

Assessing How Various Cooking Methods Influence Several Physical Qualities of Chicken Breasts

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Abstract

Juiciness and tenderness are two of the characteristics which define meat quality and acceptability for a consumer.¹ The purpose of this experiment is to determine the effect on moisture loss, tenderness, chewability, taste, aroma, color, and texture on chicken breast when cooked using different methods such as: sous-vide (water bath), baking, air-frying, and pan-frying. Killing harmful organisms by cooking is necessary for meat, and these different methods result in different moisture retention and texture of the product. The intention of this experiment is to equip consumers with the information they need to choose which cooking method best aligns with their preferences.

Limitations

A limitation that was encountered was the uniformity of chicken breast size, density, and shape. Each breast was modified by trimming off excess meat, but identical specimens pertaining to length and thickness were not achievable which may have altered results. After filleting the 6 breasts into 12 portions, some portions weighed under 100 grams while others were over. Due to the lack of extra meat, some of the smaller portions that were under 100 grams had to be used. Two treatments did have an underweight breast, but they were not used in subjective or objective testing; simply for enjoyment.

Sensory Ballot Findings

The highest rating for each cooking method is as follows: The sous-vide method scored highest in pale color, strong aroma, perfectly juicy, desirable tenderness, desirable chewability, and good flavor. The air frying and pan frying methods scored highest in perfectly golden, moderate aroma, perfectly juicy, desirable tenderness, desirable chewability, and good flavor. Oven baked had the highest score in pale color, weak aroma, perfectly juicy, slightly melting in mouth tenderness levels, desirable chewability, and weak flavor. When comparing the cooking methods to each other, the sous-vide method scored the highest on the pale color ranking with 7 out of 10 votes while pan frying had the higher score on golden color with 5 votes. Sous-vide had the highest aroma score with 6 votes while air frying had the best score in desired aroma with 5 votes. Sous-vide and air fried tied with best juiciness levels with 7 votes. Pan frying resulted to have the most desirable tenderness level with 8 votes. The majority of our cooking methods lead to desirable chewiness levels, but the air frying method had the highest score with 8 votes. Flavor was a close among all samples, yet sous-vide ranked the highest with 8 votes. The baked method had the least votes for optimal taste and ranked higher in slightly too weak with 4 votes.



Figure 1.



Figure 2.

Methods

One hundred gram portions of Heritage Farm® Boneless & Skinless Chicken Breasts with Rib Meat were cooked using four treatments: Sous Vide (Water Bath), oven, air fryer, and frying pan. The samples were cooked until reaching 165°F internal temperature. Samples were treated with one teaspoon olive oil and 2.5 grams McCormick Montreal Chicken Seasoning. Each sample was weighed before and after cooking to determine the quantity of moisture lost during the cooking process (see Figure 3). Sensory panelists were presented with a bite-size portion of chicken (approximately 8-10 grams) from each treatment and asked to rate the chicken in terms of color, aroma, juiciness, tenderness, chewability, and taste. Responses from the sensory panelists were averaged for each treatment. After being chilled overnight, some samples were tested using a Warner-Bratzler shear. Using a corer, 4 samples were taken from each quadrant of a chicken breast, in accordance with the grain direction, and placed in the shear to determine how many newtons were required to cut through the sample. A total of 16 cored samples were assessed (4 cores from 4 different treatments). The data was then averaged for each core that was tested (see Figure 4).

Results and Conclusion

Overall, the results of this experiment show that different cooking methods of chicken may be more appropriate to reach a specific result. If the desired quality for chicken is color, air frying or pan frying the chicken may be the best option. If the goal is to have a strong aroma, the sous-vide method would achieve that. Sensory panelists found that the air fried chicken had the most desirable chewiness (mouthfeel). This finding strongly correlates with the objective shear test done on the chicken one day after performing the experiment. The air fried chicken required the least amount of shear force to cut through. Closely following the air-fried chicken, the baked chicken also didn't require much force (N) to cut through. This makes sense as the baked chicken seems to have retained more moisture from start to finish in the cooking process. While there were some differences in the outcome of the chicken with each cooking method, many qualities were found to be quite similar. Sensory panelists rated many samples to have a desirable taste and tenderness. The sensory ballot results were evaluated taking into consideration that selections were up to personal preference. Overall, the data shows that each cooking method has its specific strengths and weaknesses. The cooking method to select when preparing chicken depends on the specific desired outcome.

Average Moisture Loss

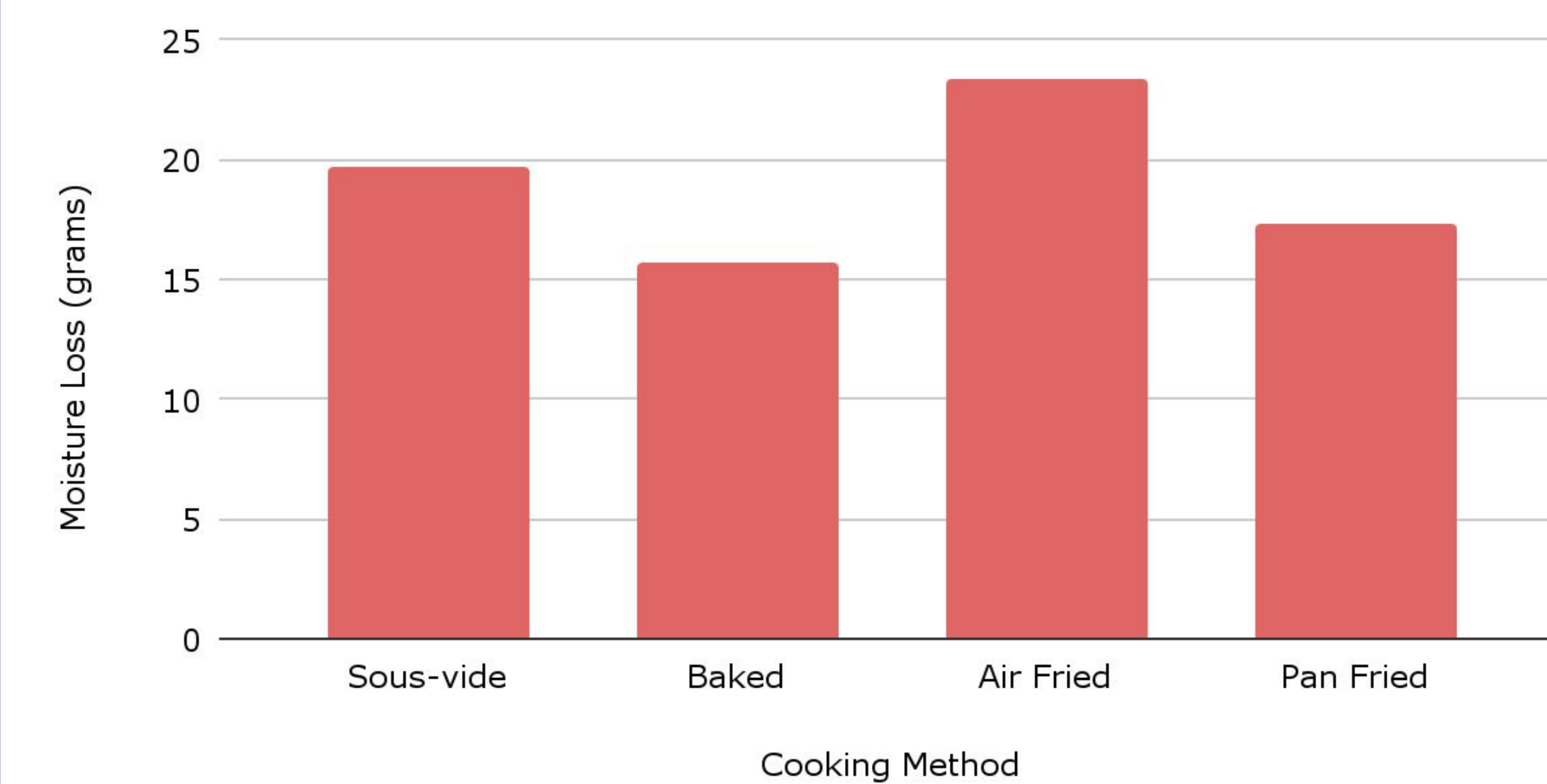


Figure 3. The amount of moisture lost during each cooking method. More moisture retained in a sample means more juiciness.

Tenderness

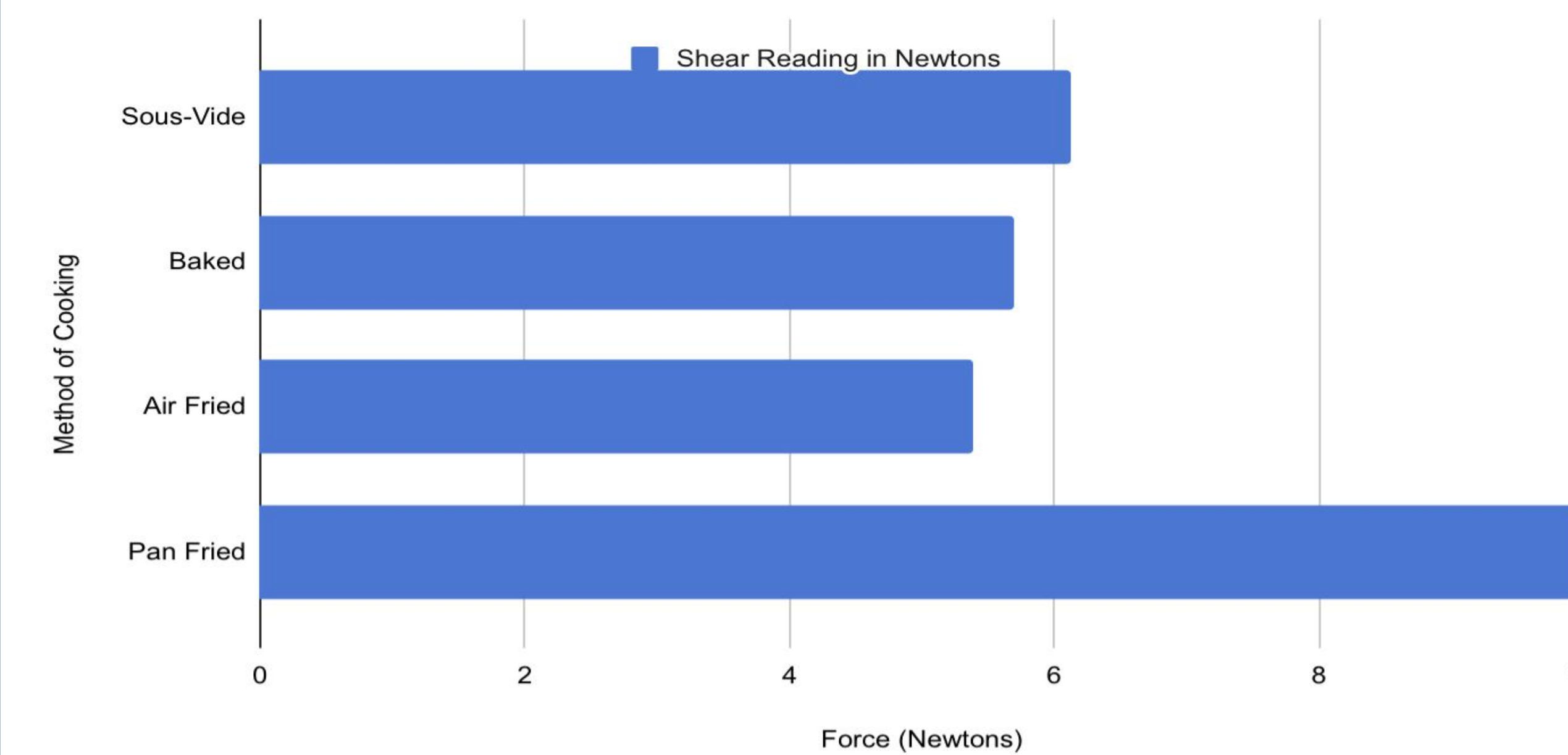


Figure 4. The amount of shear force (Newtons) needed to cut through each sample. The fewer newtons required means a more tender sample.

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