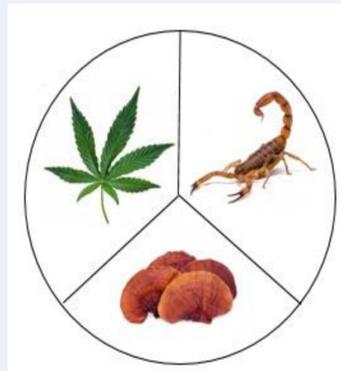


## INTRODUCTION

College athletes require a diet focused on nutritious foods and beverages. These athletes specifically rely on an increased amount of protein due to increased catabolic loss of protein associated with strength-training activities. Therefore, athletes require individualized training and nutrition to ensure good health for optimum performance.<sup>1</sup> Endurance sports, which include long-distance running, cycling, and swimming often require the athlete to consume higher calories and protein to provide sufficient energy to properly train and competitively perform (eg 1-3 h/day requires 6-10g/kg/day CHOs and 1.4-2.0 g/kg/day PRO).<sup>2,3</sup> Moreover, adequate nutrition post-training and post-competition is vital for supporting recovery and muscle protein synthesis.<sup>2</sup> However, consistently consuming adequate nutrition may pose a problem for some athletes due to their high nutritional need and limited time available for meal preparation and actual meal consumption. Therefore, some athletes use protein powders, shakes, and bars to support their nutritional needs. In a national survey of about 21,000 U.S. college athletes, respondents reported taking protein products (41.7%). Key to consistent consumption of these supplements is minimizing the development of flavor fatigue so that the athlete enjoys eating or drinking the fortified food or beverage on a consistent basis.

## PURPOSE

The purpose of this study was to increase the protein composition of a traditional cake pop by adding mushroom, hemp, and scorpion protein powder to a traditional cake pop recipe, assessing consumer overall acceptability, and conducting a cost comparison of cake pops prepared with each variation to the traditional cake pop recipe.



## METHODS

To control for variability across the cake pop recipes, each team member performed the same task for all laboratory experiments. Four lab experiments with sensory testing were conducted, but scorecard data from the first round of sensory testing for all recipe variations were missing due to the delay in receiving mail-ordered protein powders. The panelists used a scorecard to assess selected sensory qualities that included appearance, texture, flavor and overall acceptability of the four samples presented for each lab. The panelist evaluated each sample using a scale from one to four (one representing very undesirable to five representing very desirable). The panelists who were fellow classmates ranged in age. Panelists were given instruction on how to proceed with taste-testing and how to use the scorecard to record their assessment of each recipe variation. The panelist also had an opportunity to provide written comments. Recipes were adjusted according to the scores and comments provided for each recipe following each lab experiment to address challenges and issues with the cake pops. Panelist were seated in a room free from distractions and were presented a plate divided into four quadrants with one cake pop representing each recipe variation. The scorecard data was calculated using means and the nutritional content of each final recipe was determined using Esha Food Processor software. Cost per recipe and per serving were calculated using sales receipts and the ingredient amounts.

## RESEARCH OBJECTIVES

1. To enhance the protein content of a traditional cake pop recipe by using three non-traditional protein sources (mushroom, hemp, scorpion).
2. To compare selected sensory characteristics of high-protein cake pop recipes to a traditional cake pop recipe.
3. To compare the costs of a traditional cake pop to those enhanced with various non-traditional protein sources.

## RESULTS

**Table 1. Average Scorecard Results**

Sensory Characteristics	Control	Mushroom Powder	Hemp Powder	Scorpion Powder
Appearance	4.15	4.25	4.4	4.15
Texture	5	4.4	4.55	4.65
Flavor	4.65	3.4	2.9	4.25
Overall Acceptability	4.75	3.4	2.75	4.5

\* Scorecard results from week 1 and 2 are not included due to missing variation(s) on taste test.

**Table 2. Nutrition per Cake Pop**

	Calories	Total Fat (g)	Total Carb (g)	Fiber (g)	Protein (g)
Control	112.4	4.54	30.1	0.42	0.42
Mushroom	139.2	5	35.1	1.52	4.52
Hemp	127.2	5	34.8	1.22	1.82
Scorpion	*	*	*	*	2.08

\* Nutritional facts for scorpion powder were not provided from manufacturer.

**Table 3. Added Protein Cost Per Cake Pop**

Protein Variation	Additional Cost
Mushroom	\$0.67
Hemp	\$0.04
Scorpion	\$2.59



## RESULTS

Nutritional analysis results showed the cake pop with mushroom protein powder yielded the highest protein content (4.52g/cake pop), while lower amounts of added protein were found in cake pops with scorpion protein powder (2.08g/cake pop) and hemp protein powder (1.82g/cake pop). The control recipe had an overall acceptability score of 4.75, while the scorpion protein powder cake pop had a 4.5. Mushroom and hemp protein powder cake pops were the least favorite with scores of 3.4 and 2.75, respectively. After a cost analysis of each recipe, researchers found the lowest cost of added protein was the hemp protein powder (\$0.04/cake pop) followed by mushroom protein powder (\$0.67/cake pop). The largest cost increase was the scorpion protein powder (\$2.59/cake pop).

## CONCLUSION

In conclusion, researchers were successful in increasing the protein content of a convenient snack item, while keeping it cost-friendly to aid in protein. Overall, the mushroom protein cake pop yielded the most added protein content per dollar value while achieving a desirable flavor.

## REFERENCES

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