

# Use of an Informal Consumer Sensory Panel in Conjunction with Discussion to Teach Students Concepts Related to Beef Palatability

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## Abstract

Students enrolled in a general education science course at Berry College participated in an informal consumer sensory panel. Students received no prior classroom instruction in beef palatability. At the beginning of lab, students completed a pre-quiz. Questions were designed to test knowledge of beef quality attributes and to assess students' steak preferences. A rating sheet was distributed and students were presented with bite-sized steak samples (approximately 2×2×2 cm cubes). Students were asked to take a bite of cracker and drink of apple juice between each sample. After completion of the panel, results and beef palatability attributes were discussed. Students then completed the previously mentioned quiz (post-quiz). The class experience was repeated over multiple semesters and with separate instructors. Scores on questions designed to test students' knowledge of different attributes of beef quality were improved ( $P < 0.01$ ). Questions assessing students' steak preferences addressed preferred degree of doneness and asked students to choose a steak based on USDA Quality Grade, weight, cut, aging, and degree of doneness. Eighty-five of 127 students changed one or more of their answers for these questions. These results suggest an informal consumer sensory panel in conjunction with discussion is effective to teach students beef palatability attributes.

## Introduction

Consumer sensory panels are widely used in research and industry to assess consumer preference (Keliza and Gloria, 2008). However, research and industry use of consumer sensory panels is focused on determining consumer perception of the product being evaluated, and the consumer is often unaware of the quality attributes being tested. For example, in a study to test if a marinade improved tenderness, the consumer panel would not be informed of the enhancement techniques used or even that assessing tenderness is the primary objective. There are a few

reports of using sensory panels as a teaching tool. Fraser (1977) recommended sensory panels be included in home economic classes primarily based on the consideration that students in home economics could likely enter careers using and evaluating the results of these sensory panels. McClelland and Broder (1982) reported successful use of sensory panels to teach concepts of consumer preference theory in an agricultural economics course. Kauffman et al. (1999) reported the use of a sensory panel as a component of a lab to teach students concepts of "meat quality" and measurement of meat quality using pork. However, there are no reports in the literature using a consumer sensory panel to teach concepts of meat quality as it relates to beef palatability.

Therefore, the objective of this project was to determine if an informal consumer sensory panel in conjunction with discussion could be used to teach students concepts related to beef palatability.

## Methods

Multiple class experiences were performed over several semesters and by two different instructors. This study was determined to be exempt by the IRB at Berry College.

## Class experience

All students who participated in this class experience were enrolled in ANS 105, Introduction to Agricultural Sciences, at Berry College. This course counts as a general education laboratory science elective at Berry College, and is primarily taken by non-science majors. Students were informed that steak would be consumed prior to the lab, and any students who did not eat meat for any reason were excused from the lab activity. At the beginning of the lab, students completed a quiz (pre-quiz; Figure 1) consisting of 12 questions. Ten of the questions were designed to test the students' knowledge of different attributes of beef quality, and two of the questions were designed to assess students' steak preferences.

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## Use of

A rating sheet was then distributed to the students. Students were briefly instructed on the use of the rating sheet (i.e. use of the scale on the rating sheet, the meaning of terms such as “off-flavor” or “overall desirability”), and told not to discuss their opinions of the samples until all sampling was completed. Students then moved to a desk with apple juice and crackers, and were presented with bite sized steak samples (approximately 2×2×2 cm cubes) for evaluation. Students rated the steaks for juiciness, tenderness, beef flavor intensity, off flavor, and overall desirability on a scale of one to seven with seven being the most desirable. Students were not provided with any information about the sample until after all samples had been evaluated. Students were asked to take a bite of cracker and drink of apple juice between each sample. After completion of the sensory panel, evaluation sheets were collected, and the results were graphed. The results and beef palatability attributes such as quality grade, cut, or aging and the impact on palatability were discussed with the class. Students then completed the previously mentioned quiz (post-quiz).

Name \_\_\_\_\_

Meat Quality Lab Quiz  
ANS 105

True/False:

- \_\_\_ 1. The USDA Quality grade of a steak predicts its eating quality.
- \_\_\_ 2. Cuts from different parts of the beef carcass differ in eating quality.
- \_\_\_ 3. Steaks with more intramuscular fat are less palatable than steaks with less intramuscular fat.
- \_\_\_ 4. A “Flat Iron steak” is a steak that has been prepared using a newly-developed, rapid-cook technology that improves tenderness.
- \_\_\_ 5. All the steaks that are sold in restaurants come from carcasses that graded Choice or Prime.
- \_\_\_ 6. The eating quality of a steak is determined solely by the genetics/breeding of the animal from which it originated.
- \_\_\_ 7. Steaks cooked to a higher temperature are
  - a. Tougher
  - b. More tender
  - c. Temperature does not effect tenderness
- \_\_\_ 8. The meat trait most related to overall palatability is
  - a. Juiciness
  - b. Tenderness
  - c. Beef flavor
  - d. Off flavor
- \_\_\_ 9. Steaks aged for \_\_\_ days are more tender
  - a. 7
  - b. 21
  - c. Aging does not effect tenderness
- \_\_\_ 10. If you ordered a steak at a restaurant, how would you order the steak to be cooked?
  - a. Rare
  - b. Medium-rare
  - c. Medium
  - d. Medium-well
  - e. Well-done
- \_\_\_ 11. What are four quality grades of young beef?
- \_\_\_ 12. If you wanted to have the best eating experience possible and money was not an object, which of the following steaks would you be more inclined to purchase
  - a. A Choice, 16 oz. round steak, aged 3 days and cooked to medium
  - b. A Select 12 oz. ribeye steak, aged 30 days and cooked to medium-rare
  - c. A Prime 10 oz. top sirloin steak, aged 10 days and cooked to well
  - d. A Choice 12 oz. Flat Iron steak, aged 5 days and cooked to medium-well

Why?

**Figure 1.** Quiz administered to students prior to (pre-quiz) and following (post-quiz) the informal consumer sensory panel and discussion. Questions 1-9 and 11 were designed to test the students knowledge of factors associated with beef palatability. Questions 10 and 12 were designed to assess students' steak preferences.

Class experience one was performed over two semesters for a total of four lab sections and 57 students. This experience was the initial experience and designed to test the effectiveness of the use of an informal consumer sensory panel in conjunction with discussion to teach concepts related to beef palatability. This experience included steaks from different muscles that also differed in quality, cooking temperature, and aging.

Class experience two was performed for one lab section of the class for a total of 14 students. This experience was designed to test the effectiveness of the use of an informal consumer sensory panel in conjunction with discussion to teach concepts related to beef palatability using only steaks purchased at a local grocery store.

For class experience three, the students were enrolled in two separate sections of the class and had two different instructors. Each class section had two lab sections for a total of four lab sections and 56 students. This experience was designed to test the effectiveness of the use of an informal consumer sensory panel in conjunction with discussion to teach concepts related to beef palatability with two separate instructors.

### Steak samples

Steak samples were from infraspinatus (flat iron) or longissimus (strip) muscle. For class experience one, the following samples (n = 9) were presented to the students: an infraspinatus steak cooked to an internal temperature of 66°C, 71°C, or 82°C, a longissimus steak aged for 1, 7, or 21 days, and a low, medium, and high Choice longissimus steak. All longissimus steaks were cooked to 71°C. The longissimus steaks aged for 1, 7, or 21 days were obtained from the same animal. Choice infraspinatus steaks were purchased from a local grocery store. All steaks were stored frozen until the day prior to the class experience. Longissimus steaks were obtained from the University of Georgia Meat Science and Technology Center and originated from cattle that were harvested under inspection at the facility. For class experiences two and three, the following samples (n = 5) were presented to the students: an infraspinatus steak cooked to 66°C, 71°C, or 82°C, and a low and high Choice longissimus steak. All longissimus steaks were cooked to 71°C. All steaks were purchased from a local grocery store and were stored frozen until the day prior to the experience. All steaks were cooked on a clam-shell electric grill with no seasonings applied.

Statistics Four replications of the class experience one were completed. Lab A had 14 students, Lab B had 17 students, Lab C had 14 students, and Lab D had 12 students. Fourteen students from one lab section participated in class experience two. Fifty-six students from four lab sections participated in the class experience three. Lab A had 16 students, Lab B had 15 students, Lab C had 11 students, and Lab D

had 14 students. For class experience one and three, scores on the ten questions from the pre and post-quiz designed to test student's knowledge of different attributes of beef quality were tested for effect of lab section, pre or post-quiz, and the interaction using the univariate split-plot method for repeated measures analysis with JMP Software (version six, SAS Institute Inc., Cary, NC). For class experience two, lab section was not included in the statistical model as there was only one lab section. In the event of a significant main effect or interaction, mean separation was performed by student's T test.

## Results and Discussion

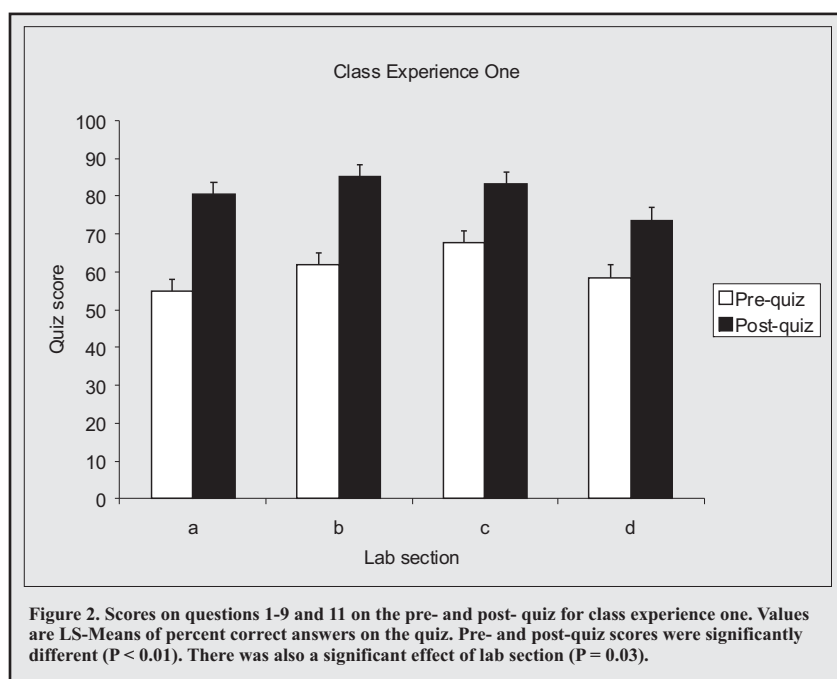
Class experience one was designed to test whether an informal consumer sensory panel in conjunction with discussion could be used to increase student's ability to understand concepts related to beef palatability. Scores on the 10 questions designed to test students' knowledge of different attributes of beef quality were improved (Figure 2;  $P < 0.01$ ). Based on the number of incorrect answers, students were not familiar with the USDA quality grade system prior to the class experience (20 and 57 incorrect answers on pre-quiz questions 1 and 11, respectively). However, after completion of the class experience, the students had better knowledge of the USDA quality grade system (4 and 5 incorrect answers on post-quiz questions 1 and 11, respectively). Prior to the class experience, students were aware that cut, genetics and cooking temperature can impact eating quality (2, 13, and 11 incorrect answers on pre-quiz questions 2, 6, and 7, respectively). However, the class experience appeared to improve the students' knowledge of the impact of cut, genetics and cooking temperature on eating quality (1, 6, and 5 incorrect answers on post-quiz questions 2, 6 and 7,

respectively). Thus, the class experience improved the students' knowledge of beef quality attributes.

Class experience two was designed to determine whether a similar improvement in student knowledge of beef palatability concepts could be obtained using an informal consumer sensory panel that evaluated steaks purchased solely at a local grocery store in conjunction with discussion. This eliminated the concept of aging from the samples evaluated since the harvest time of the purchased steaks was not known. Scores on the 10 questions designed to test students' knowledge of different attributes of beef quality were improved ( $62.1 \pm 3.4\%$  vs.  $88.6 \pm 3.4\%$  pre-quiz vs. post-quiz, respectively;  $P < 0.01$ ). The number of incorrect answers on the various questions followed the pattern observed in class experience one. As class experience two did not include steaks aged for different periods of times, students might have been expected to show less improvement on question nine, which specifically addressed the impact of aging on tenderness. However, in class experience two, no student missed question nine on the post-quiz despite seven incorrect answers for question nine on the pre-quiz. Although this study did not compare the effect of discussion of beef quality attributes alone to the effect of using informal consumer sensory panel in conjunction with discussion, the improvement on question nine in class experience two suggests discussion alone would have resulted in improved quiz scores. Nonetheless, based on class experience two, an informal consumer sensory panel using only steaks purchased at a local grocery store in conjunction with discussion appeared to effectively teach students concepts related to beef palatability.

Since all the steaks and other expendable supplies for class experience two were purchased from the local grocery store, class experience two also afforded the opportunity to easily assess some of the cost associated with this activity. Class experience two was performed in the summer of 2008. All expendable supplies purchased for the class experience cost a total of \$43.10. Obviously, the cost will vary with time and location, but a cost of \$3.08 per student for expendable supplies for this activity is surprisingly affordable.

Class experience three was designed to test the effectiveness of using an informal consumer sensory panel in conjunction with discussion to teach concepts related to beef palatability by two separate instructors. All prior class experiences had been performed by a single instructor. For class experience three, four separate labs with two separate instructors performed the informal consumer sensory panel (two labs per instructor). Scores on the 10 questions designed to test students'





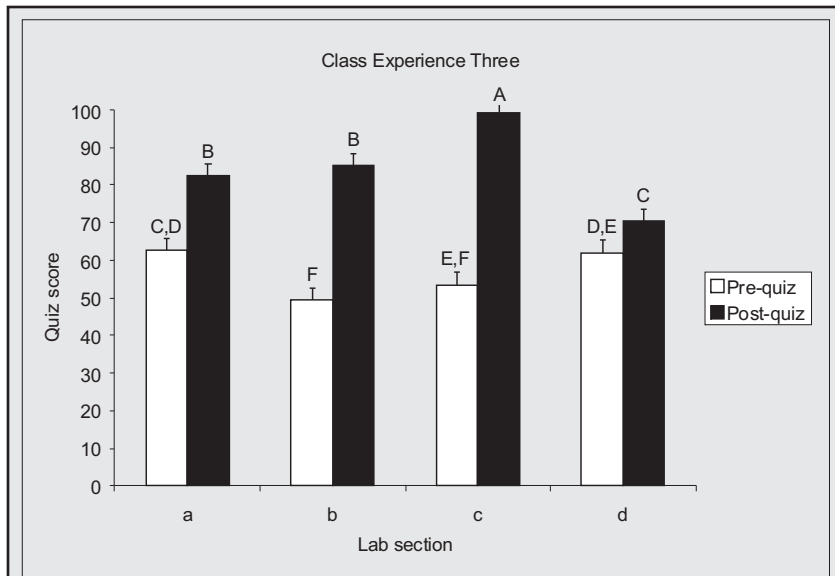


Figure 3. Scores on questions 1-9 and 11 on the pre- and post-quiz for class experience three. Values are LS-Means of percent correct answers on the quiz. Pre- and post-quiz scores were significantly different ( $P < 0.01$ ). There was also a significant effect of lab section ( $P = 0.02$ ), and a significant lab\*time interaction ( $P < 0.01$ ). Bars which do not share a common letter are significantly different. Lab sections A and B were taught by one instructor, and Lab sections C and D were taught by another instructor.

knowledge of different attributes of beef quality were improved (Figure 3;  $P < 0.01$ ). Although there were significant differences in scores between lab sections, the differences did not appear to be due to instructor, as instructor one taught both the lab with the highest post-quiz score (Lab C) and the lab with the lowest post-quiz score (Lab D), and instructor two taught labs with intermediate post-quiz scores (Labs A and B). Also, the post-quiz score was improved relative to the pre-quiz score for each lab section, indicating use of an informal consumer sensory panel in conjunction with discussion to teach concepts related to beef palatability is effective with different instructors.

Over the three class experiences, two quiz questions assessed students' steak preference. One addressed preferred degree of doneness and the second asked students to choose a steak based on USDA Quality Grade, weight, cut, aging, and degree of doneness. Interestingly, 85 of the total 127 students who participated in one of the class experiences changed one or more answers. Twenty-four students changed their preferred degree of doneness following the consumer sensory panel. Of the 24 students who changed their preferred degree of doneness, 21 shifted in the direction of preferring their steak cooked to a lower degree of doneness. Regarding the question asking students to choose a steak based on USDA Quality Grade, weight, cut, aging, and degree of doneness, 74 of the students changed their answer

from the pre-quiz to the post-quiz. In response to the "why" on question 12 on the pre-quiz, some students indicated they did not know why or left the answer blank. On the post-quiz, no student indicated not knowing why and only four students in all of the class experiences chose to leave the answer blank. This shift in the students' preference suggests learning, and the students should be able to make more informed beef purchasing and preparation decisions after the class experience. Although it was not tested in this study, it would be interesting to determine if discussion alone could have the same impact on students' preference.

## Summary

In every repetition of the informal consumer sensory panel in conjunction with discussion, students performed better on the post-quiz than the pre-quiz. The increase in performance occurred for different instructors, suggesting this technique for teaching beef palatability concepts could be effectively adopted by other instructors. Most encouraging, many students changed their answers to the preference questions which suggests application of the new information. Thus, use of an informal consumer sensory panel in conjunction with discussion is an effective way to teach beef palatability concepts to students.

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