PHYS-014

The effect of Novel Sucrose Fatty Acid Esters for Whipped Cream

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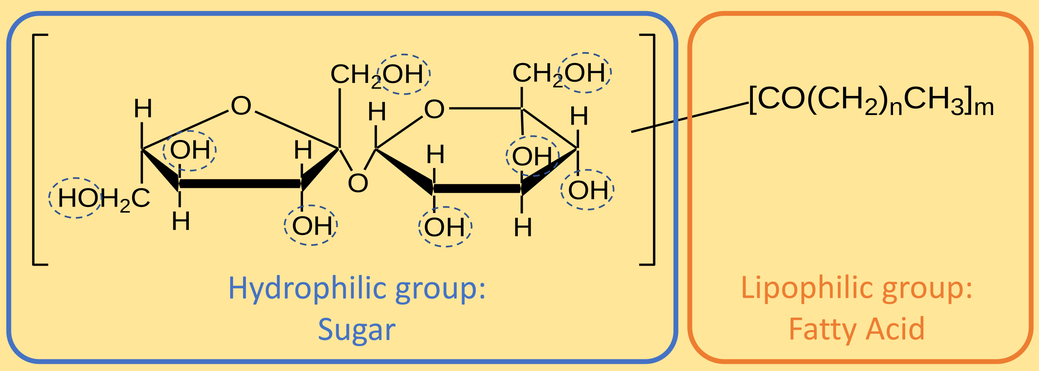
INTRODUCTION

Sucrose Fatty Acid Esters (SEs) are food emulsifiers that are manufactured from sucrose and fatty acid methyl esters. In the manufacture, distribution, and application of whipped cream, it is necessary to appropriately control the emulsification (emulsion stability) and demulsification (foaming property) of emulsions, which pose a very serious problem for whipped cream manufacturers. In addition, the whipped cream is recently required to maintain shape retention when distributed at ambient temperature. In this research, we evaluated the function of " RYOTO Sugar Ester S-470 (HLB 4, stearic fatty acid)" which launched a new product compared to other Sucrose Esters of Fatty Acids(SEFAs) for emulsion stability, foaming properties, and shape retention of whipped cream.

MATERIALS

Wide variety of "Sucrose Fatty Acid Esters (SEs)". SEs is possible to modify the property in food by changing kinds of fatty acids or degree of esterification.



Nomenclature for RYOTO Sugar ester

S-370

- Percentage of Main Fatty Acid
- HLB
- Kinds of Fatty Acid

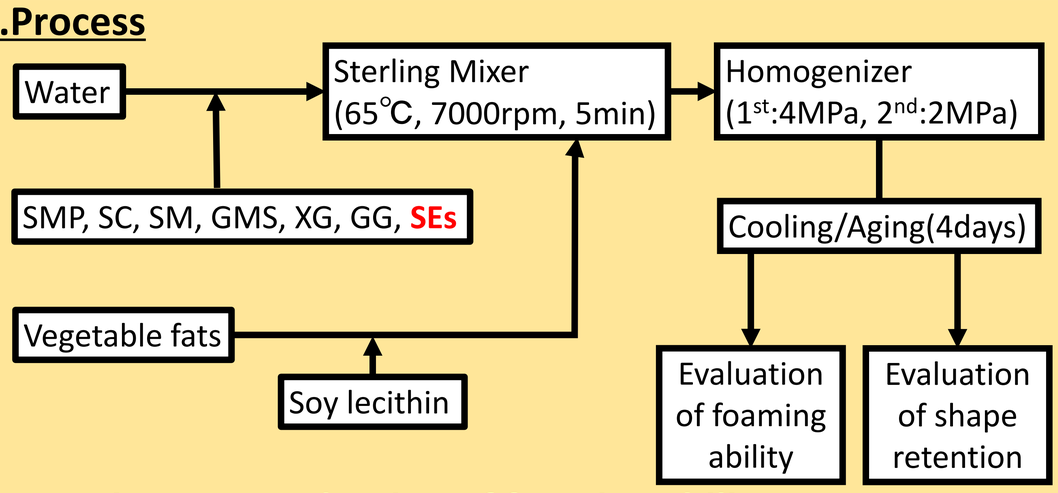
Fatty Acid		
L	C12	Lauric acid
M	C14	Myristic acid
P	C16	Palmitic acid
S	C18	Stearic acid
O	C18:1	Oleic acid
B	C22	Behenic acid
ER	C22:1	Erucic acid

METHODS

1.Composition

Ingredients	Without SEs	With SEs
Vegetable fats	35.0 %	35.0 %
Skim milk powder (SMP)	3.0 %	3.0 %
Sodium caseinate (SC)	1.2 %	1.2 %
Sodium metaphosphate (SM)	0.10 %	0.10 %
Glycerol monostearate (GMS)	0.05 %	0.05 %
Soy lecithin	0.10 %	0.10 %
Xanthan gum (XG)	0.04 %	0.04 %
Gua gum (GG)	0.06 %	0.06 %
SEs(S-470/S-570/S-1670)	-	0.10 %

2.Process



3.Experiment1. Evaluation of foaming ability

1. Add 30 g of sugar to 400 g cream.
2. Stir using a mixer (400 rpm).
3. Measure OR and hardness at regular time intervals.

Calculation of overrun (OR)

OR =(Do－D） ／D×100

Do： Specific gravity of cream before stirring

D： Specific gravity of cream after stirring

Measurement of firmness

Using RHEO METER CR-500DX (Sun Scientific Co.)

Plunger: 30 mm Disc type

Table lifting speed: 20 mm / min

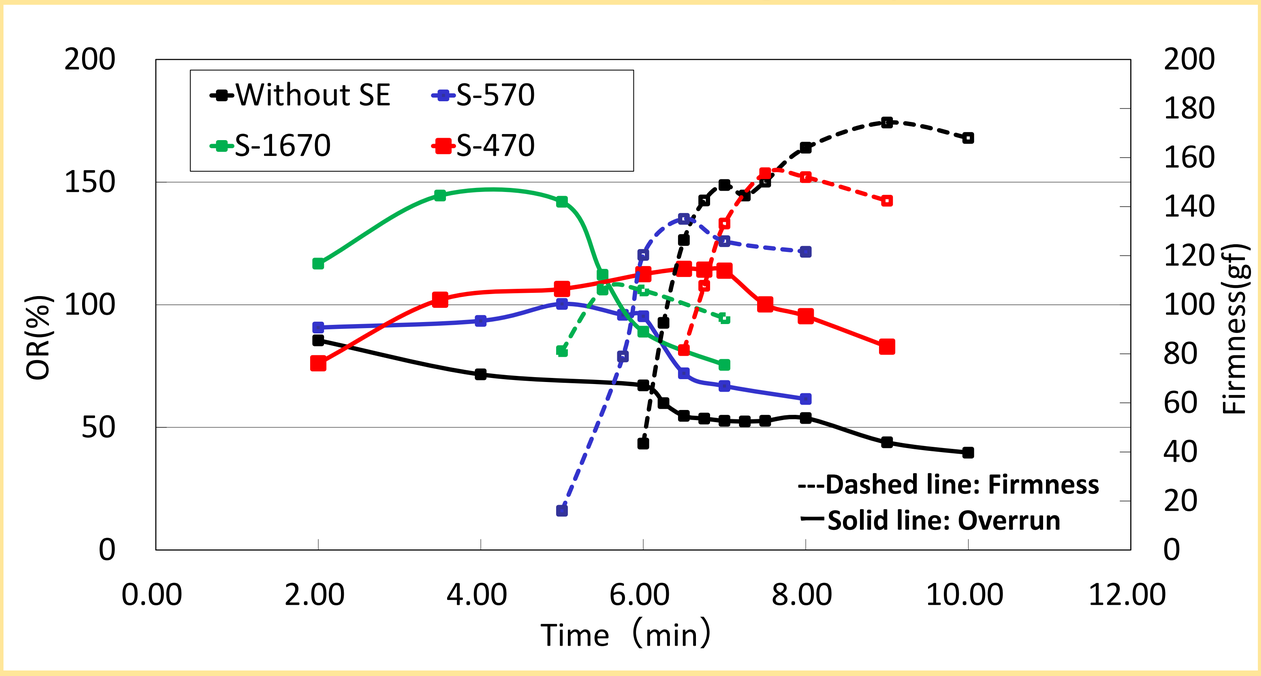
Measure load value[gf] at penetration of 5 mm

4.Experiment2. Evaluation of shape retention

1. Whip the cream to the point where its stiffness reaches 120.
2. Keep the squeezed cream at room temperature (30℃) for 1 hour.
3. Observe the condition of the cream every 15 minutes.

Result 1 "S-470" promotes a good balance of overrun and firmness.

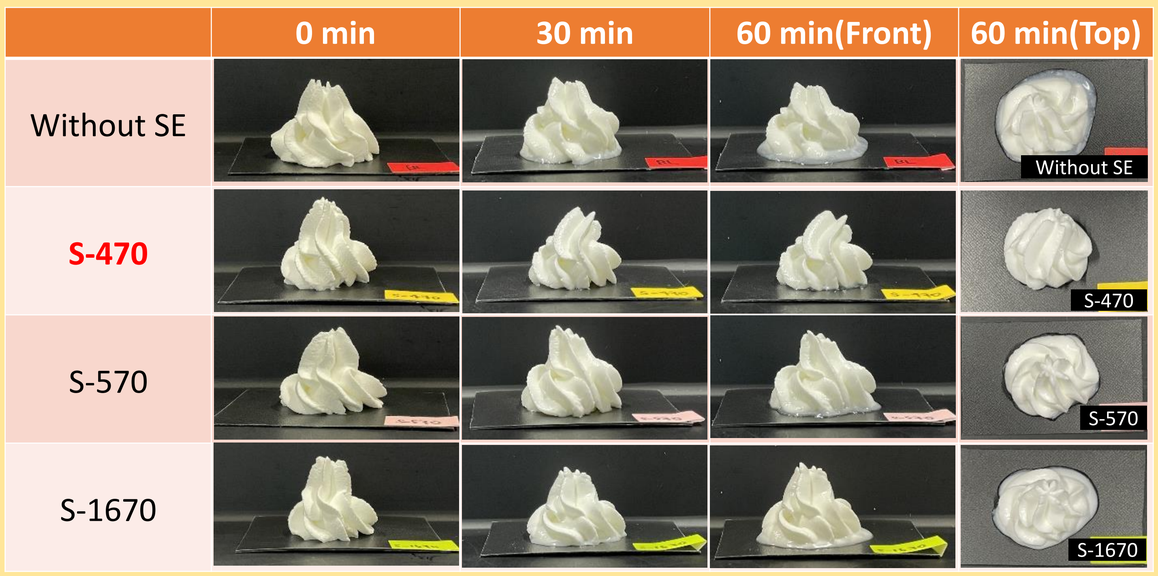
Evaluation of foaming ability



Whipped cream with S-470 maintained good balance between overrun and firmness compare to with or without other SEFAs.

Result 2 "S-470" promotes retention of shape at elevated temperatures.

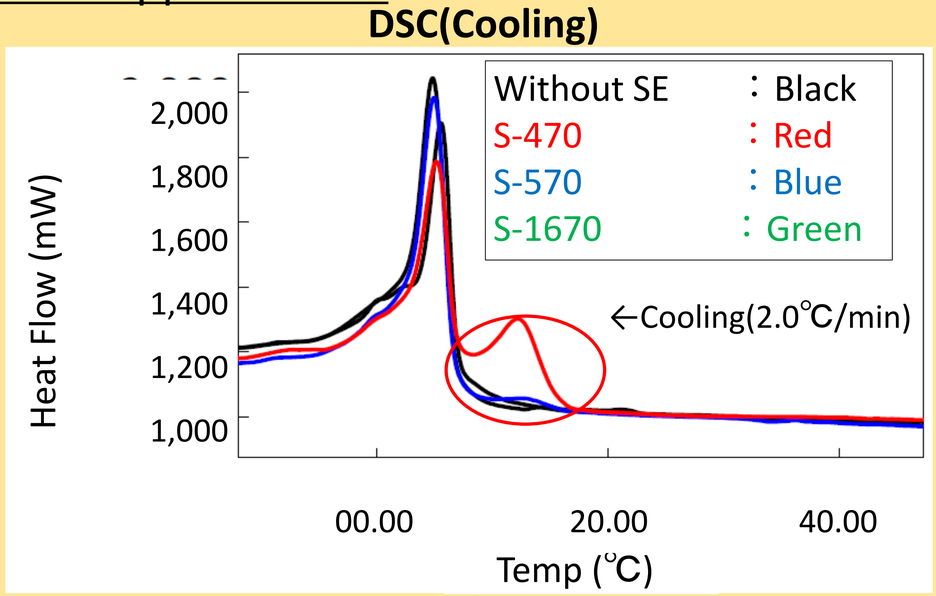
Evaluation of shape retention



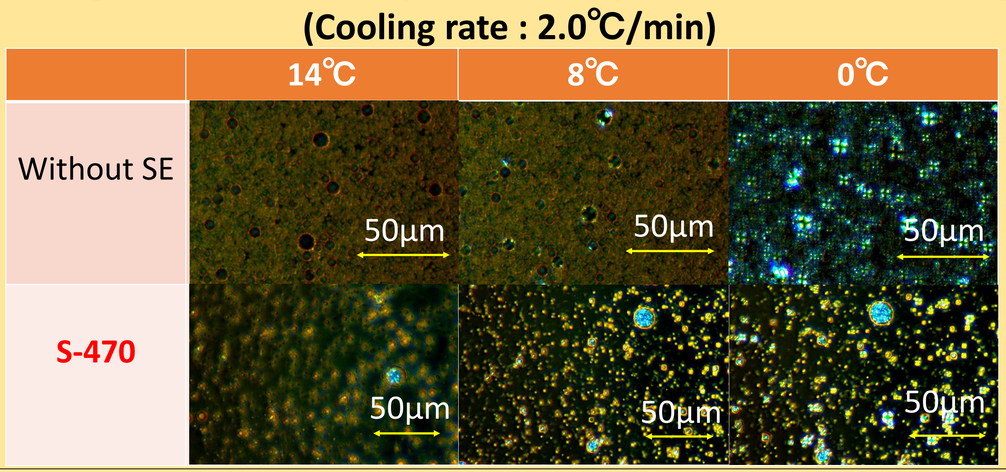
Whipped cream with S-470 showed less water separation and retained its shape compared to with or without other SEFAs above the melting point of fats that we used.

Discussion Effect mechanism of S-470 in improving physical properties of whipped cream.

DSC(Cooling)



Changes in emulsion droplets of whipped cream under cooling (Cooling rate : 2.0℃/min)



1. SEFAs are known to contribute to the improvement of emulsion stability and overrun, as shown by the results of S-1670 in this study. S-470 is also found to improve it.
2. According to the results of DSC and microscopic observation of emulsions, it was confirmed that crystallization was accelerated in emulsions containing S-470. This is expected to be due to the enhancement of interfacial heterogeneous crystallization. This is thought to increase the amount of crystals in the cream when it is whipped and to strengthen the fat crystal network, which contributes to the improvement of firmness and shape retention.