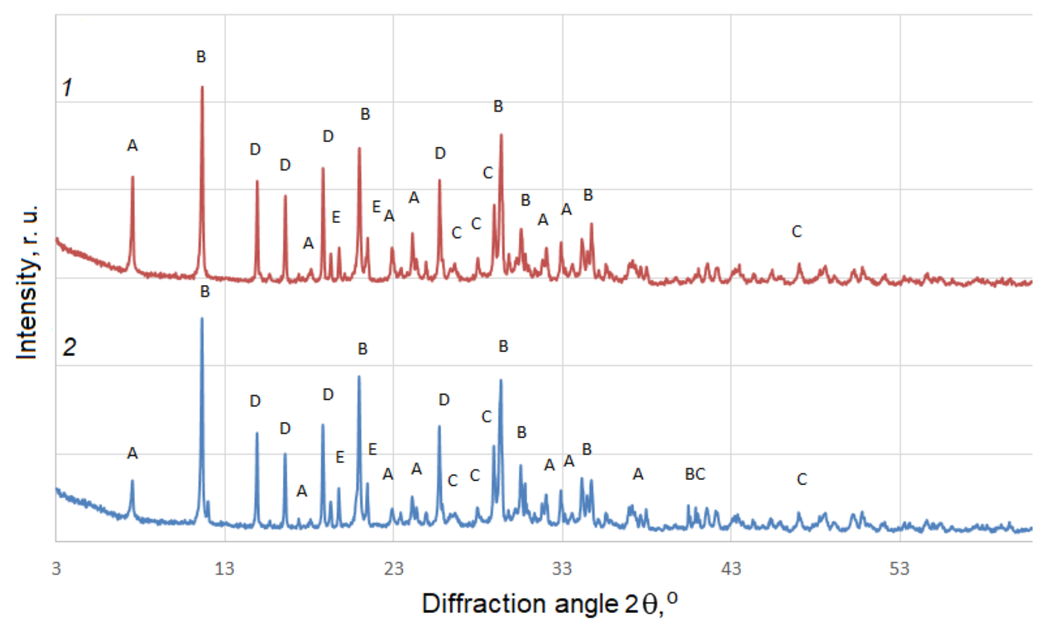

Fig. 4. X-ray curves for the granular product obtained using: *1* – DG; *2* – FBG

Despite the dominance of very small granules in granular phosphate supplements, the granular product is less dusty (Fig.5)and very bulky, and does not caking during long periods of storage.

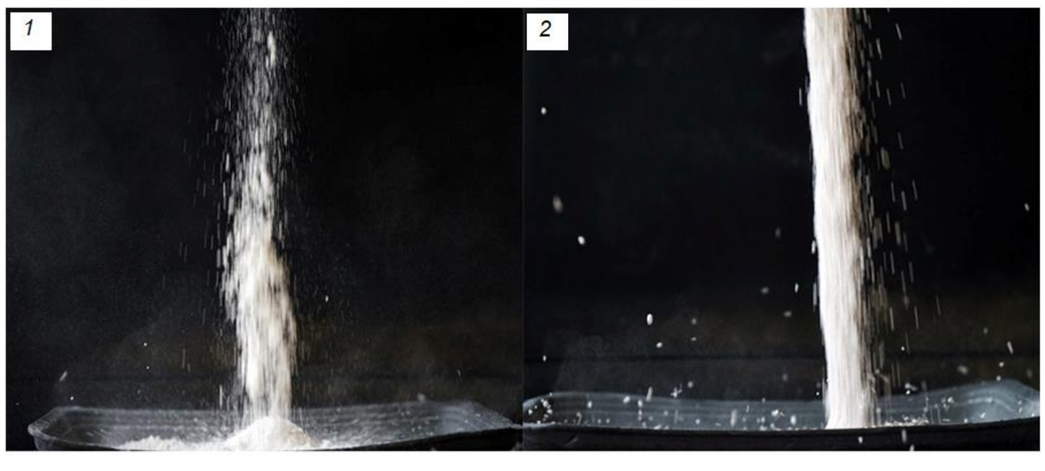

Fig. 5. $Ca/Mg/PO_4$ dust test: *1* – not granulated, 2 – granulated using FBD

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