The use of clearing agents reduces temporarily the scattering within the dermis, enhancing light transmittance, thus facilitating diagnostic and therapeutic treatment of various dermatological conditions. In this study, pulsed photothermal radiometry (PPTR) is used to monitor the perfusion of clearing agents through porcine skin. The perfusion of the clearing agent through the skin is conducted by using a microneedle roller to create pores on the skin surface, through which the clearing agent will diffuse. To assess the penetration, PPTR experiments are performed in back-propagation emission configuration by delivering a 10 mJ, 5 ns laser pulse to the porcine skin. A sequence of PPTR signals is recorded every 2 min during a period of 20 min to evaluate the perfusion of the clearing agent. A one-layer 1-D analytical PPTR model considering scattering is used to determine optical and thermal properties of the studied samples. The changes in the optical and the thermal properties as a function of time allow measuring the rate of skin clearing providing more information at deeper skin depths. Measurements of diffuse reflectance using an integrating sphere coupled to a UV-VIS spectrometer were carried out for comparison with the current methodology. These results could be useful in establishing a methodology for the photothermal monitoring and optical and thermal characterization in skin therapeutic treatments.