

## Soy Beverages - Calcium Fortified

BVR-48

**Optimum stability and mouthfeel in extended shelf-life, neutral pH beverages!**

### Introduction:

FMC BioPolymer offers a range of stabilizers designed specifically to stabilize and provide mouthfeel to soy beverages. The Avicel<sup>®</sup> and Avicel-plus<sup>®</sup> range of stabilizers will provide excellent suspension of insoluble particles (e.g. calcium, cocoa powder, etc.) in soy drinks ranging from very low viscosity, refreshing beverages to creamy, indulgent beverages. Stability and suspension of insolubles can be ensured at refrigerated temperatures as well as ambient temperature storage conditions. These stabilizers will ensure good taste and mouthfeel in your soy beverages that will help you develop brand loyalty and repeat purchases.

FMC BioPolymer also provides a stabilizer range for low pH soy beverages, see application bulletin Acidified Protein beverages (BVR-49).

### FMC BioPolymer Stabilizer Line for Soy Beverages

Product	Ingredient list	Purpose
Avicel-plus <sup>®</sup> BV 2625 stabilizer	E 460 Cellulose E 466 Cellulose gum E 407 Carrageenan  Sugar used as a standardizing agent	Produces creamy textured soy beverages
Avicel <sup>®</sup> BV 1518 stabilizer	E 460 Cellulose E466 Cellulose gum  Sugar used as a standardizing agent	Stabilises low viscosity soy beverages
Viscarin <sup>®</sup> SD 389 carrageenan	E 407 Carrageenan  Dextrose is used as a standardizing agent	Can be added to prevent creaming during storage

## Benefits of Avicel® and Avicel-plus® stabilizers:

FMC BioPolymer offers Avicel-plus BV 2625 and Avicel BV 1518, specifically formulated to provide long term shelf stability at ambient temperatures to both soy beverages based on liquid soy and recombined soy beverages.

Avicel-plus BV 2625 is an optimized combination of cellulose and carrageenan which will enhance the mouthfeel and body of the soy beverage to create a creamy refreshing drink with excellent emulsion stability and suspension properties.

Avicel BV 1518 is a cellulose based product which provides excellent suspension properties at very low viscosities. A refreshing soy beverage can be created with a viscosity similar to the viscosity of plain soy milk. As with plain soy milk, after prolonged storage some creaming will be visible, if this is undesirable a small amount of Viscarin® SD 389 carrageenan (0.01 to 0.02%) can be added to eliminate this creaming.

## Additional Benefits:

- Maintains functionality under direct and indirect UHT processing
- Provides stability with consistent mouthfeel and uniform body
- Stabilizes solids (e.g. minerals, calcium, etc.) under ambient or refrigerated conditions

## 1. Soy Beverages Based on Liquid Soy

**Formulation Guideline:** % by weight

<u>Ingredients</u>	<u>Calcium Fortified Soy Milk</u>	<u>Calcium Fortified Soy Milk</u>	<u>Calcium Fortified Chocolate Soy Milk</u>
Sugar	9.00	9.00	7.00
Calcium carbonate	-	-	0.30
Tri-calcium phosphate*	0.31	0.31	-
Cocoa powder	-	-	1.00
Avicel-plus® BV 2625	0.35	-	0.40
Avicel® BV 1518	-	0.35	-
Fluid Soy milk	to 100	to 100	to 100

\* Alternative sources of calcium, e.g. calcium carbonate, can be used for fortification to provide a calcium level of 120 mg/100 ml soy beverage.

## Processing Guidelines:

- Blend all dry ingredients.
- Disperse in fluid soy base with medium shear for 10 to 15 minutes.
- UHT process (142°C for 3 to 5 seconds).
- Cool to approximately 70°C and homogenize 150/50Bar.\*
- Cool to 10°C and fill aseptically.

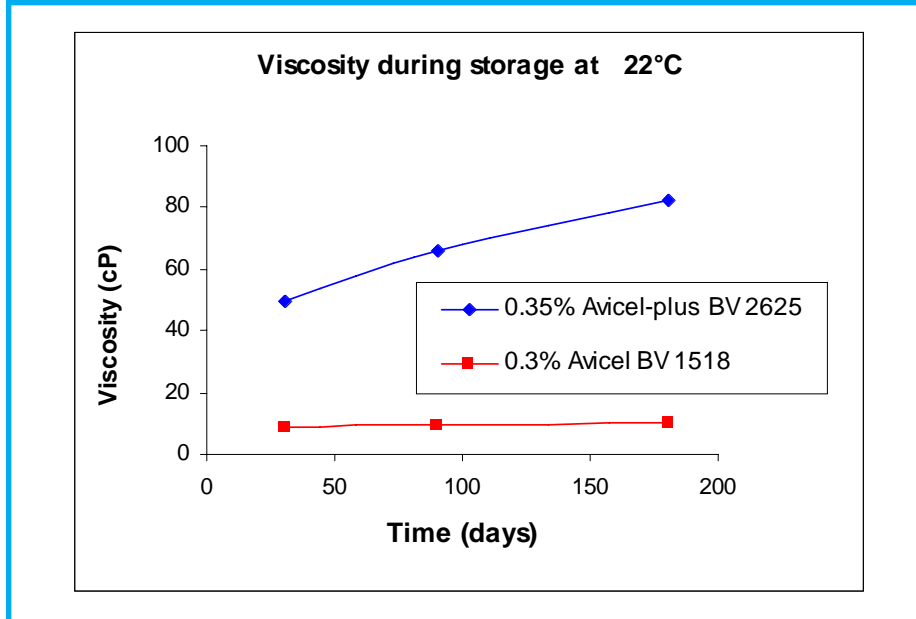
\* Alternatively, upstream homogenization can be applied.

## Discussion:

Table 1 illustrates the stability of calcium fortified soy milks stored during 4 months at ambient temperature. Avicel-plus® BV 2625 gives a creamy mouthfeel with no creaming and only a trace of calcium sedimentation. Avicel® BV 1518 gives a refreshing mouthfeel with only a trace of sedimentation and slight creaming. Figure 1 illustrates the viscosity profile during storage at 22°C indicating a slight viscosity increase from 50 to 80cP when formulating with Avicel-plus BV 2625 and a very stable low viscosity during shelf life when formulating with Avicel BV 1518.

**Table 1 : Stability after 4 months storage of Ca-fortified soy milks at 22°C**

Stabilizer	Avicel-plus BV 2625	Avicel BV 1518
Use-level, %	0.35	0.3
Sedimentation	Trace	Trace
Mouthfeel	Creamy	Refreshing
Creaming	None	Slightly creaming



**Figure 1: Viscosity profile of calcium fortified soy milks prepared with Avicel and Avicel-plus stabilizers stored at 22°C.**

Viscosity measurement: Brookfield equipped with spindle 61, speed 12 rpm, measured after 1 minute.

## 2. Calcium Fortified Recombined Soy Beverages

### Formulation Guidelines: Green Tea/Honey Flavoured Soy Beverage

<u>Ingredients</u>	<u>% (by weight)</u>
Soy protein isolate <sup>(1)</sup>	3.75
Sugar	2.00
Maltodextrin 15 DE	2.00
Soy bean oil	1.50
Avicel BV 1518	0.40
Tri-calcium phosphate	0.15
Soy masking flavour <sup>(2)</sup>	0.10
Green Tea flavour <sup>(3)</sup>	0.025
Honey flavour <sup>(4)</sup>	0.006
Demineralized (or soft) water	to 100.00%

(1) For example Supro plus 651, The Solae Company

(2) For example Givaudan 8106099871/ 514318H

(3) For example Givaudan 8107001892/ 97782-33

(4) For example Givaudan 8006085309/ 77988-33

### Processing Guidelines:

- Prepare a dry blend of Avicel, part of the sugar and tri-calcium phosphate; add to the water and mix high speed for 5 minutes.
- Add soy protein isolate, mix at high speed and heat mixture to 70°C.
- Mix until full hydration of the soy proteins has been achieved.
- Add rest of the sugar and maltodextrin followed by the oil and flavours, mix until homogenous.
- Apply heat treatment : pre-heating to 75°C, 2 step homogenization 200/20 Bar, UHT 140°C for 3 to 5 seconds.
- Cool down to below 15°C and fill aseptically.

## Regulatory Information

All products manufactured by FMC BioPolymer meet all standards of quality as defined by:

- US Code of Federal Regulations (21 CFR)
- Food Chemicals Codex
- J.E.C.F.A. Specifications issued by FAO/WHO
- European Economic Community Directives

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