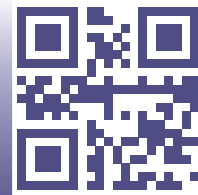




Formulator Report: Floraesters® Improve Antiperspirants



Floraesters reduce perceived irritation caused by antiperspirants, reduce antiperspirant sensitivity, and enhance consumer preference, without inhibiting effectiveness, when included in antiperspirants.¹

Floraesters 60 [INCI: Jojoba Esters] provides multiple benefits to personal care formulations, including the ability to boost skin hydration, enhance barrier function, and reduce the appearance of irritation-associated erythema, due to its emolliency and occlusivity. Floraesters 60 also has the ability to improve product shelf life due to its superior oxidative stability. Unlike some “jojoba butter” ingredients that are partially-hydrogenated, Floraesters 60 is interesterified. This produces esters with only cis-unsaturates and no trans-fats.

Floraesters K-100® Jojoba [INCI: Hydrolyzed Jojoba Esters (and) Jojoba Esters (and) Water (Aqua)] provides a multitude of formulation benefits. Its substantivity makes it well-suited to entrap molecules at the skin surface. Clinical studies have shown that Floraesters K-100 Jojoba is effective at reducing the appearance of irritation-associated erythema, as well as improving skin barrier function and restoration.

Both Floraesters are COSMOS / Ecocert certified, and EU and China REACH compliant.

Clinical Study Facts²:

In double-blind, vehicle-controlled, randomized clinical studies, **Floraesters K-100 Jojoba** and **Floraesters 60** produced the following benefits:

- **Significantly reduced pain** caused by antiperspirants **by 83%** compared to the vehicle (**Figure 1**)
- **Significantly reduced sensitivity** caused by antiperspirants **by up to 77%** compared to the vehicle (**Figure 2**)
- **Preferred by more than 86%** of consumers for **least irritation and overall product performance** (**Table 1**)
- **Did not impact the effectiveness of antiperspirant activity** when included in a solid antiperspirant (**Figure 3**)

Formulation Benefits	Floraesters 60	Floraesters K-100 Jojoba
Occlusivity comparable to petrolatum (without stickiness)	X	
Provides “slip” to finished products	X	
Soluble in most oils and some silicones	X	
Emolliency remains after rinse-off		X
Substantivity	X	X
Water resistant	X	X
Fragrance fixative		X
Soluble in most alcohols and glycols		X
Results in rich emolliency on skin	X	X
Botanically derived	X	X
Provides extended shelf life due to its oxidative stability	X	X
Biodegradable ³	X	X

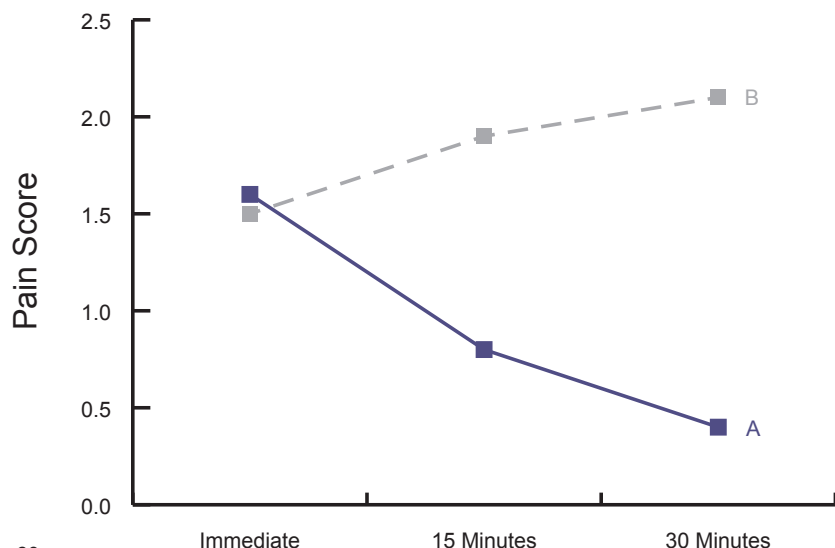
1. Cargill has not tested Floraesters in final OTC drug formulations. Compliance with FDA regulations is the responsibility of the customer.
 2. Final Report available upon request. Figures and Tables can be found on the next two pages of this document.
 3. Biodegradable according to OECD 301B.

Floraesters Reduce Perception of Irritation

Figure 1. Reduced Perceived Irritation with Floraesters 60 and Floraesters K-100 Jojoba

Figure 1. The antiperspirant deodorant containing **Floraesters 60 and Floraesters K-100 Jojoba** reduced pain scores (i.e. discomfort due to stinging, burning, and itching) by 83% compared to the vehicle antiperspirant without Floraesters. (See Claim Sheet 18-108.)

—■— A - vehicle + 0.5% Floraesters 60 + 1.0% Floraesters K-100 Jojoba
 - - ■ - B - vehicle



Study Design: Antiperspirants with and without 0.5% Floraesters 60 + 1.0% Floraesters K-100 Jojoba were applied to the underarms of subjects sensitive to antiperspirants, followed by subject evaluations. The results appear in *Figure 1*.

Floraesters Protect Sensitive Skin

Figure 2. Reduced Antiperspirant Sensitivity with Floraesters 60 and Floraesters K-100 Jojoba

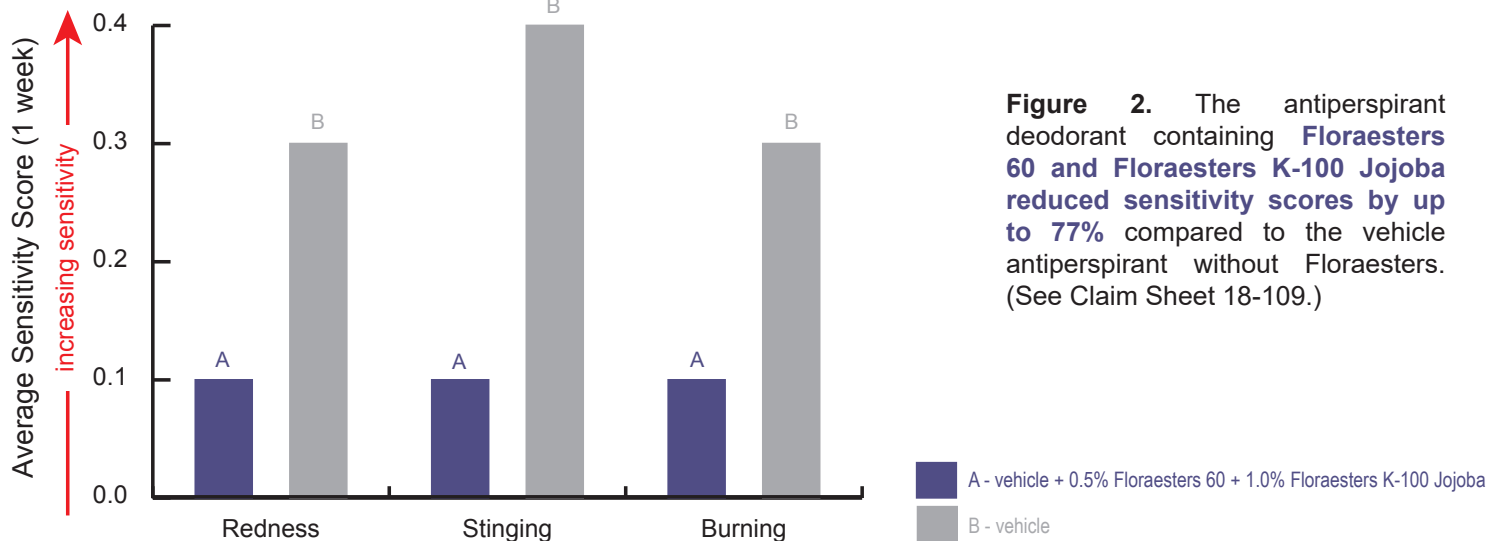


Figure 2. The antiperspirant deodorant containing **Floraesters 60 and Floraesters K-100 Jojoba** reduced sensitivity scores by up to 77% compared to the vehicle antiperspirant without Floraesters. (See Claim Sheet 18-109.)

Study Design: Antiperspirants with and without 0.5% Floraesters 60 + 1.0% Floraesters K-100 Jojoba were applied and evaluated for sensitivity (i.e. redness, stinging, burning, and itching) once daily during 1 week of use on the underarms by female subjects sensitive to antiperspirants. The results appear in *Figure 2*.

4. All studies were conducted double-blind, vehicle-controlled, and randomized.

Floraesters Increase Consumer Preference

Table 1. Increased Consumer Preference with Floraesters 60 and Floraesters K-100 Jojoba⁵

Parameter	Test Article	Percent Preference
Least Irritation*	A - vehicle + FE60 + K-100	86%
	B - Vehicle	14%
Least Stinging, Burning, Itching*	A - vehicle + FE60 + K-100	86%
	B - Vehicle	14%
Overall Product Performance*	A - vehicle + FE60 + K-100	86%
	B - Vehicle	14%

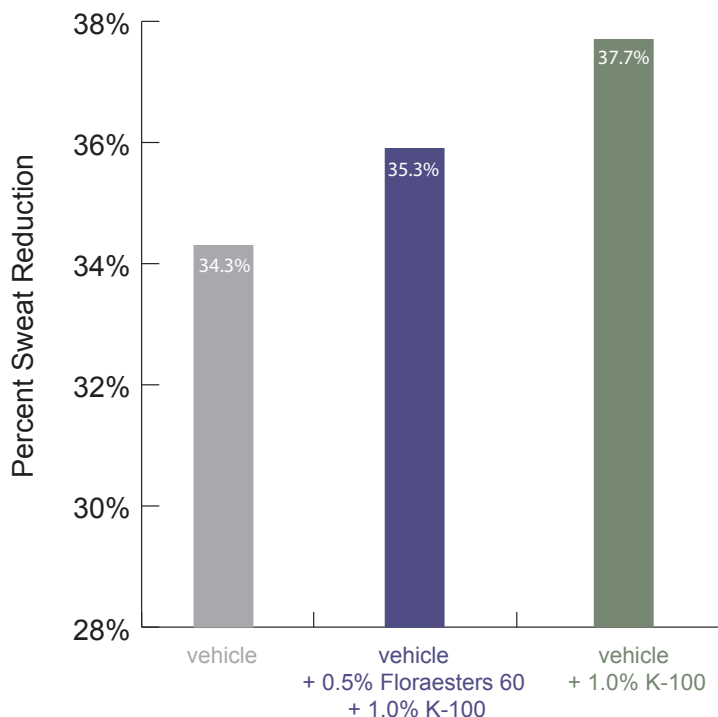
Table 1. 86% of consumers preferred the antiperspirant deodorant containing **Floraesters 60 and Floraesters K-100 Jojoba** compared to the vehicle antiperspirant without Floraesters. Statistical (*) significance was apparent where indicated ($p < 0.05$). (See Claim Sheet 18-110.)

Study Design: Antiperspirants with and without 0.5% Floraesters 60 + 1.0% Floraesters K-100 Jojoba were applied and evaluated for sensitivity (i.e. redness, stinging, burning, and itching) after 1 week of use on the underarms by female subjects sensitive to antiperspirants. The results appear in *Table 1*.

Floraesters Do Not Inhibit Antiperspirant Active Effectiveness

Figure 3. Percent Sweat Reduction

Figure 3. The antiperspirant deodorant containing **Floraesters 60 and/or Floraesters K-100 Jojoba** demonstrated equivalent antiperspirant activity (as measured by percent sweat reduction) compared to the vehicle antiperspirant without. All test articles demonstrated statistically significant ($p < 0.01$) reductions in sweat.



Study Design: Antiperspirants with and without 0.5% Floraesters 60 + 1.0% Floraesters K-100 Jojoba were applied (under occlusion) daily to female subjects' backs for 3 consecutive days (Days 1-3). On Day 4, pre-weighed absorbent cotton pads were secured to the test sites, and subjects sat in a personal sauna (60°C) for 20 minutes. Cotton pads were then collected and weighed to gravimetrically determine the quantity of sweat. The results appear in *Figure 3*.

⁵ The preference data does not include subjects that indicated no preference.

Soothing Antiperspirant for Sensitive Skin⁶

This moisturizing antiperspirant reduces irritation and sensitivity caused by typical antiperspirants. Floraesters K-100 Jojoba and Floraesters 60 provide natural jojoba emolliency which hydrates and soothes skin. Floraesters and Floramac 10 are gentle ingredients making them an ideal choice designed for delicate underarm skin.

Phase	Trade/Common Name	INCI Name	Manufacturer	% wt./wt.
A	Vegarol [®] 1898	Stearyl Alcohol	Essential Ingredients	17.00
	Castor Wax MP-80	Hydrogenated Castor Oil	Acme-Hardesty Co.	4.00
	Floraesters 60	Jojoba Esters	Floratech	0.50
	Floramac 10	Ethyl Macadamiate	Floratech	1.50
B	Floraesters K-100 Jojoba	Hydrolyzed Jojoba Esters (and) Jojoba Esters (and) Water (Aqua)	Floratech	1.00
	Purac [®] Hipure 90	Lactic Acid	Corbion	0.10
	SF1202 01P	Cyclopentasiloxane	Momentive Performance Materials	20.00
C	Dry-Flo [®] PC	Aluminum Starch Octenylsuccinate	AkzoNobel Chemicals	3.00
	Supra [®] H USP	Talc	Luzenac America, Inc.	0.50
	Reach AZP-908 ⁷	Aluminum/Zirconium Tetrachlorohydrate-Gly	Summit Reheis	22.00
D	SF1202 01P	Cyclopentasiloxane	Momentive Performance Materials	q.s.
	Bentone [®] Gel TN V	C12-15 Alkyl Benzoate (and) Stearalkonium Hectorite (and) Propylene Carbonate	Elementis Specialties	1.00
	Fragrance ⁸	-----	-----	q.s.
			Total	100.00

Procedure:

- Combine the ingredients of Phase A in a vessel with heat. Start mixing with propeller agitation at 60-65°C. Continue heating to 70-80°C.
- In a separate vessel, mix the Floraesters K-100 Jojoba with the Purac Hipure 90 of Phase B at room temperature by stirring. Once the mixture becomes a clear liquid, add the SF1202 01P at room temperature. Begin heating to 70-80°C.
- Add Phase B to Phase A at 70-80°C with medium propeller agitation.
- When the mixture becomes uniform, begin cooling to 65-70°C.
- Add Phase C to Phase AB in the order listed with medium propeller agitation at 65-70°C. The Reach AZP-908 should be added at 65°C.
- In a separate vessel, add the SF1202 01P to the Bentone Gel TN V of Phase D, gradually to avoid making clumps, at room temperature with medium propeller agitation. When the mixture becomes uniform, add the Fragrance.
- When Phase D becomes uniform, begin heating to 60-65°C.
- Add Phase D to Phase ABC with medium propeller agitation at 60-65°C.
- Transfer the mixture into a container at 55-60°C.

Formula Properties:⁹

Property	Result
pH	4 - 5
Hardness	71 - 85 dmm
Melting Point	50 - 57°C

Ingredient Information

24/7 Online

iLabel[®]
www.floratech.com/info



Floraesters 60
Floraesters K-100 Jojoba

6. INCI/Trade names must be verified with each manufacturer.
7. Distribution of the AP active was confirmed by analyzing the chloride content in the top, middle, and bottom layers of duplicate antiperspirant sticks. All layers were within 10% of one another.
8. Fragrance: Fresh Rain UAE 03647/00 supplied by Givaudan Fragrance Corporation
9. Stick hardness and melting point were unaffected by the addition of Floraesters.