

Development of microencapsulated sodium metabisulfite (SMBS) for deoxynivalenol (DON) detoxification in animal feed

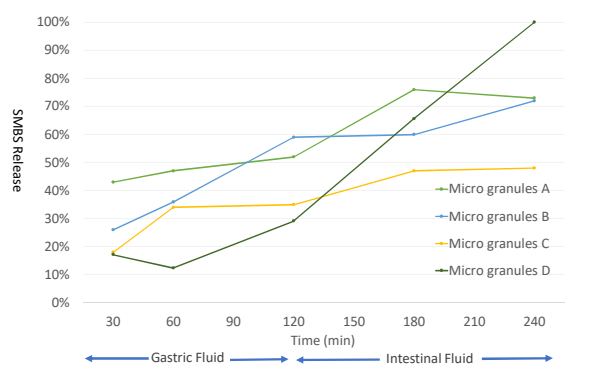
(DON) detoxification in animal feed
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Introduction

- Deoxynivalenol (DON) contamination in animal feed may cause a reduction in growth performance and compromise the immune system of farm animals. (1,2)
- Sodium metabisulfite (SMBS) is a promising chemical agent to detoxify DON to form DON-sulfate, a less toxic variant in small intestine. (3)
- However, SMBS can quickly decay in acidic condition such as stomach, which results in losing its ability to detoxify DON. (4) Therefore, protection of SMBS is critical before it is released in the small intestine.
- SMBS is highly water soluble, easily being oxidized, thus can not be encapsulated in aqueous medium.
- The objective of the current study was to develop an encapsulated SMBS micro granules using fatty acids of different melting points, which can stand the acidic condition of stomach and release the SMBS in the small intestine.

Result

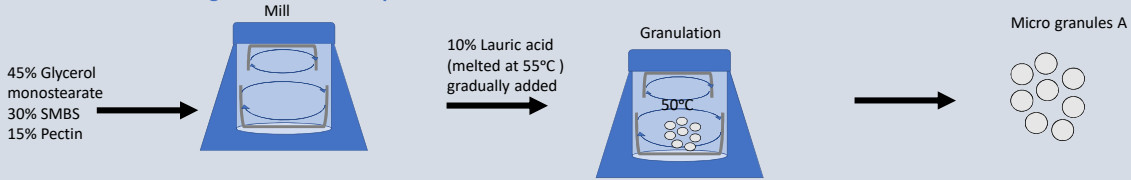
Figure1 SMBS release profile in SIF and SGF from different micro granules



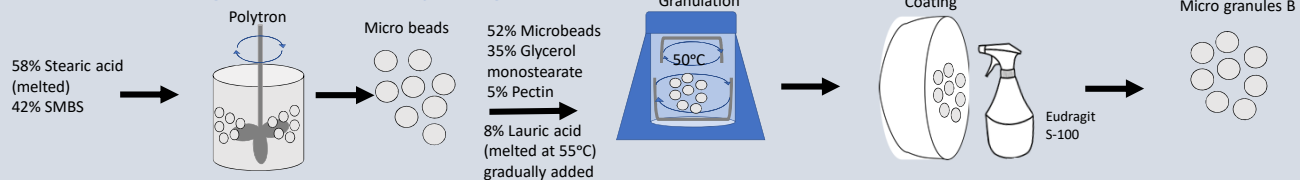
Development of encapsulated SMBS formula

Preliminary study

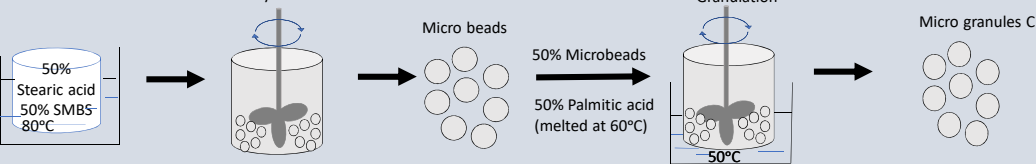
Procedure 1: hot melt granulation techniques



Procedure 2: hot melt granulation + secondary coating

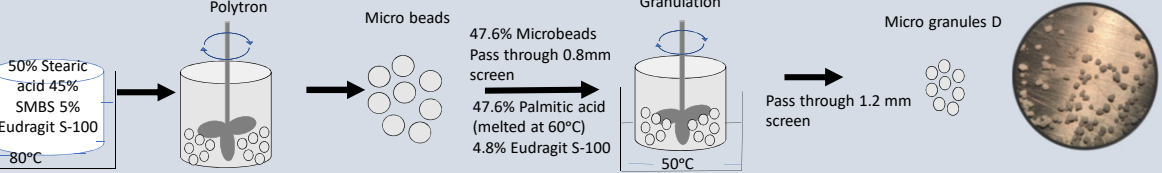


Procedure 3



Stage 2

Optimize Formula of Micro Granules



Summary and Future Directions

- Three different encapsulation procedures were used and the efficiency of them were evaluated by the releasing profiles of SMBS in the simulated gastric fluid (SGF) and simulated intestinal fluid (SIF).
- According to the release profiles (Fig. 1), procedure 3 showed the most promise in delivering SMBS to the intestines, thus was selected for further optimization.
- The final formula contained stearic acid 23.8%, SMBS 21.42%, palmitic acid 47.6%, and Eudragit S-100 7.18%. It released less than 30% of SMBS in SGF and completely release the encapsulated SMBS within 4 hours in SIF (Fig. 1).
- The developed SMBS granules will be further evaluated in experimental animals.

References

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