A quantitative descriptive analysis comparing sensory profiles of nipple creams

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Introduction:

Lanolin is derived from wool wax and is a key ingredient in modern day skin creams and ointments (Schlossman & McCarthy, 1979). Its use for cosmetic and pharmaceutical applications requires the removal of impurities such as pesticide residues and detergents left over from the wool wax processing via a multi-stage refining sequence. Variability in the refinement methods used can influence the purity level and final properties of the lanolin end-product (Clark, 1999; Schlossman & McCarthy, 1979). Simplistically, the higher the level of refinement, the more contaminants will be removed. Super-refinement impacts colour of the lanolin material (although sometimes lanolin may be artificially lightened through a bleaching step) and reduces the amount of odour compounds (Clark, 1999).

A lanolin grade that complies to the United States (USP) and European Pharmacopoeia (Ph. Eur.) has set maximum permitted levels for impurities, making it particularly useful for applications such as nipple care in breastfeeding mothers, where it is used to aid comfort and breastfeeding success. As it is not removed before nursing, purity of the material is critical to ensure that the nipple cream is safe and is accepted by the infant. It is not always clear what grade of lanolin is used for nipple care products, with many simply stating that they are 'medical grade'; a statement which does not correlate directly with the pharmacopoeia standards.

In this study, a quantitative sensory descriptive analysis of five lanolin nipple creams (Finished Products, FP) was carried out according to the American Society for Testing and Materials (ASTM) E1490 Standard. Two lanolin Raw Materials (RM), one cosmetic grade and one pharmaceutical grade, were evaluated alongside the nipple care products to determine the effects that the refinement process has on lanolin sensory characteristics.

Materials & Methods:

Table 1. Sample Selection

Sample Name	Grade	Product Type	Sample ID
HPA® Lanolin (Lansinoh Laboratories Inc., VA, USA)	Highly Purified Anhydrous Lanolin/Ultra-Pure	FP	Sample 1
Purelan™ (Medela AG, Baar, CH)	'medical grade'	FP	Sample 2
Multi-Mam Lanolin (BioClin BV, Delft, NL)	'medical grade'	FP	Sample 3
Ardo Care Lanolin (Ardo Medical AG, Unterägeri, CH)	'medical grade'	FP	Sample 4
Maternity Lanolin Nipple Cream (Boots, Nottingham, UK)	'medical grade'	FP	Sample 5
Pharmalan™ PH EU-SO-(RB) (Croda, Goole, UK)	Ph. Eur. Grade	RM	Sample 6
Corona 8-SO-(RB) (Croda, Goole, UK)	Cosmetic Grade	RM	Sample 7

Samples underwent quantitative descriptive analysis (QDA) by a trained independent testing panel (n=8). 100% women aged between 18-65 years. Samples were assessed on various parameters; appearance, aroma, oral characteristics, rub-in and after-feel characteristics (Figure 1). Prior to formal sample review, for each attribute, the procedure, definition and scale were agreed. An in-house colour chart based on the Gardner Scale (scale:1-66) was used to determine the shade of yellow that best described each sample.

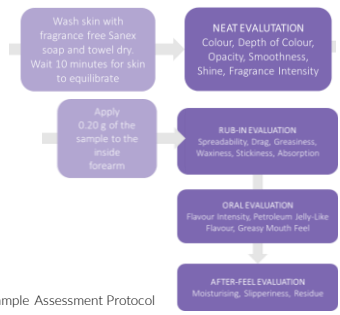

Figure 1. Sample Assessment Protocol

A two factor ANOVA (mixed model) and Tukey Kramer HSD multiple comparison test were used to identify significant differences between samples (5%, p=0.05).

Results & Discussion:

Aroma and Oral Characteristics

There were no statistically significant differences between the samples in terms of their fragrance intensity (p=0.674). There were also no significant differences in flavour intensity (p=0.604), petroleum jelly-like flavour (p=0.586) and greasy mouth-feel (p=0.704) when samples were evaluated orally.

Colour Assessment

All samples were reasonably light in colour, with nothing scoring higher than 18 on a scale of 1-66. Sample 1 (HPA Lanolin) was the lightest in colour with a rating of 2, while the other lanolin FP scored between 7-16, indicating they were darker in colour and more similar to the lanolin RM (samples 6 & 7) which scored 18 and 10 respectively.

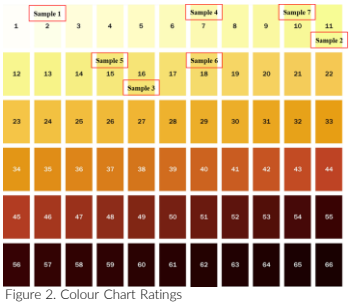

Figure 2. Colour Chart Ratings

Neat, Rub-In and After-Feel Characteristics

Sample 1 (HPA Lanolin) was rated the lowest for colour depth and opacity and highest for smoothness and shininess when evaluated neat. When scored for rub-in characteristics, spreadability ratings ranged from 32.0-70.5 (scale: 0 = not easy to spread and 100 = very easy to spread), with a higher score indicating the material was more spreadable. Sample 1 (HPA Lanolin) had the highest rating for spreadability and was significantly more spreadable than lanolin RM sample 6. Sample 1 was rated significantly less sticky than samples 4-7. Sample 1 was also rated as the fastest absorbing test sample. All samples were rated relatively low for slipperiness. Sample 6 had the highest amount of drag and was also the waxiest in nature. No significant differences between lanolin samples were noted for moisturising (p=0.564) or skin residue after-feel characteristics.

Conclusions:

The difference in refinement method did not lead to any notable differences in aroma or flavour; both methods of physical distillation of raw wool grease to remove chemical impurities also remove compounds that cause malodour, and decreases the levels of undesirable by-products of oxidation, which can cause wool grease to become rancid (Clark, 1999). However, the deeper yellow colour observed for the medical grade FPs and lanolin RMs tested in this study is characteristic of the high temperature distillation process which is the standard method applied to lanolin to remove impurities (Clark, 1999). The low temperature processing of sample 1 will have contributed to the paler and more transparent final product.

The data presented here indicates that all the lanolin samples evaluated are appropriate for their intended use, however, there are detectable differences in a number of key sensory characteristics for different lanolin materials, possibly relating to the level and method of refinement used to achieve a pure final product. In particular, the HPA Lanolin was lightest in colour, significantly less sticky, the least greasy and the most spreadable compared to other topical lanolin nipple care products evaluated.

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Conflict of Interest Statement
Data collection for this study was conducted by Sensory Dimensions. Authors are affiliated with Lansinoh Laboratories.

References:

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