

The Impact of Lightstruck and Stale Character in Beers on their Perceived Quality: A Consumer Study

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ABSTRACT

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The relative liking or disliking that beer drinkers have for characteristics generally regarded as off-flavours by brewers, namely lightstruck and stale, has been explored in a consumer trial where products are presented branded and unbranded. Drinkers display a significant preference for fresh over lightstruck product, irrespective of branding. By contrast, drinkers seemed to be less clear about their liking or otherwise for stale character, although in this case they clearly prefer the branded product over the unbranded product when the beers are fresh and vice-versa when the beer is aged. A stale version of a beer that consumers are familiar with fails to meet expectations for that product. Significant numbers of drinkers do declare a liking for lightstruck and aged character.

Key words: Aged, beer, consumer trial, lightstruck, preference.

INTRODUCTION

Much attention has been paid to the science underpinning the development of aged/oxidized¹ and lightstruck⁴ characteristics in beers. For the most part it has generally been accepted that beers displaying these flavours are deficient, hence much effort is devoted to production protocols that will lessen their impact.

Notwithstanding this, a number of brands of beer are presented to the customer such that these types of flavour notes are present. Notably this includes those beers packaged into clear or green glass bottles without the use of reduced bittering agents to afford protection against the development of skunk-like aroma. It also includes beer that displays overt cardboard-like aromas, typically because of protracted distribution networks devoid of chilling. Despite their supposed deficiencies, these beers are still purchased and consumed. There is circumstantial evidence that efforts to “clean up” the off flavour can meet with disfavour from the customer.

Guinard et al² concluded that customers’ opinions of beer flavour tended to differ from those of experts, particularly in the case of men. The expert rankings were substantially on the basis of an absence of flavour defects.

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The strong significance of branding in the determination of customer preference was highlighted².

In the present study we report a consumer investigation to assess the impact that deliberate ageing or “skunking” of beer has on its acceptability to customers when products are either branded or unbranded.

MATERIALS AND METHODS

Location

The test was performed at the Sudwerk Brewery and Grill in Sacramento, CA. Three tables were set up for the test between the restaurant and bar areas. At any one time up to four people were seated for the test.

Samples

The beers used for the tests were commercial lager-style products, held on ice and freshly poured for tasters on demand. Beer A was an imported brand, while B was a domestic brand. Beer A was presented either as is, or after it had been “skunked” by exposure to direct sunlight for six hours. Beer B was presented as is, or after it had been “staled” by holding at 40°C for 14 days. The abused beer displayed overt lightstruck or aged character as assessed informally within the laboratory.

Tasters

Assurances were made that tasters were of legal drinking age or older. No other criterion was used to select tasters, who participated of their own free will and with no “pressganging” or selection process. Prior to participating in the taste test, customers filled out a brief questionnaire, which was used to obtain gender and age information, assess whether the customer was a “user and liker” of beer, and to provide some further demographics indicating customer profile.

Design

A paired preference test design was used. Samples were presented either branded or not branded. In the former case this was achieved by standing the glasses on beer mats displaying the brand name and logo. In the latter case no beer mats were used. An individual taster evaluated only beer A or B, never both. A sample consisted of approximately two ounces of beer poured into a clear plastic eight-ounce glass. A total of eight samples were arranged on a clearly partitioned tray delineating four pairs. Any

unused opened beer was discarded after 30 minutes. The customer was denied sight of the pouring operation. The order of presentation within and between pairs was randomised. Each pair was labelled with the letters “x” and “y” irrespective of whether placed upon a beer mat or not. Tasters were instructed verbally and in writing to indicate their preference between a pair of samples. Following each indication of preference they were to select one among four possible reasons provided for their preference (some gave more than one reason). Customers were verbally instructed to taste the four pairs on the tray sequentially beginning with the pair nearest them and ending with the pair farthest from them. They were not instructed as to how much to drink before recording a preference. Other details of the tests are described in Results and Discussion.

Results of the trials were tabulated and evaluated against a two-tailed null hypothesis. Values of significance were obtained from consultation of probability tables³.

RESULTS AND DISCUSSION

The tasters

For beer A, the test population was 33 men and 16 women. For beer B there were 39 men and 13 women. The overall population tested was relatively young (ages: mean 29, median 25, mode 23). They claimed relative moderation in their drinking habits: of the categories of drinking habits offered, 27% claimed to consume 2 or fewer beers per week; 40% 7 or fewer beers per week and the remainder 14 or fewer beers per week. Almost three-quarters said that they mostly drank in bars or at parties, the remainder primarily drank at home.

Fig. 1 depicts the declared preferred beer style for the population, however a substantial number (26%) of the people tested appear to be relatively naïve. To illustrate, some said their favourite style was Pilsner, yet the preferred brands they nominated were in fact stouts. There was an approximately equal preference amongst the tasters for beer from bottle or tap, but fewer than 3% declared any preference for beer from can.

TABLE I. Comparison of a branded product presented fresh and “skunked”.

(a) Preference for branded product A		
Beer was ...	Fresh	Lightstruck
Responses	31	18
Preference expressed for fresh beer ($p \leq 0.085$)		
(b) Percentage preferring one or other beer by criteria		
Beer was ...	Fresh	Lightstruck
Taste	50	30
Aroma	4	0
Carbonation	2	4
Appearance	6	0
No criterion offered	4	0
(c) % of people selecting one or other beer based on declared weekly beer consumption		
Preferred beer ...	Fresh	Lightstruck
14 beers per week	27	25
7 beers per week	42	31
2 beers per week	31	44

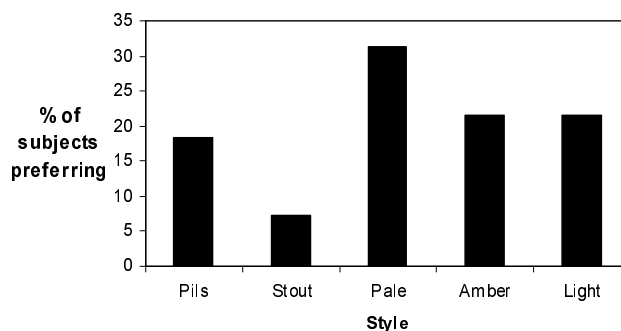


Fig. 1. Declared preference for beer style amongst the tasters used.

The beers

Beer A has been identified in this report as an import and Beer B, a domestic. In choosing each beer for this test, the overriding criteria were that the brands should be easily recognizable by the tasters and that, in the case of Beer A, it be packaged in a container susceptible to the lightstruck reaction whereas Beer B should not be available in such a package. Because individual tasters consumed only Beer A or Beer B, direct comparisons were not being drawn between the imported and the domestic beer by the tasters and thus any possible impact of such a comparison was not considered.

Beer A: a test of liking for lightstruck character

When beer A was presented branded to the sample population, preference was shown for the “fresh” beer (Table Ia). At $p < 0.085$ there is not necessarily a clear preference for the “fresh” beer but rather a trend toward a preference for “fresh” over “skunky” beer. The tasters were not led by the proctor to focus on flavour attributes but nonetheless 81% claimed that their preference decision was based on taste (and, perhaps surprisingly, not aroma) (Table Ib). In all of the ensuing studies this same declaration occurs (see the various tables): the tasters are almost entirely focusing on taste. Guinard et al² have previously emphasised the importance that customers seem to ascribe to taste. It

TABLE II. Comparison of an unbranded product presented fresh and “skunked”.

(a) Preference for unbranded product		
Beer was ...	Fresh	Lightstruck
Responses	33	16
Preference expressed for fresh beer ($p \leq 0.05$)		
(b) Percentage preferring one or other beer by criteria		
Beer was ...	Fresh	Lightstruck
Taste	49	27
Aroma	8	0
Carbonation	8	2
Appearance	0	0
No criterion offered	4	2
(c) % of people selecting one or other beer based on declared weekly beer consumption		
Preferred beer ...	Fresh	Lightstruck
14 beers per week	24	36
7 beers per week	36	36
2 beers per week	40	29

certainly would not be expected that they would draw attention to any differences in foaming, for all beers were poured so as to have a uniform depth of foam and all glasses were clean. Equally the beers were identical in carbonation. There was some indication that those reporting the most moderate drinking habits had an increased preference for the lightstruck version of brand A (Table Ic). In all of the studies reported in this paper it must be accepted that a number of people (albeit in the minority) do register a preference for products that the brewer might ordinarily deem “off flavours”.

TABLE III. Comparison of branded and unbranded product in fresh or skunked states.

(a) Preference for beers, branded vs. non-branded		
Beer was . . .	Branded	Non-branded
Lightstruck	23	26
Fresh	25	24
No significant differences observed		

TABLE IV. Comparison of a branded product fresh and aged.

(a) Preference for branded product B		
Beer was . . .	Fresh	Stale
Responses	25	27
No significant preference expressed		
(b) Percentage preferring one or other beer by criteria		
Beer was . . .	Fresh	Stale
Taste	34	34
Aroma	2	4
Carbonation	6	4
Appearance	6	4
No criterion offered	0	6
(c) % of people selecting one or other beer based on declared weekly beer consumption		
Preferred beer . . .	Fresh	Stale
14 beers per week	41	38
7 beers per week	47	31
2 beers per week	12	31

TABLE V. Comparison of an unbranded product fresh or aged.

(a) Preference for unbranded product		
Beer was . . .	Fresh	Stale
Responses	29	23
No significant preference expressed		
(b) Percentage preferring one or other beer by criteria		
Beer was . . .	Fresh	Stale
Taste	34	26
Aroma	8	4
Carbonation	6	6
Appearance	6	2
No criterion offered	2	6
(c) % of people selecting one or other beer based on declared weekly beer consumption		
Preferred beer . . .	Fresh	Stale
14 beers per week	33	29
7 beers per week	56	43
2 beers per week	11	29

In the trial wherein beer A was unbranded, there was an even more statistically significant preference for the fresh over the “skunky” beer (Table IIa). In this case it appears that the more abstemious drinkers now preferred the fresher product (Table IIc).

In the test where beer A was presented lightstruck in both glasses, but one glass was branded as beer A whilst the other glass was unbranded, there was no significant difference and this also applied when the test was repeated with unskunked beer (Table III). It does not appear that the population tested associated lightstruck character with the beer brand concerned, accordingly deeming it preferable.

Beer B: a test of liking for stale character

When beer B was presented branded to consumers in fresh and aged forms there was no significant preference for either product (Table IVa). Again it appeared as if the less regular drinkers were more likely to register a preference for aged product (Table IVc). When the beers were

TABLE VI. Comparison of branded and unbranded product in an aged state.

(a) Preference for stale beers, branded vs. non-branded		
Beer was . . .	Branded	Non-branded
Responses	18	34
Preference expressed for unbranded beer ($p \leq 0.05$)		
(b) Percentage preferring one or other beer by criteria		
Beer was . . .	Branded	Non-branded
Taste	20	40
Aroma	0	4
Carbonation	6	12
Appearance	2	6
No criterion offered	6	4
(c) % of people selecting one or other beer based on declared weekly beer consumption		
Preferred beer . . .	Branded	Non-branded
14 beers per week	44	24
7 beers per week	33	57
2 beers per week	22	19

TABLE VII. Comparison of branded and unbranded product in a fresh state.

(a) Preference for fresh beers, branded vs. non-branded		
Beer was . . .	Branded	Non-branded
Responses	34	18
Preference expressed for unbranded beer ($p \leq 0.05$)		
(b) Percentage preferring one or other beer by criteria		
Beer was . . .	Branded	Non-branded
Taste	46	22
Aroma	2	0
Carbonation	8	8
Appearance	2	2
No criterion offered	8	2
(c) % of people selecting one or other beer based on declared weekly beer consumption		
Preferred beer . . .	Branded	Non-branded
14 beers per week	29	33
7 beers per week	50	50
2 beers per week	21	17

not branded there was again no significant preference for fresh or aged beer (Table Va) and again the less regular drinkers seemed to prefer the aged product. However, when two glasses of aged product were presented, one of them branded, the declared statistically significant preference was for the unbranded product (Table VIa) whereas the converse applies when the beers were presented fresh (Table VIIa).

Clearly in this case the branding is very important to the taster's preference. When given a stale version of a product that they are familiar with, the consumer's expectations for the product are not met. That is, if they are to be provided with stale beer they would prefer it not to be the recognised brand that they accept for its freshness of flavour.

CONCLUSIONS

For the sample population tested on this study

1. Drinkers prefer fresh to lightstruck beer and this is not impacted by branding.
2. For staling there is a less dramatic aversion to the off character such that no preference is expressed for either the fresh or stale beer alone. However there is clear synergy with branding. If a beer is stale, the consumer would prefer not to think of it as being a brand that they know. If beer is fresh the consumer opts for the well-known brand.

3. Sizeable numbers of people do declare a preference for beers that display flavour characteristics (stale, lightstruck) which brewers traditionally view as undesirable.

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