The Perfection of Butter Chicken

By

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Abstract

Butter chicken is appreciated worldwide for its creamy curry and tender and juicy chicken. The hardest part of any butter chicken recipe is making sure the chicken is cooked to perfection. We wanted to make the best butter chicken we possibly could, and to do that we had to figure out what variable would be the most important to change in the recipe to make that happen. We determined, that because it was a salt-based marinade, we would need to change the amount of time that the chicken spent marinating. For our experiment to be as precise and have clearly defined results it required us to test multiple different lengths of marinating time. We started marinating sample 3 12 hours before cooking, sample 2, one hour before cooking and putting sample 1 into the marinade right as we were cooking. We pan-fried the chicken to start, cooking it most the way through and then each sample finished cooking in the curry. The results of this experiment showed us that most people preferred the chicken that marinated for 1 hour, over the chicken we dipped in right before we cooked it and the chicken that sat for 12 hours. Based off the results we found, marinating for longer periods of time is not actually necessary for your chicken to have the desired attributes

Key Terms: Butter chicken, Marinade, salt-based, Length of time, Tender, Juicy

Introduction

Butter chicken is one of the most popular foods that came from India, appreciated worldwide for its relatively mild flavor, creamy sauce and juicy chicken. This meal originated in Delhi India around 70 years ago and was created when a small store decided that the tandoori chicken they had previously created needed a curry to go along with it, and thus butter chicken was created. In this experiment, our goal was not to worry about the curry, the goal was to find out how the length of time spent marinating effects the tenderness and moistness of the chicken. One of the key components of making butter chicken is making sure the chicken is full of flavor and very tender. In different recipes this is achieved in different ways, some let the curry cook longer and let the chicken cook directly in the curry. And in others, the chicken uses a marinade that the chicken brines in. There are a few benefits of the marinating method. One is that when you marinate the chicken in a salt-based marinade it will be more tender, and how tender the chicken changes with the length of time its marinated. This experiment has one independent variable and two dependent variables. The independent variable is the length of time the chicken spends marinating. The

dependent variables in the experiment are the juiciness of the chicken and the tenderness of the chicken. The chemical explanation for how this is accomplished is that the sodium chloride is attracted to the H2o in the meat. The sodium chloride keeps the proteins from coagulating once the meat is heated. This is because the positively and negatively charged ions of the sodium chloride attract the opposite sides of the amino acids, which restricts them from being able to coagulate. Meaning the longer it marinates, the more time the sodium chloride has to bind with the proteins making the meat more tender. Our hypothesis is that sample 3, which will be marinated for 10 minutes, will be the toughest to chew and driest. Then sample 2 which will be marinated for an hour will be relatively moist and tender. Sample 3, will be marinated for 12 hours, and produce the optimal pieces of chicken, both being tender, moist and full of flavor.

Methods

Marinade

Ingredients- Chicken thighs, ½ cup of plain yogurt, 1 ½ tablespoon minced garlic, 1 tablespoon minced ginger (or finely grated), 2 teaspoons garam masala, 1 teaspoon turmeric, 1 teaspoon ground cumin, 1 teaspoon red chili powder, and 1 teaspoon of salt.

Sauce

2 tablespoon olive oil, 2 tablespoon ghee (or 1 tablespoon butter + 1 tablespoon oil), 1 large onion sliced or chopped, 1 ½ tablespoon garlic minced, 1 tablespoon ginger minced or finely grated, 1 ½ teaspoon ground cumin, 1 ½ teaspoon garam masala, 1 teaspoon ground coriander, 14 oz (400g) crushed tomatoes, 1 teaspoon red chili powder, 1 ¼ teaspoons salt, 1 cup of heavy or thickened cream, 1 tablespoon sugar, and ½ teaspoon kasoori methi.

Process

First add ½ cup of plain yogurt to a mixing bowl, 1 ½ tablespoon of minced garlic, 1 tablespoon of minced ginger, 2 teaspoons of garam masala, 1 teaspoon turmeric, 1 teaspoon of ground cumin, 1 teaspoon of red chili powder, and one teaspoon of salt, then mix all the ingredients. Add 1.8 lbs of

chopped chicken breast to the marinade then mix. Let chicken marinate for 12 hours. Cook chicken most of the way through in a pan with olive oil. Set chicken to the side and add two tablespoons of olive oil, 2 tablespoons of ghee, one large onion sliced and chopped, fry onion until it is sweating and slightly brown. Then add 1 ½ tablespoon of garlic, 1 tablespoon of ginger, 1 ½ teaspoon of ground cumin, 1 ½ teaspoon of garam masala, and 1 teaspoon ground coriander. Cook for 1 minute and 20 seconds while stirring occasionally. Then add 14 oz of crushed tomatoes, 1 teaspoon of red chili powder, and 1 ¼ teaspoon of salt. Let simmer while stirring occasionally for 10 to 15 minutes or when the sauce thickens and turns a dark red color. Remove sauce from heat and add to blender, blend till sauce is smooth then add back into the pan. Add 1 cup of heavy thickened cream, 1 tablespoon of sugar, ½ teaspoon kasoori methi, and put the chicken back into the pan with the sauce. Fry in the pan till chicken is cooked all the way through and sauce is bubbling.

Sample #1 was dipped in the marinade right before cooking, sample #2 marinated for 1 hour, and sample #3 was marinated for 12 hours.

Independent variable: The length of time the chicken marinated

Dependent variable: The tenderness and moistness of chicken.

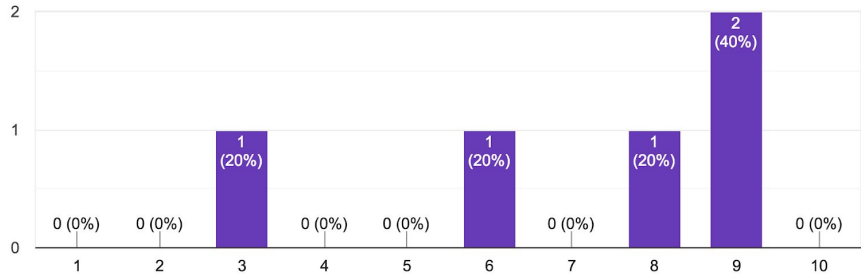
Qualitative results: We were looking for chicken that was tender and juicy, we decided which of our three samples was the best using those qualities through a short survey that peers from our class filled out after tasting each type of curry.

Quantitative results: Another test that we could have carried out would be to test the tenderness and moistness of the various buttered chicken samples. To test the tenderness we would measure the pounds of force necessary to cut the chicken, if it was easier to cut through, then the chicken was more tender. To test the juiciness or the increase in moisture capacity we would have had to weigh a piece of chicken from each sample before cooking and after cooking and calculate the percent of mass lost in the piece of chicken from each sample.

Results Table

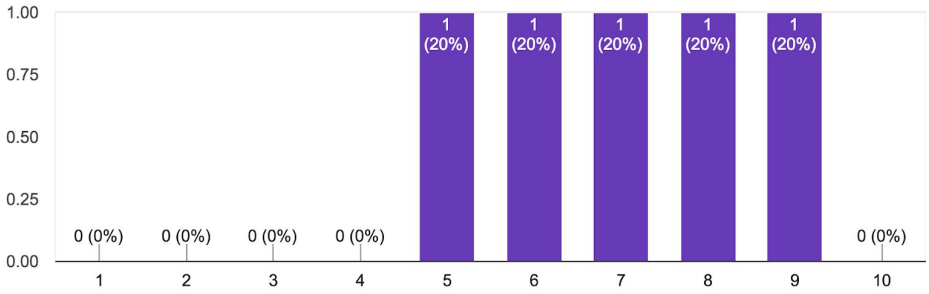
Sample #1 Moistness of Chicken

5 responses



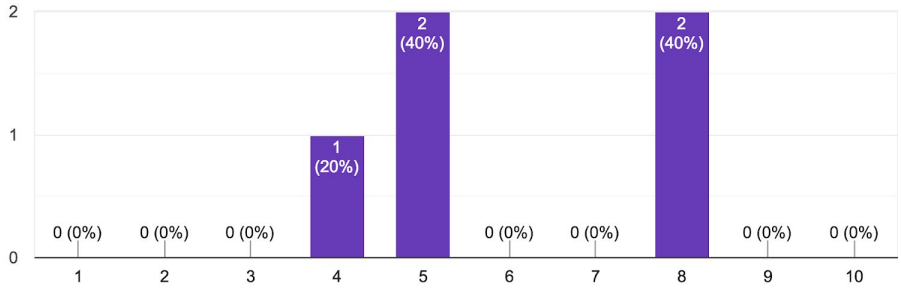
Samlple #2 Moistness of Chicken

5 responses



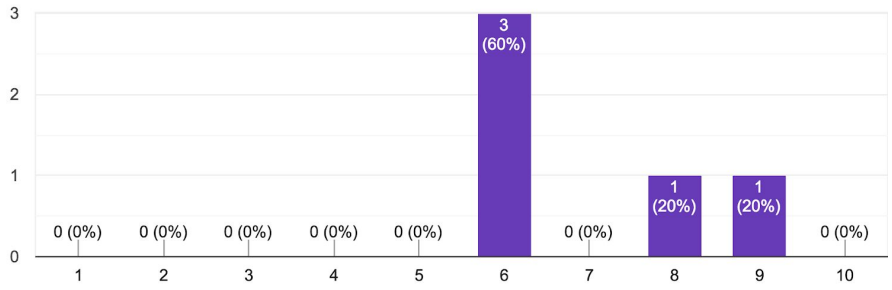
Sample #3 Moistness of Chicken

5 responses



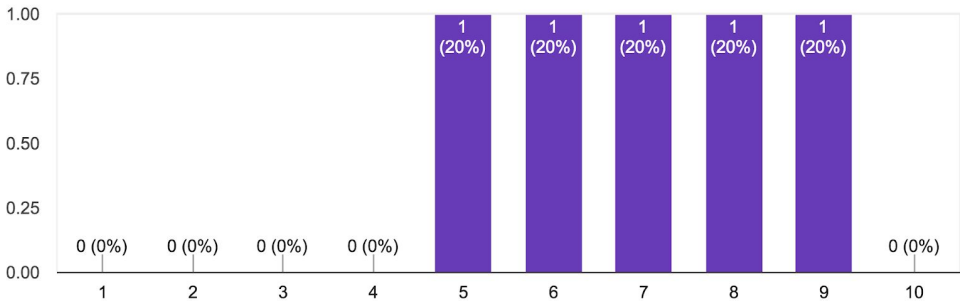
Sample #1 Chickens Tenderness

5 responses



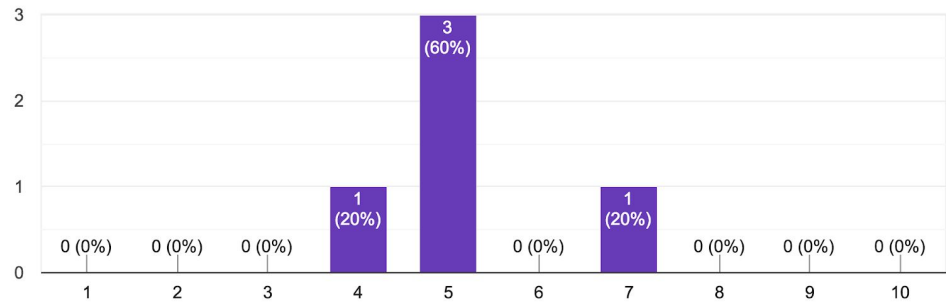
Sample #2 Chickens Tenderness

5 responses



Sample #3 Chicken Tenderness

5 responses



Results

To better understand which buttered chicken was the moistest and most tender, we had five taste testers try our chicken and then fill out a survey. After having five different people try each one of our samples and taking a survey we found that the majority of the people thought that sample #1 which was dipped in the marinade was the moistest. We where surprised they believed this because we thought that the chicken that was marinated the longest would be the moistest and most tender. They also thought that sample #2 which marinated for 1 hour was the most tender. We were surprised by this for the same reasons as sample #1. This was surprising to us because we thought originally that the chicken that would marinate for the longest time would be the moistest and most tender.

Discussion and conclusion

The results we got surprised us, our expectations were that the longer the chicken marinated the more tender and juicy it would be. What we found is that when the chicken is marinated for an hour, it produced the best results. The best guess we have for this is that after a certain amount of time, the proteins break down too much to be able to retain a desirable tenderness and that the sodium Chloride eventually dries out the chicken instead of increasing its water capacity. Some potential uncertainty with our experiment is that not every piece of chicken is created equal and guaranteeing that the testers at a similar piece of chicken from each test is very hard to do. This fact would have potentially affect which pieces of chicken were more tender than others. To get more accurate results we would have needed to do the water capacity test. This is due to the fact that each piece of chicken has the same initial water capacity so human error and inconsistencies in feel would not have affected these results. Another change we could make if we were to repeat the experiment is adding in even more test, such as one that lasted 48 hours, or added one that was 6 hours, right in between our two test.