A Comparison of Civilian and Military Consumer Panels Along 9-point Hedonic and LAM-scale Measures of Evaluation for Some MRE™ Items

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History

Historically, civilian and military personnel have worked together to develop the rations and the means to assess their acceptability. The MRE (Meal-ready-to-eat) is one of the current ration items in the military. Measures of evaluation are presently under review and refinement based on a system of over 60 years research.

Evolution of the Panel

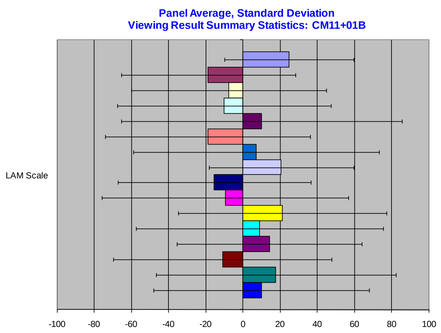




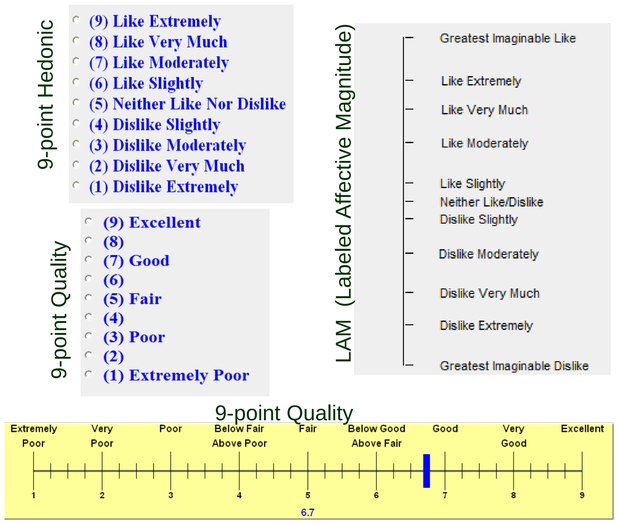




Coffee down selection… (too many samples, segmentation needed)

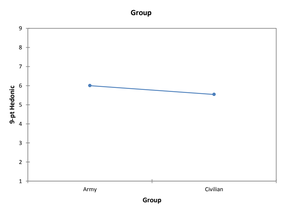


Evolution of the Scale

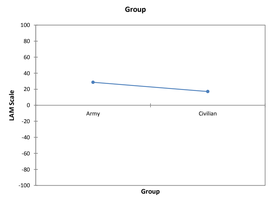


Evolution of the Ration

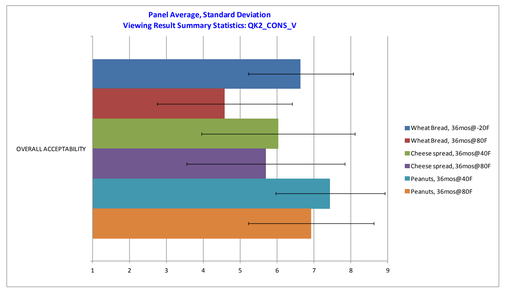
Evolution of the Report

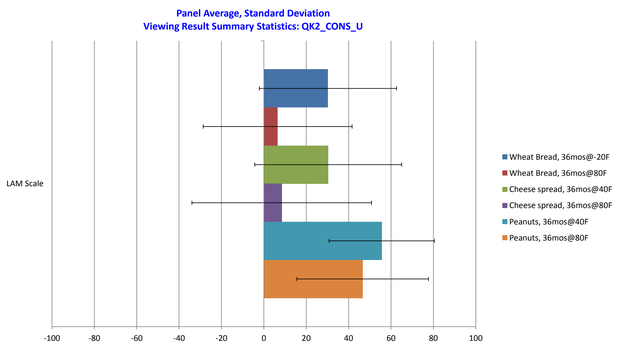


Category	Mean	Groups
Army	6.000	A
Civilian	5.540	A



Category	Mean	Groups
Army	28.638	A
Civilian	17.113	A





Problem

Within military circles where a descriptive 9-point Quality scale and an affective 9-point Hedonic scale were used, confusion between the two scales sometimes occurred. The confusion spilled over also into interpretation of the results. Some food scientists who were less initiated in sensory practices assumed that a “7” on either scale was the same and that there was no point in performing two tests. An aversion to what was perceived to be redundancy began to emerge. In order to draw a greater distinction between the two 9-point scales and their respective panel types (consumer vs. trained panel), the qualitative scale was moved to a continuous, sliding scale. The confusion was reduced some but other researchers were spurred to resolve another issue, that of statistically treating categorical data as if it were continuous data. This led to the development of the LAM scale. The LAM addresses the issue of ratio determinations and proper statistical analyses but presented investigators with another problem—that of perception and meaning. The 9-pt Hedonic scale has been used so extensively and has so much data collected by it that experienced researchers would rather see data “the old way” that has become intuitive in meaning for them rather than develop the same kind of intuition and meaning from a LAM score. Perceiving meaning has been an obstacle. This research attempt s to draw comparisons and establish relationships between the two different scales in order to get the benefit of drawing valid conclusions such as “this product is liked twice as much as this other product”. Admittedly , this has seemed to be an uphill battle due to researcher heuristics and cultural norms associated with such a long-standing and reliable scale such as the 9-point Hedonic.

Research Evidence

Analysis of variance:

Source	DF	Sum of squares	Mean squares	F	Pr > F
Model	5	115.632	23.126	6.560	< 0.0001
Error	102	359.581	3.525		
Corrected Total	107	475.213			

Computed against model Y=Mean(Y)

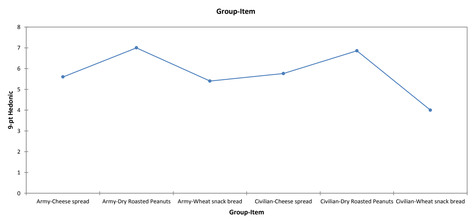
Analysis of variance:

Source	DF	Sum of squares	Mean squares	F	Pr > F
Model	5	55297.357	11059.471	8.625	< 0.0001
Error	126	161557.199	1282.200		
Corrected Total	131	216854.556			

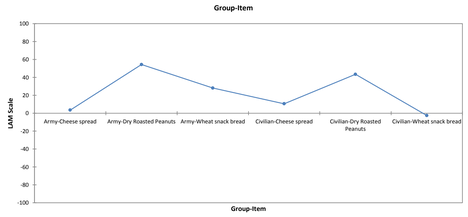
Computed against model Y=Mean(Y)

Spectrum of LAM scores

Product	Consumer group	n	LAM score
Almonds, dry roasted (stored 36 months at 40F)	Employees, NSRDEC	39	**54**
Almonds, dry roasted (stored 36 months at 80F)	Employees, NSRDEC	39	**47**
Apple-cinnamon flavored Bar (no wrapper)	Employees, NSRDEC	46	**10**
Apple-cinnamon flavored Bar w/Quercetin (no wrapper)	Employees, NSRDEC	46	**7**
Bagel (relatively fresh--tested in Nov 2005)	Employees, NSRDEC	50	**38**
BBQ Pork wraps	NSRDEC soldiers only	41	**32**
Beef Taco wraps	NSRDEC soldiers only	41	**22**
Butter buds (24 month @40F)	Dieticians (90% college-age, Female)	28	**15**
Butter buds (24 month @80F)	Dieticians (90% college-age, Female)	28	**11**
Cheese Whiz (within the "Best if used by" date)	Employees, NSRDEC	37	**8**
Choclettos (individually wrapped, one square)	NSRDEC soldiers only	31	**-27**
Cran-Raspberry Flavor First Strike Bar (no wrapper)	Dieticians (90% college-age, Female)	28	**40**
Cran-Raspberry Flavor First Strike Bar (no wrapper)	Employees, NSRDEC	46	**29**
Cran-Raspberry Flavor First Strike Bar w/Quercetin	Employees, NSRDEC	46	**28**
Cran-Raspberry Flavor First Strike Bar w/Quercetin (no wrapper)	Dieticians (90% college-age, Female)	28	**34**
Dove Milk Chocolates	Employees, NSRDEC	13	**59**
Fruit Smoothie with herbal health components	Employees, NSRDEC	43	**-11**
M and M`s, Peanut	NSRDEC soldiers only	31	**48**
M and M`s, plain, milk chocolate	NSRDEC soldiers only	31	**48**
MRE Bread (relatively fresh)	Employees, NSRDEC	36	**33**
MRE Bread (stored 6 mos at 100F)	Employees, NSRDEC	39	**12**
MRE Cheese Spread (relatively new, tested in May-2006)	Employees, NSRDEC	37	**41**
Oreo Cookies (regular) with 2% milk rinse (15 Nov 2006)	Youth (age 12-21, average age = 15)	27	**66**
Q-plus citrus flavor, soft chews	Employees, NSRDEC	46	**26**
Reese`s pieces, peanut butter	NSRDEC soldiers only	31	**62**
Reese's peanut butter Christmas Bells	Middle school students (age ~ 12-14 yrs)	41	**59**
Reese's peanut butter cups (miniatures)	Middle school students (age ~ 12-14 yrs)	41	**73**
Skittles, ORIGINAL	NSRDEC soldiers only	31	**55**
Skittles, SOUR	NSRDEC soldiers only	31	**29**
Skittles, TROPICAL	NSRDEC soldiers only	31	**49**
Skittles, WILD BERRY	NSRDEC soldiers only	31	**50**
Starburst, orange-flavored fruit chews (no wrapper)	Employees, NSRDEC	46	**29**
Syrup-filled French Toast (New MRE item, relatively fresh)	Employees, NSRDEC	36	**46**
Syrup-filled French Toast (New MRE item, stored 6 months at 100F)	Employees, NSRDEC	39	**28**
Tootsie Roll	NSRDEC soldiers only	31	**19**
Tuna--Hickory Smoked (Starkist, Tuna Creations)	NSRDEC soldiers only	46	**12**
Tuna--Lemon and Cracked Pepper (Starkist, Albacore Tuna Fillet)	NSRDEC soldiers only	46	**17**
Tuna--Lightly Seasoned (Starkist, Light Meat Tuna Fillet)	NSRDEC soldiers only	46	**-9**
Tuna--Sweet & Spicy (Starkist, Tuna Creations)	NSRDEC soldiers only	46	**20**
Tuna--Terriyaki (Starkist, Light Meat Tuna Fillet)	NSRDEC soldiers only	46	**13**
Tuna--Zesty Lemon Pepper (Starkist, Tuna Creations)	NSRDEC soldiers only	46	**12**
Twizzlers, cherry, bitesize	NSRDEC soldiers only	31	**29**



Category	Mean	Groups		
Army-Dry Roasted Peanuts	7.000	A		
Civilian-Dry Roasted Peanuts	6.857	A		
Civilian-Cheese spread	5.762	A	B	
Army-Cheese spread	5.600	A	B	
Army-Wheat snack bread	5.400		B	
Civilian-Wheat snack bread	4.000			C



Category	Mean	Groups		
Army-Dry Roasted Peanuts	54.354	A		
Civilian-Dry Roasted Peanuts	43.410	A		
Army-Wheat snack bread	28.100	A	B	
Civilian-Cheese spread	10.503		B	C
Army-Cheese spread	3.462		B	C
Civilian-Wheat snack bread	-2.574			C

Summary

Military subjects and civilian subjects evaluated several MRE items for liking/disliking using a LAM scale. A few days later, military and civilian panels evaluated the same samples using a 9-point hedonic scale. Samples were stored for 36 months at 80 degrees F. Reference samples were also stored at lower temperatures. The objective of the study was to evaluate consumer acceptance of the items and to compare the relative significance of liking between two consumer types and rating scales with the same military rations. ANOVA was performed along with Duncan's post hoc tests. Variance levels were compared. Slopes of normalized graphs were used to visually sense the differences between results. In our data we see differences that are significant within the groups by category (product type) but lack significance between the overall categories (Army vs. Civilian—a larger n would fix this). It appeared that there was greater variance with LAM scale results than with the 9-pt hedonic results. A trend exists and appears consistent in that the military consumers tended to rate products higher regardless of the scale. Post-hoc analysis demonstrated some products (e.g. wheat-snack bread) were determined to be significantly different between groups (Army vs. Civilian) on one scale but not with the other. The LAM scale provides broader discrimination options but may also require a larger ‘n’ as some of our results suggested. This research supports the need to view the value of the LAM scale within the context of historical data, sample size, decision making needs, and analysis technique. An organization’s replacement of the 9-pt hedonic scale with a LAM scale should be done after gradual testing across test materials and consumer types as nuances influencing decision making may exist.

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