

Table 6. Consumer Properties used in the Consumer Preference Model

Consumer Properties
Effectiveness
Thickness
Greasiness
Smoothness
Creaminess
Spreadability
Absorption Rate

Scientific Measure of Customer Needs

- Consumers tend to like their skin creams “thick”, “smooth”, and “creamy” – not the things we usually have you measure in 1013 & 1014
 - Thickness \sim force of viscous drag $\sim \eta^{1/2}$
 - Smoothness $\sim 1/(\text{coefficient of friction})$
 - Creaminess $\sim [(\text{thickness})(\text{smoothness})]^{1/2}$

Note that this is not an exact science!

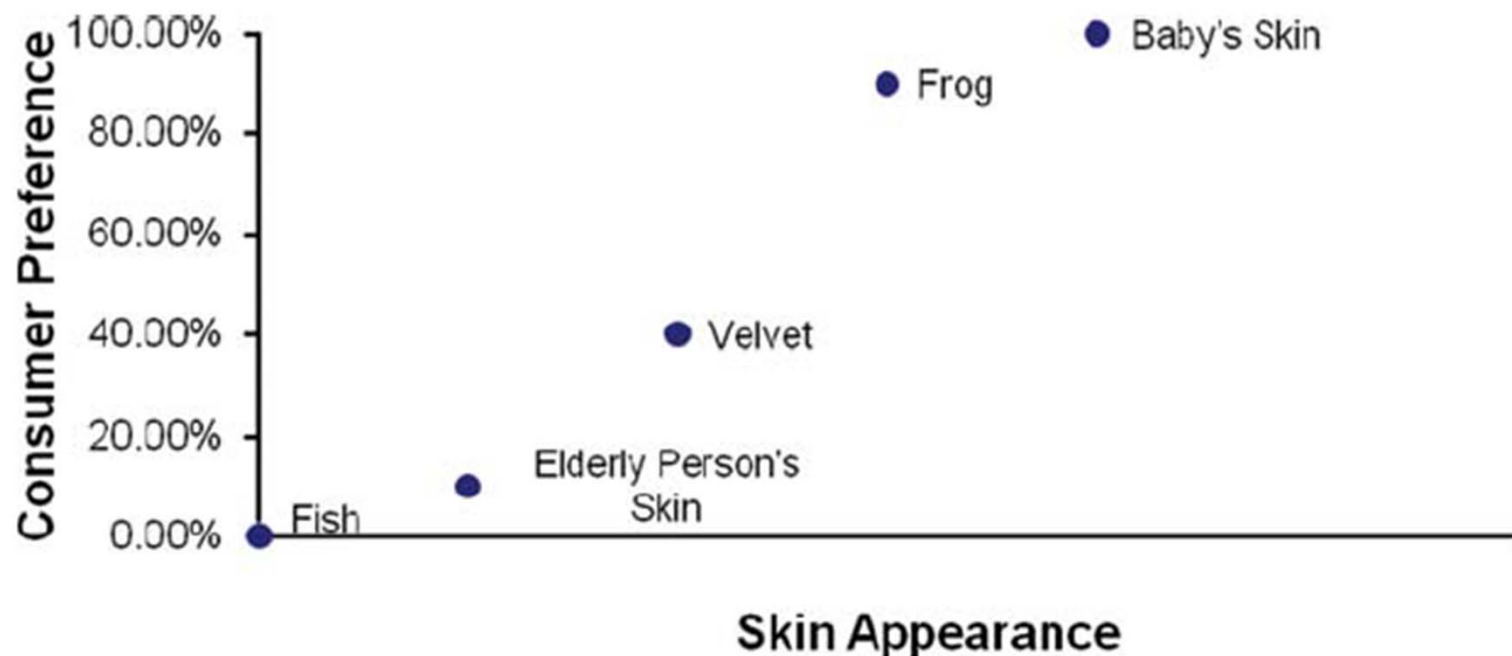


Figure 4. Consumer preference for skin appearance.

[Color figure can be viewed in the online issue, which is available at wileyonlinelibrary.com.]

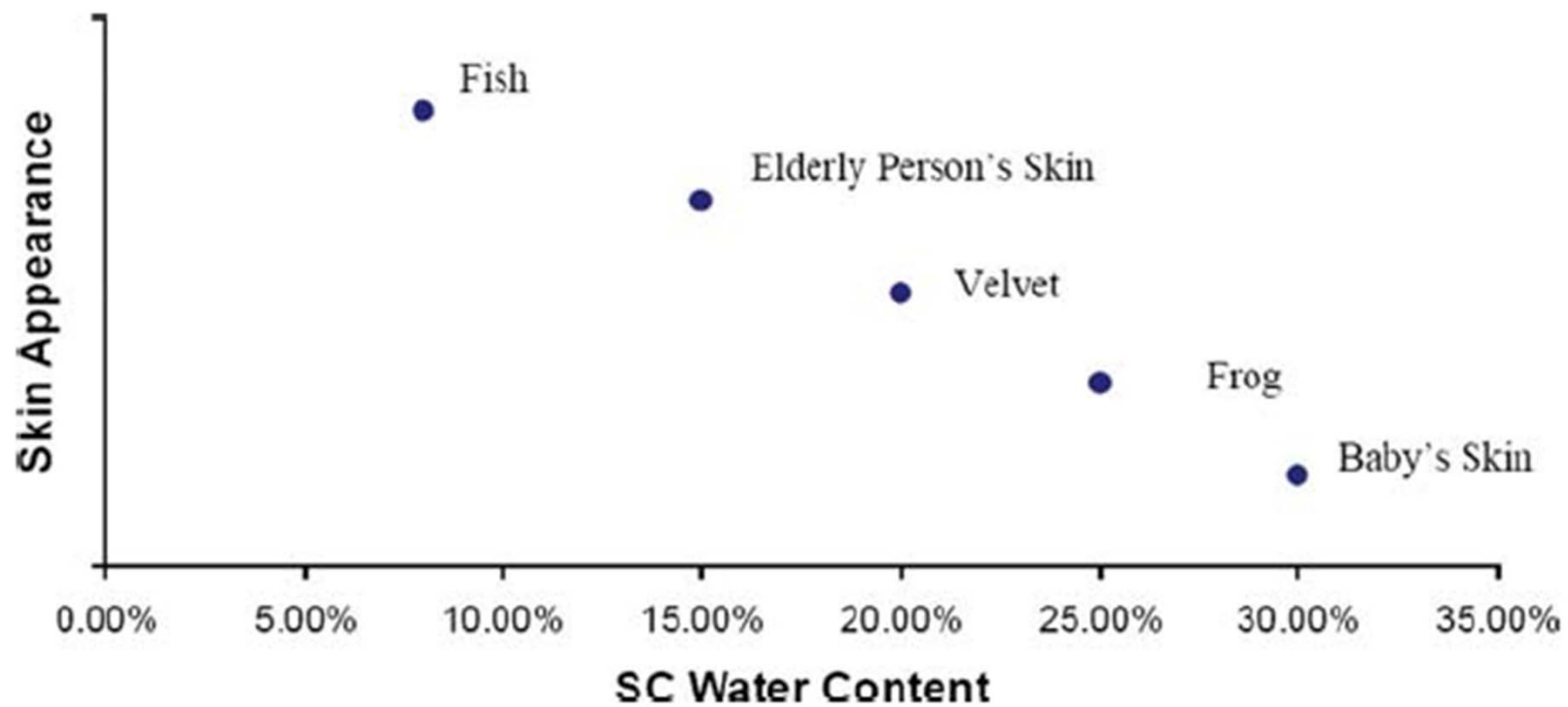


Figure 5. SC water content related to the skin appearance.

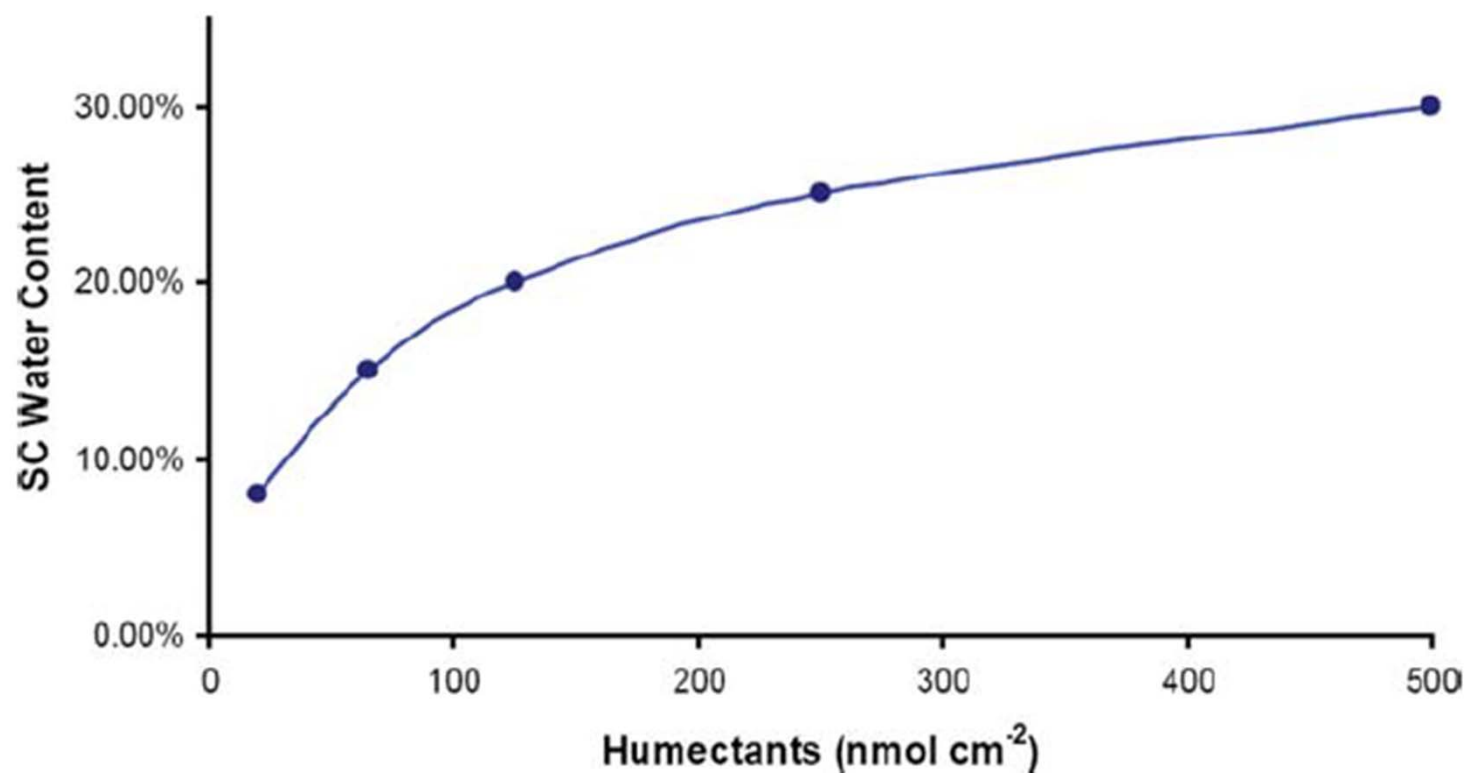


Figure 6. SC water content as a function of humectants applied.

[Color figure can be viewed in the online issue, which is available at wileyonlinelibrary.com.]

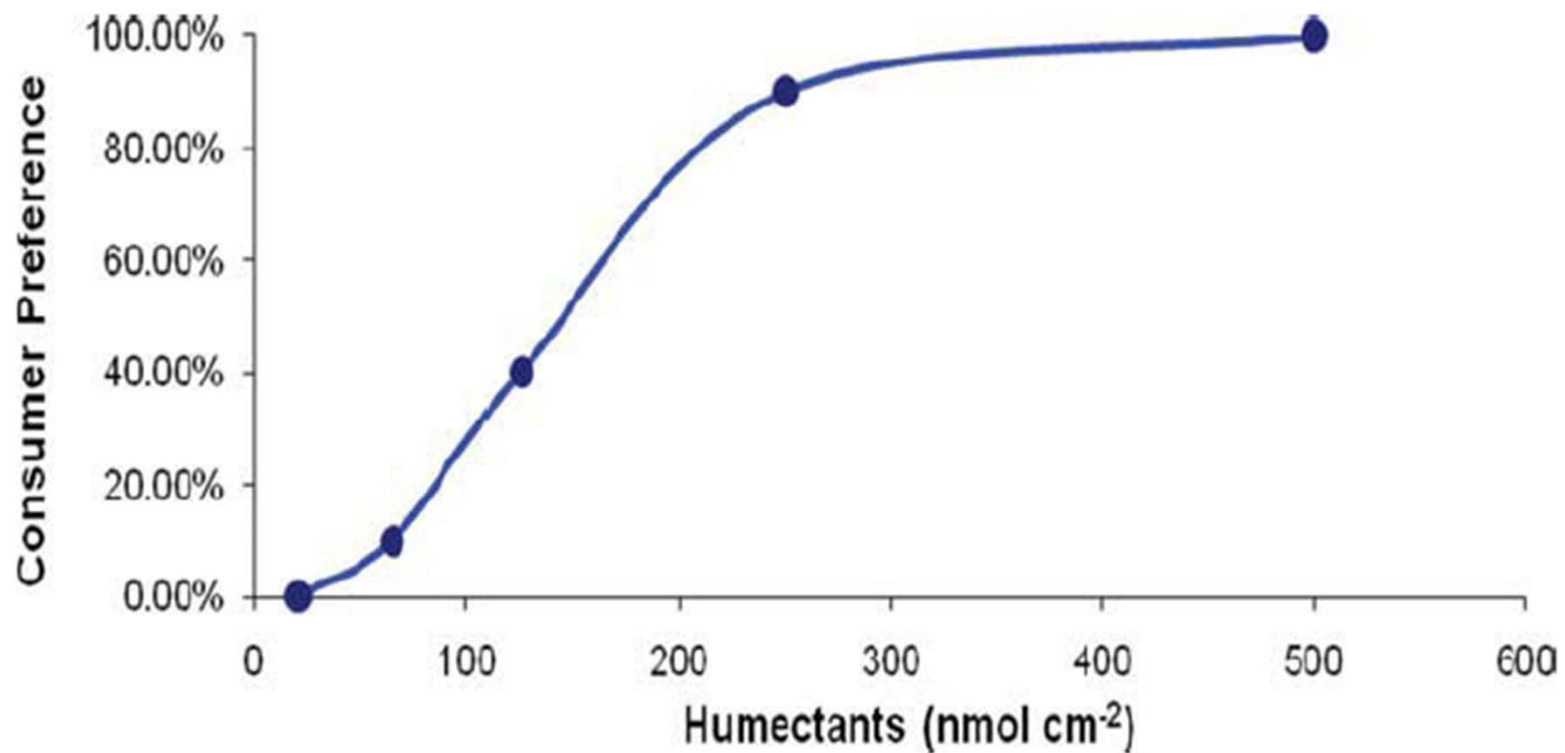


Figure 7. Consumer preference for effectiveness vs. the amount of humectants applied.

Table 8. Viscosity Consumer Perception and the Fluids Used for Comparison by Consumers

Viscosity (Poise)	Consumer Perception	As thick as
3700	Extremely Thick	Toothpaste
640	Moderately Thick	Dishwashing
85	Moderately Thin	Salad Dressing
19	Extremely Thin	Coffee Cream

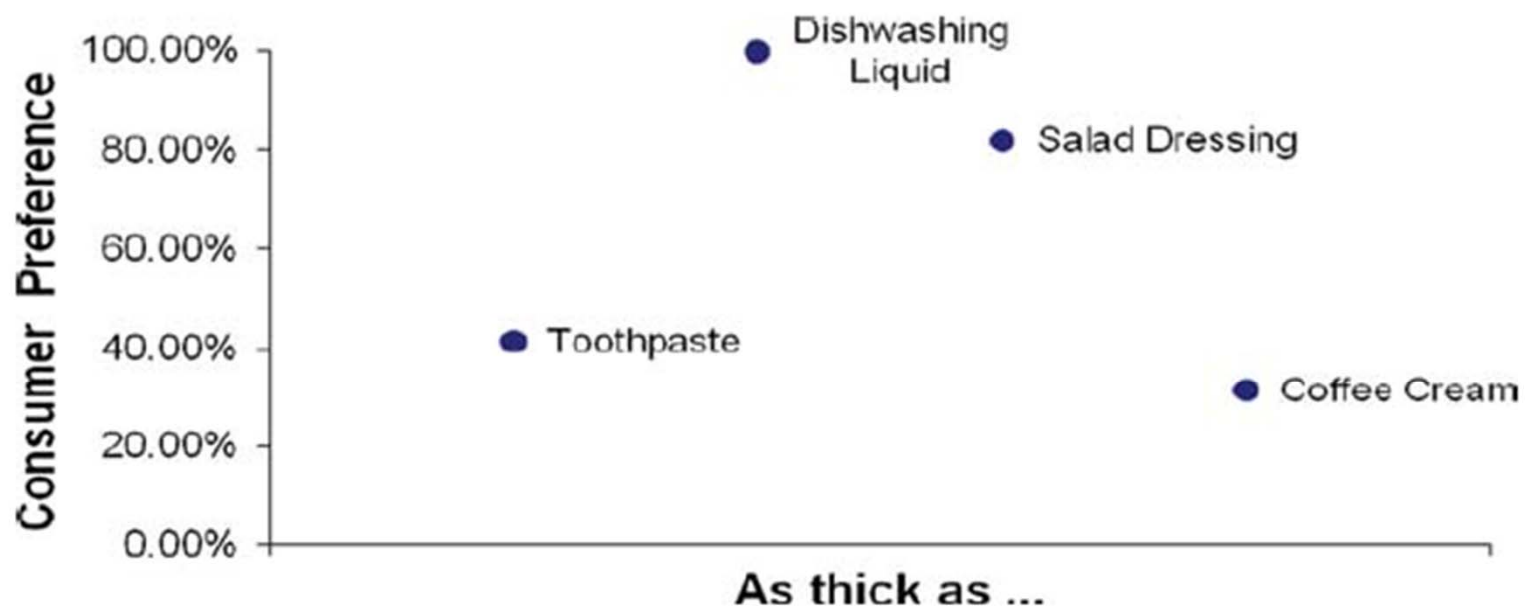


Figure 8. Consumer preference for thickness comparing the lotion to different products.

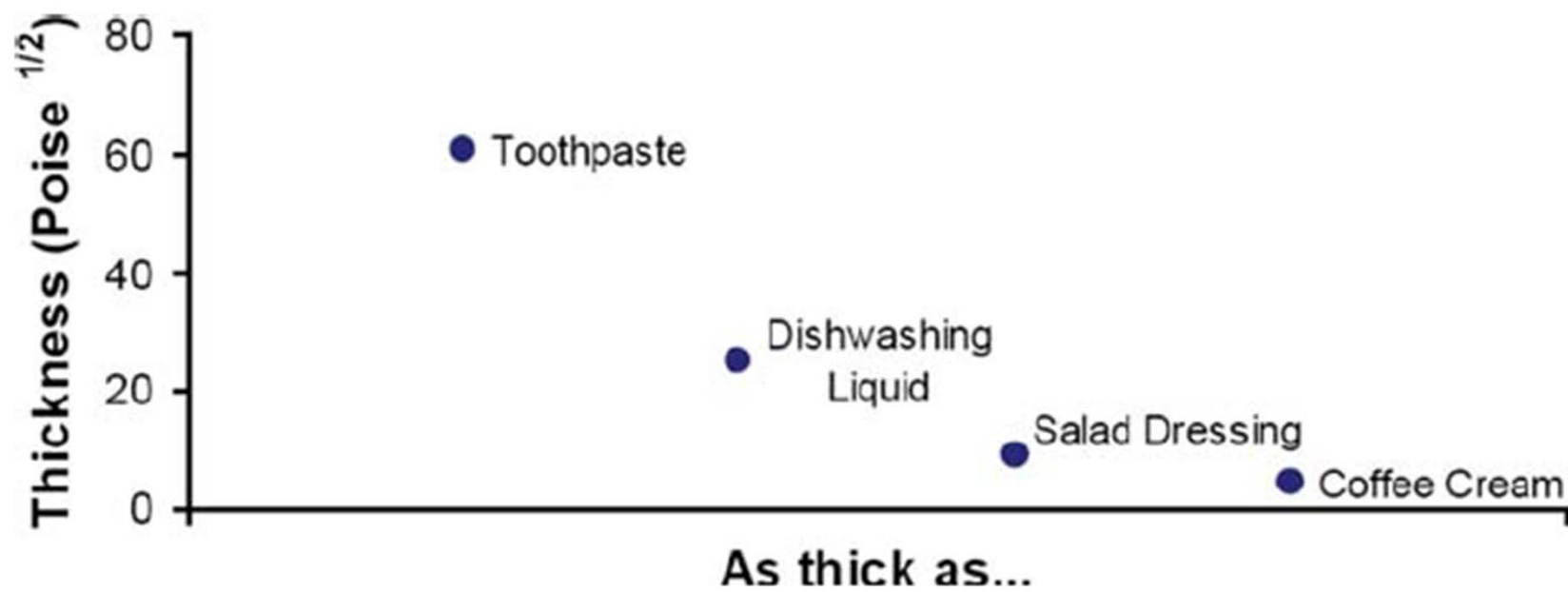


Figure 9. Thickness of different fluids.

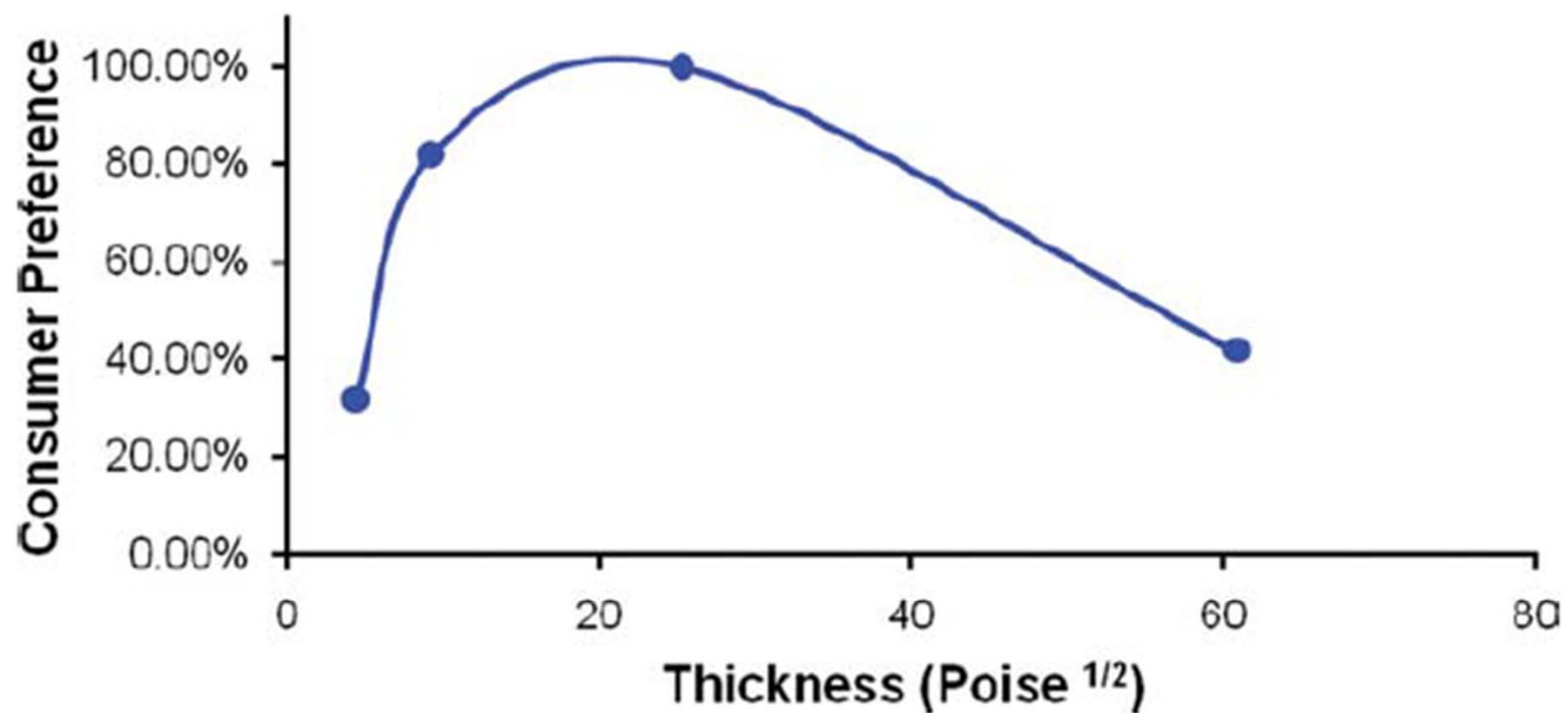


Figure 10. Consumer preference as a function of the thickness of the lotion.

Table 9. Concentration of Fatty Oils, Consumer Perception and Comparison Fluids

Concentration of Oils (% w/w)	Consumer Perception	As grease as...
30	Very Greasy	Grease
20	Moderately Greasy	Baby Oil
10	Moderately not-Greasy	Suntan Lotion
5	Not Greasy	Alcohol



Figure 11. Consumer preference for greasiness comparing the lotion to different products.



Figure 12. Oil concentration of different fluids.

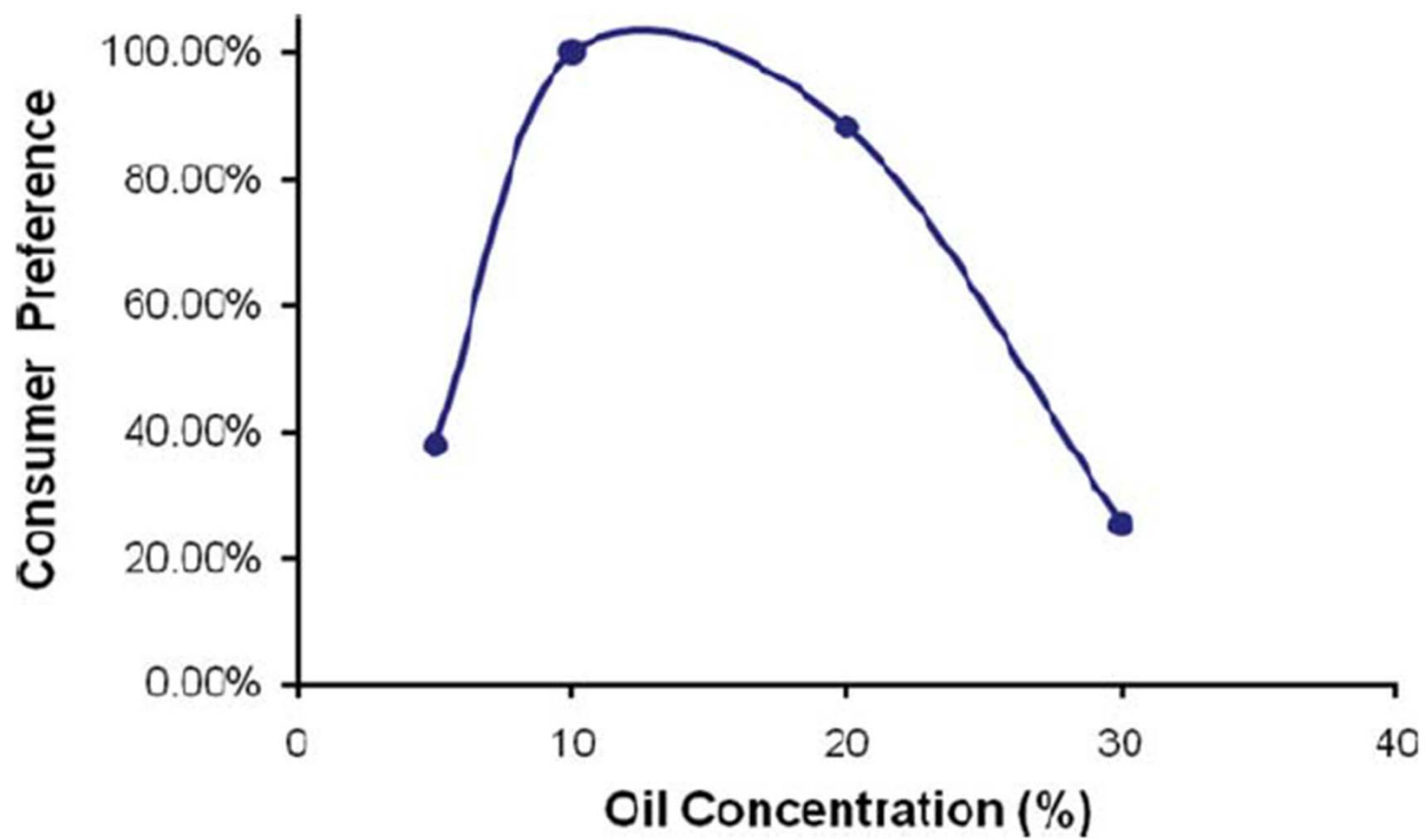


Figure 13. Consumer preference as a function of oil concentration.

Table 10. The Smoothness as a Function of Coefficient of Friction

Greasiness (%)	Percentual change in coefficient of friction	"New" coefficient of friction*	Smoothness
30	-0.3554	0.25784	1.93918
20	0.1166	0.44664	1.11947
10	0.5886	0.63544	0.78685
5	0.8246	0.72984	0.68508

Table 11. Consumer Perception of Smoothness

Smoothness	Consumer Perception	As smooth as...
1.93918	Very Smooth	Baby's Skin
1.11947	Moderately Smooth	Cotton
0.78685	Moderately Rough	Carpet
0.68508	Very Rough	Lizard

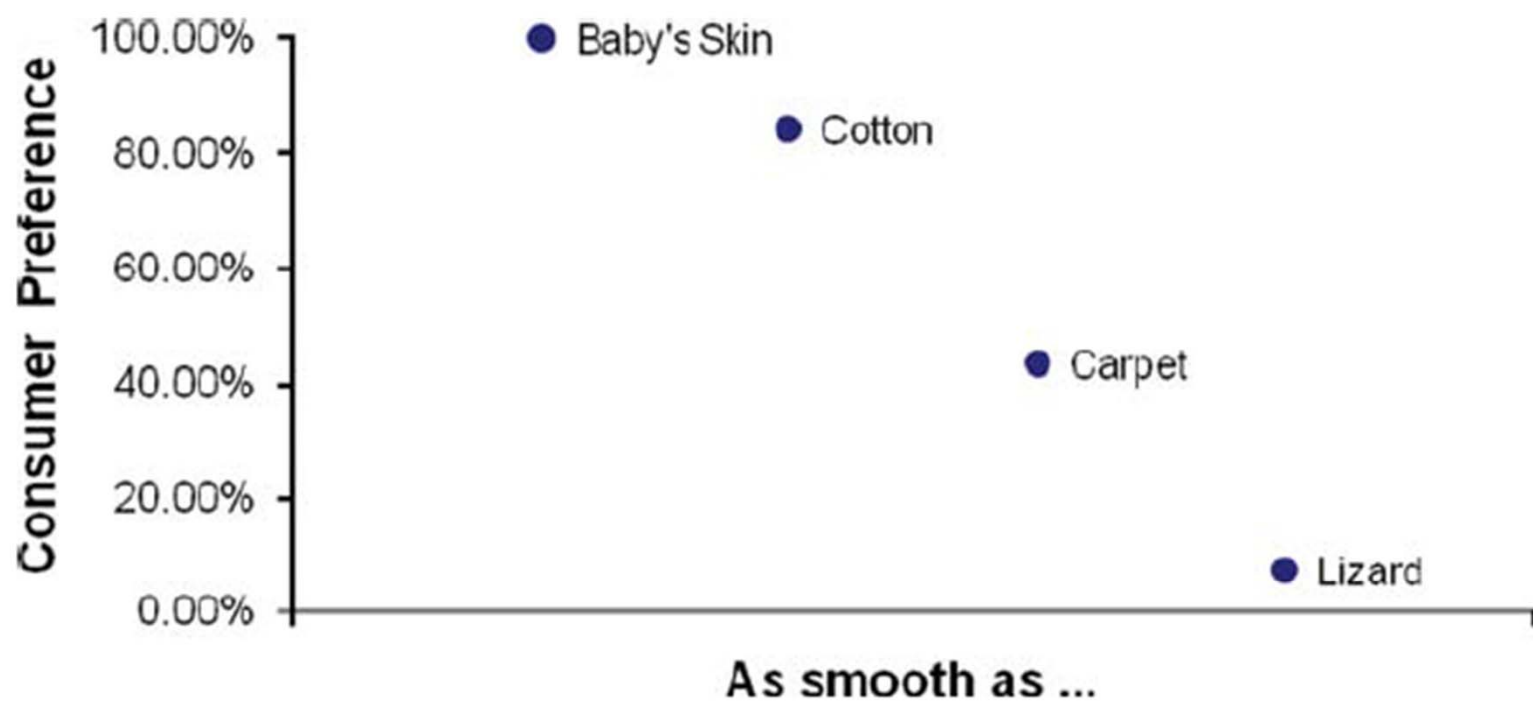


Figure 15. Consumer preference for smoothness comparing the skin to different surfaces.

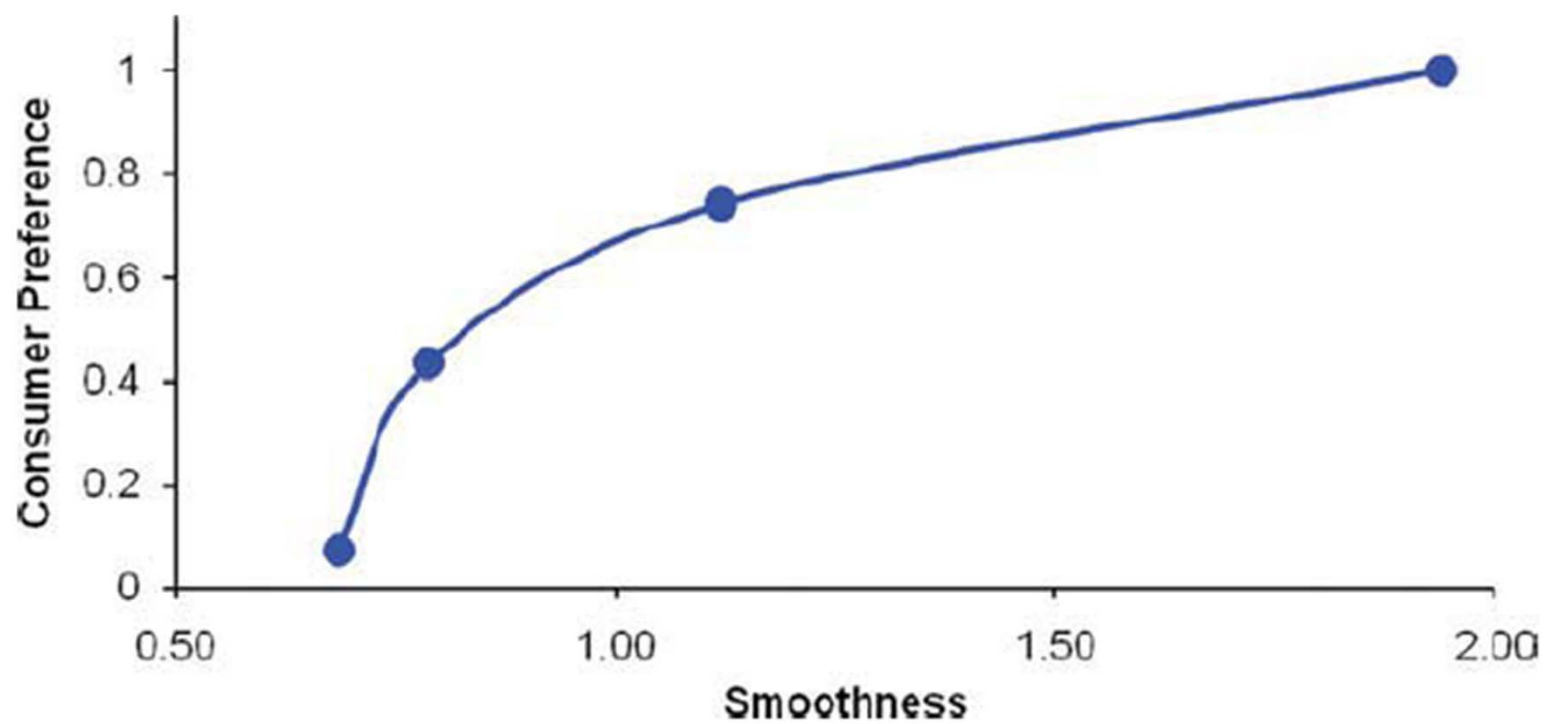


Figure 17. Consumer preference as a function of smoothness.

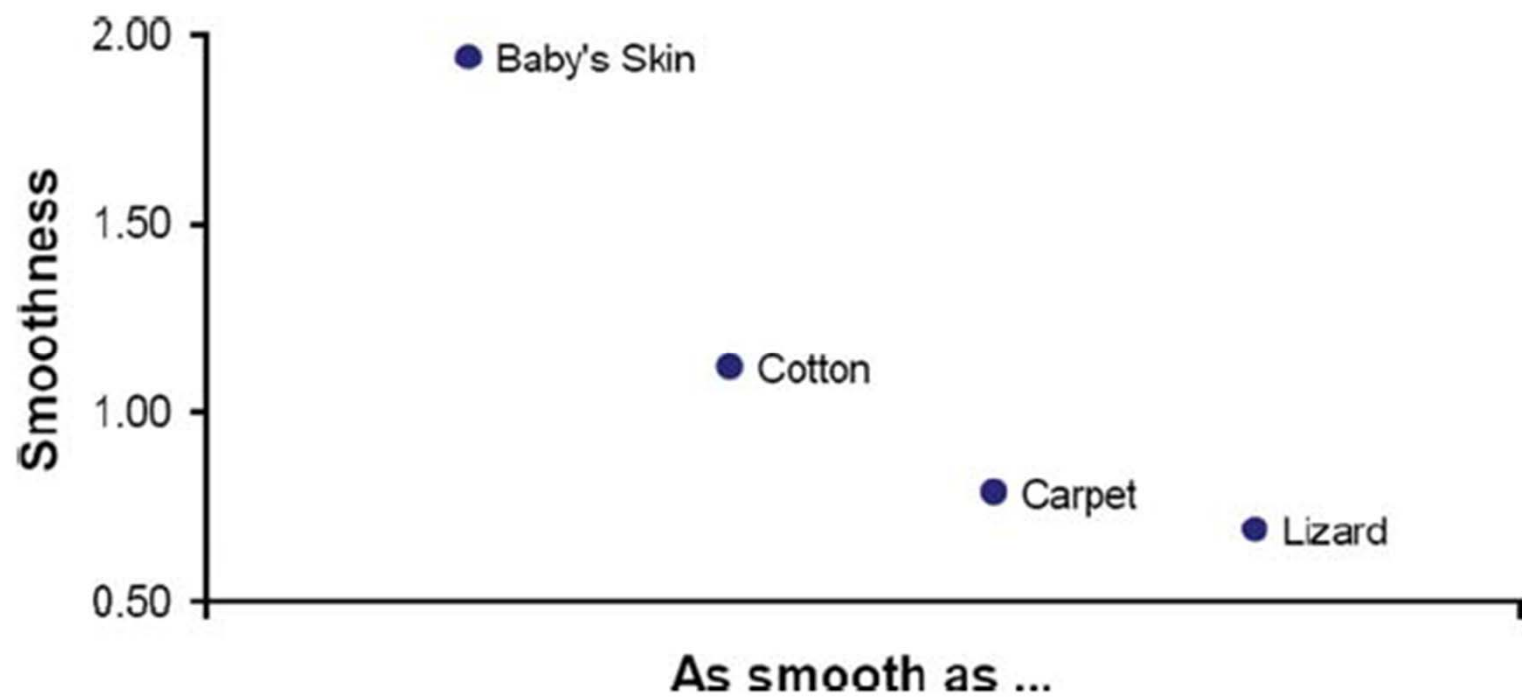


Figure 16. Smoothness of different products.



Figure 18. Consumer preference for creaminess comparing the lotion to different foods.

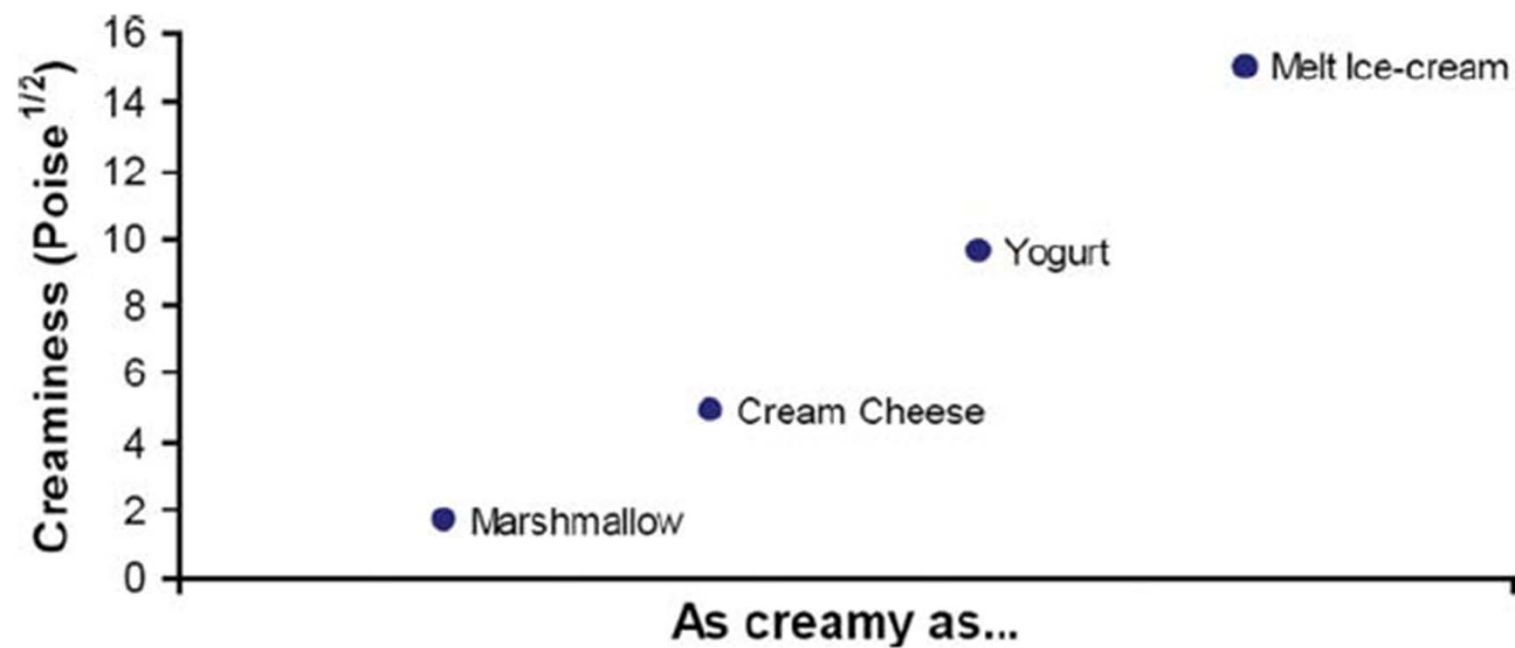


Figure 19. Rate of creaminess of the foods used for comparison.

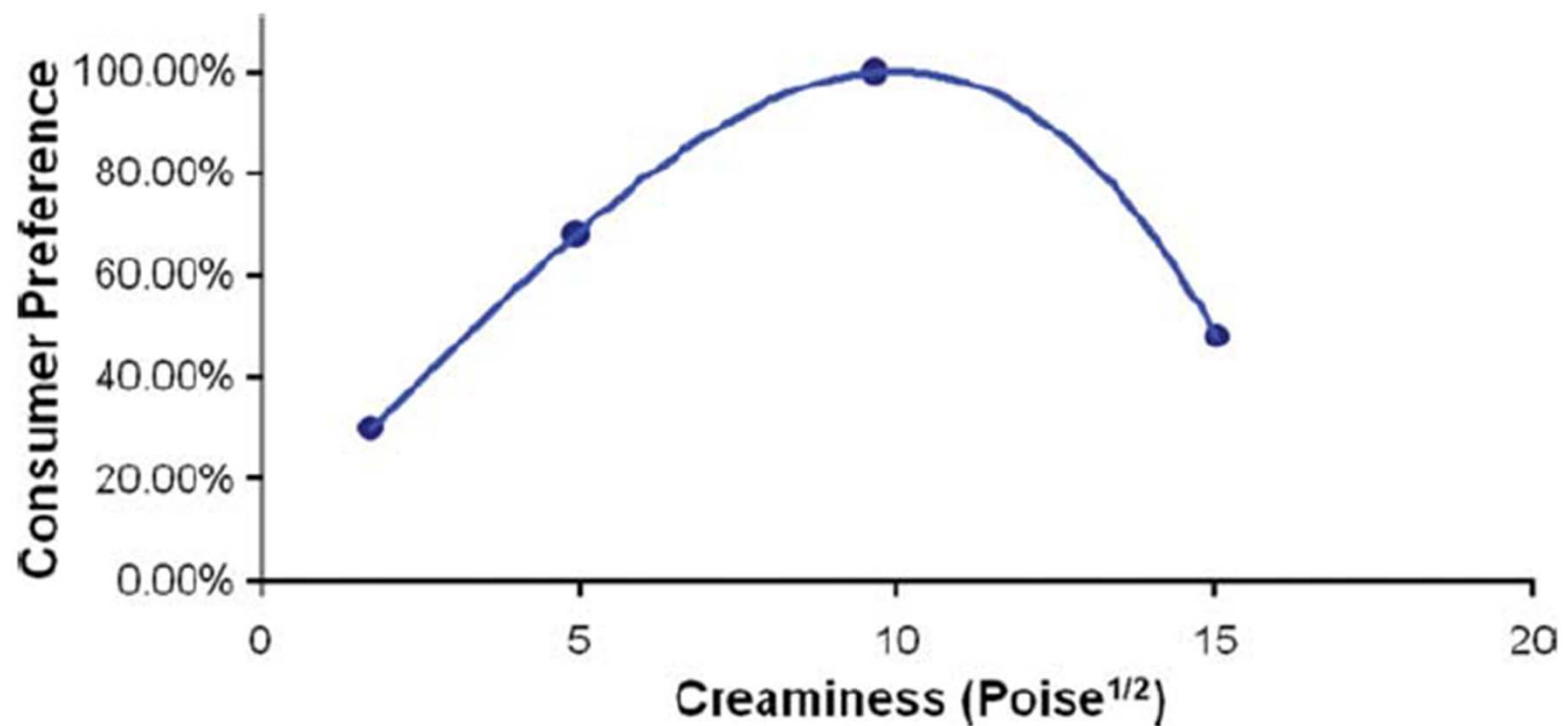


Figure 20. Consumer preference as a function of creaminess.

Table 12. Spreading Capability and Consumer Perception as a Function of the Contact Angle

Contact Angle	Spreading Capability	Consumer Perception	As spreadable as...
180°	0.00%	No Spreading	Glue
150°	6.70%	Little Spreading	Syrup
120°	25.00%	Some Spreading	PeptoBismol
90°	50.00%	Fair Spreading	Liquid Detergent
60°	75.00%	Large Spreading	Ketchup
30°	93.30%	Strong Spreading	Vegetable Oil
0°	100.00%	100% Spreading	Water

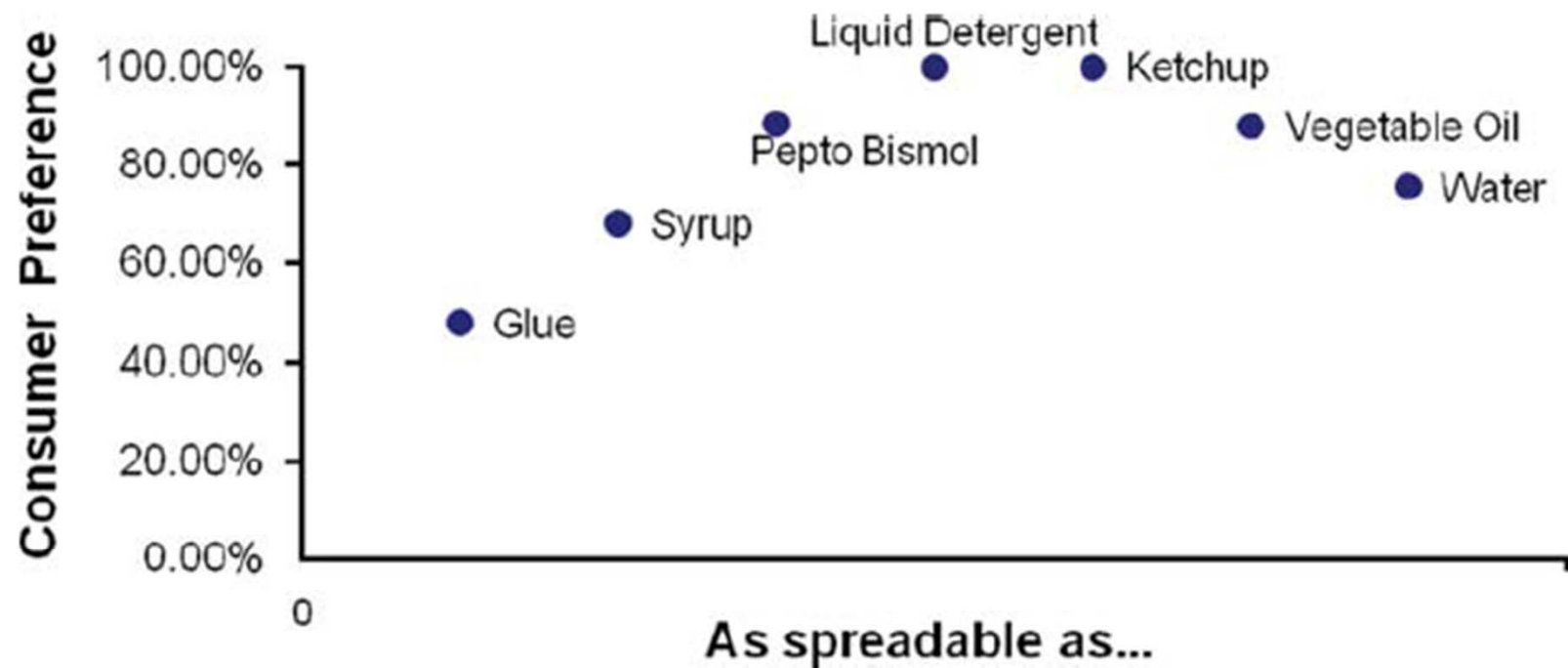


Figure 21. Consumer preference for spreadability comparing the lotion to different products.

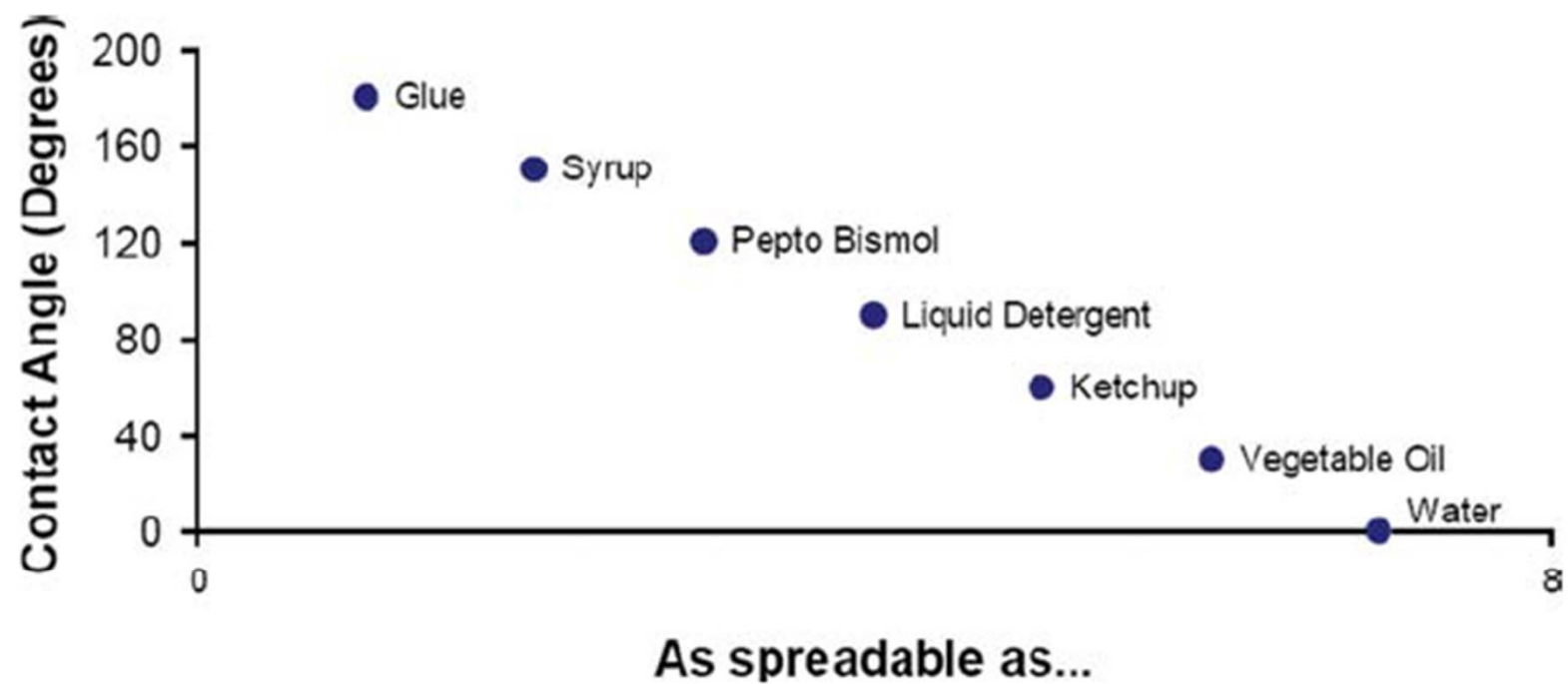


Figure 22. Contact angle of different substances used for comparison.

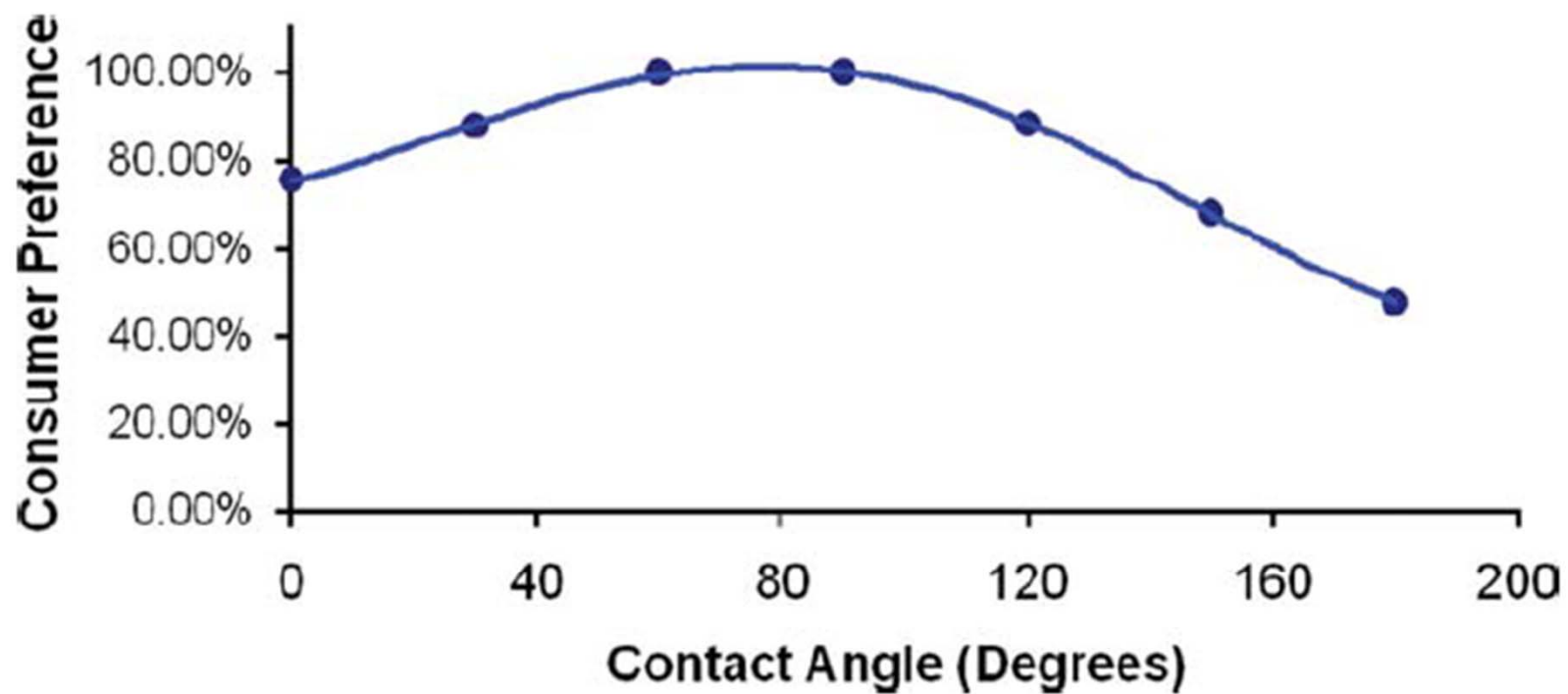


Figure 23. Consumer preference of spreadability as a function of the contact angle.

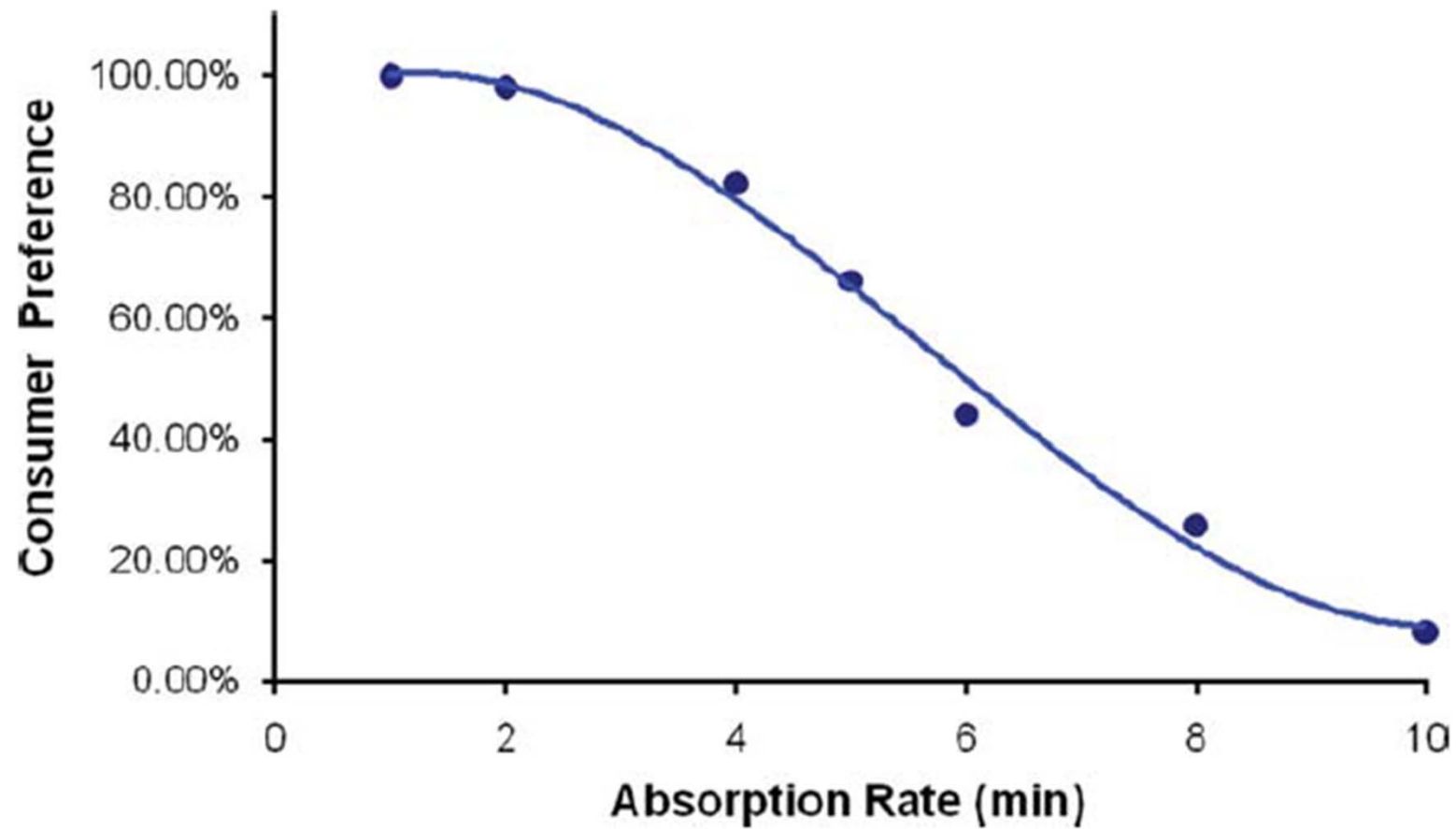


Figure 24. Consumer preference as a function of the time to reach steady state.