Chocolate Fat Bloom

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Fat bloom is a common occurrence when working with chocolate products. It is a physical defect that appears during storage of chocolate and is characterized as a whitish layer on the outer surface (Figure 1). Chocolate with fat bloom is not only visually unappealing, but also impacts the flavor and textural qualities, which are important determinants of consumer preference. The phenomenon is not fully understood, but research suggests there are many factors which may contribute to fat bloom formation such as poor tempering, mixture of incompatible fats, disrupted cooling methods, temperature fluctuations, storage conditions and abrasion or finger marking.

Fat bloom impacts all of us: manufacturers, suppliers and customers alike. It is important to understand when and why it is occurring to hone in on the problem and implement a corrective action. Overall, fat bloom is inevitable, but once you understand the fundamentals you can prevent it from occurring prior to the end of shelf life.

CHOCOLATE STRUCTURE

Chocolate has a complex flavor profile and compositional matrix consisting of sugar, cocoa particles and emulsifiers dispersed in a continuous phase of cocoa butter (Figure 2). Cocoa butter is a polymorphic fat composed of three main triglycerides (TAGS). These TAGS are the building blocks of a strong foundation. A TAG molecule is composed of a glycerol backbone with three fatty acid chains linked by ester bonds. This molecule is most commonly illustrated in a chair-like or tuning-fork formation. These TAGS can crystallize in six different polymorph formations (Forms I-VI), which have specific melting points. Polymorph Form V is the ideal form to achieve when working with chocolate. When cocoa butter is in this form, chocolate achieves many favorable attributes such as a smooth, even melting, clean snap and nice gloss. This can be accomplished by tempering.

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Figure 1

Molecular Chocolate Matrix

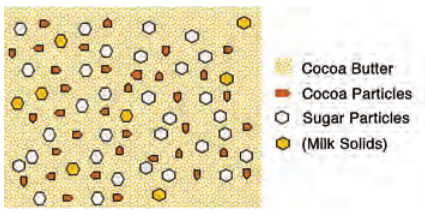


Figure 2



Melissa Tisoncik is the research and development manager–product development at Blommer Chocolate in the company's Chicago R&D team. Previously, she worked at the USDA labs.