

## Physical Attributes of Mixtures of Cocoa Butter with Cupuassu, CBS or Low trans CBR Fats Additions, Concerning Chocolate Manufacture

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Cocoa butter is the most important ingredient in chocolate manufacture due to its distinct attributes like snap and hardness at room temperature. Due to cocoa butter polymorphism, a pre-crystallization or tempering process of the chocolate mass is required. In some countries, including Brazil, the partial substitution of cocoa butter by alternative fats is legally permitted. Physical properties of binary mixtures of cocoa butter and the following fats: cupuassu fat, cocoa butter substitute (CBS), cocoa butter replacer (CBR) were evaluated. The CBS was a lauric fat based on palm kernel oil and the CBR was a non-lauric low trans fat based on palm oil. Added fats were at 5, 10, 15, 20, 25 and 30% (w/w) levels. The tempering of the mixtures at 24°C for 8 min was carried out using a lab-scale tempering apparatus (700mL capacity). The results indicate that mixtures with CBS presented the lowest snap values, ranging from 2,1kg<sub>f</sub>/cm<sup>2</sup> to 0,4kg<sub>f</sub>/cm<sup>2</sup> for 5% and 30%, respectively. Mixtures containing cupuassu or CBR fats showed similar snap values (2,6kg<sub>f</sub>/cm<sup>2</sup>) at 5% level, very close to pure cocoa butter (2,5kg<sub>f</sub>/cm<sup>2</sup>). The snap values decreased with the increase of the alternative fats proportion. The mixtures with cupuassu fat presented higher values of snap than the CBR and CBS fats. A similar trend was observed regarding the melting point. Cupuassu (*Theobroma grandiflorum* Schum) is botanically a very close relative of cocoa (*Theobroma cacao*). Therefore the similarity of chemical and physical properties is not surprising. The incorporation of alternative fats decreased the mixtures melting point. The melting point of the pure cocoa butter used was 35,3°C, a value similar to the mixtures with 5% cupuassu or 5% CBR fat. The mixtures with CBS showed the lowest melting point, ranging from 33,7°C (5% CBS) to 32,4°C (25% CBS). All mixtures were completely melted at 35°C, a desirable attribute in chocolates. The low trans CBR fat presented the highest solid fat content at 25°C. The physical characterization of the mixtures indicate the viability of partial substitution of cocoa butter by the alternative fats using up to 25% cupuassu or CBR or only 5% CBS.