

Studies on Cocoa Butter Replacer Fats

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Cocoa butter has traditionally been the main fat used in chocolate and it is a legal requirement. However, because of the increasing price of cocoa butter and fluctuations in the availability of cocoa beans, attempts have been made to obtain replacements for cocoa butter from other vegetable fats.

There are two types of chocolate, real and imitation. In real chocolate products the fat phase consists of only two components, *i.e.* cocoa butter and milk fat. Exceptions to this are found in the UK, Ireland, Japan, Denmark and some East European countries, where it is permissible to replace part of the cocoa butter with other vegetable fats. In imitation chocolate products the major part of the fat phase consists of non-cocoa butter fats with a consistency and melting behaviour similar to cocoa butter.

All those fats which can partly or totally replace cocoa butter in real and imitation chocolate are known as cocoa butter replacer fats. They are classified into two groups. Cocoa Butter Equivalents (CBE) and Cocoa Butter Substitutes (CBS).

Cocoa Butter Equivalents

These are fats which are similar in physical and chemical properties to cocoa butter and are therefore compatible with it. They are able to mix with cocoa butter in all proportions without altering the melting, rheological or processing properties of cocoa butter. Palm mid-fraction (PMF) has physical and chemical properties quite similar to those of cocoa butter but not close enough for it to be used as the sole fat in the manufacture

of chocolate. Certain exotic fats such as engkabang (illipe), sal stearin, shea stearin, *etc.* are therefore blended with it in order to bring the properties of the mixture closer to those of cocoa butter and simultaneously achieve a better degree of miscibility with cocoa butter. Formulation work carried out at PORIM has identified several promising blends that have performed well in chocolate. These blends were used as extenders up to the permitted legal maximum of 5% in chocolate. The composition and properties of two of the blends are shown in *Table 1*.

TABLE 1. COMPOSITION AND PROPERTIES OF COCOA BUTTER EXTENDER FATS

Composition %	(1)	(2)
PMF	70	50
Engkabang (illipe)	30	40
Sal Stearin		10
Properties		
SFC %		
20°C	72.4	63.2
25°C	60.0	56.0
30°C	29.7	39.9
32.5°C	2.4	12.0
35°C	1.6	3.0
37°C	—	1.8
40°C	—	—
JCC		
(Jenson Cooling Curve)		
T Max °C	27.2	26.8
T Min °C	22.7	22.8
ΔT	4.5	4.0
t max (min)	61	57
t min (min)	35	37
Δt	26	20
Q = ΔT/Δt	0.17	0.2
Tempering Time (min)	44	34

Note: CB Tempering Time – 33 mins