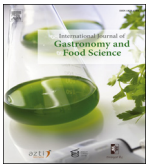

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Culinary concept

Making a Balinese Meringue

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Abstract

A new concept in meringue is introduced. A brief summary of current thoughts on meringue is included. A unique cooking and chilling process is outlined which produces a low sugar meringue with excellent overrun and good stability. This new meringue, which the author describes, possesses unique characteristics, due at least in part to the low pH of the local coconut palm sugar. It is hereby named Balinese Meringue, after the location of its creation.

Keywords: Overrun; Meringue; Coconut palm sugar

Introduction

Probably the best thing to come out a love story of a dessert series is a postscript. There have been rumblings of hydrocolloid and liquid nitrogen bans in Italy (Martini, 2010), so when asked to present at Art and Pastry conference in Lugarno in early 2013, I wanted to make something with nothing. By that I mean, I wanted to take the concepts and textures that had been generated with the use of hydrocolloids, and create a challenge: to make similar innovations in texture and taste with the very foundation of pastry making, the meringue.

Variations on the meringue are everywhere. From the microwave sponge, to the coconut water wafer, to the methylcellulose granite, the meringue is an inspiration. In fact, the meringue is a "scaffolding," (Vega and Sanghvi, 2006) about whose architecture we are surprisingly uncertain. While reviewing the research on foam formation in Vega's inimitable study of egg whites and angel food cake, the following details were remarkable (my notes follow in italics):

a. Anecdotal evidence in the kitchen is insufficient for the research scientist, while scientific literature is rarely relevant in the kitchen.

Therefore, the opportunity exists to continue to create meaningful bridges between food science and gastronomy.

b. An objective, measurable definition of a meringue does not exist. How can such a pillar of contemporary pastry be so poorly defined, and therefore understood?

This seemed a great opportunity to analyse the fundamental assumptions about what a meringue is and, more importantly, what it can be.

c. The recommended temperature for Swiss meringue can vary wildly.

Therefore, it is a great time to analyse the recommended temperatures, and perhaps establish a new benchmark.

d. The foaming properties of a protein are defined by its ability to adsorb at the air-water interface, and to generate a film that surrounds a gas bubble and stabilizes the gas phase

Therefore we should be paying attention to this film formation at a microscopic level. We recommend further

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research here. It seems that attention to the film formation and a better understanding of the mechanisms of its stability could significantly alter meringue methodology.

e. Foam stability is increased by reducing the mean bubble size.

Therefore we should understand what tools we have to control bubble size.

f. Prolonged whipping can increase instability in egg white foams.

Then perhaps we should analyse whipping time as part of the meringue recipe – and what about whipping temperature? !

g. The addition of sugar is expected to increase the temperatures of protein denaturation, as well as reduce the drainage.

Then how do we make a delicious meringue that is not too sweet?

Most importantly, the optimal conditions for meringue making do not seem to be established. So what was the response? We set out to make a new type of meringue that can be used for mousses, masking cakes, wafers, and other meringue based applications. Our priority was a delicious meringue that could be consumed in reasonable quantities without excess sweetness. A high priority initially was that this meringue should have a dense, fluffy, and mouth-filling texture. (In this end, our meringue was much lighter than anticipated, due in no small part to the greatly reduced sugar percentage.) We tested meringues to determine the optimal cooking temperature, protein content, sugar percentage, and whipping time.

Culinary concept: definition

The culinary concept of Balinese Meringue making is based on the understanding that a low pH sugar can aid foam formation and stability. The methodology of the meringue making, which includes high heat, and freezing prior to whipping, is designed to create a low sugar meringue.

Methodology of the culinary process

We also introduced a new concept in meringue formation: to chill the "meringue mix" (or meringue paste) below 0 °C prior to whipping. Our next step was to decrease the pH of the mix by using the uniquely low pH of our granulated coconut palm sugar from *Big Tree Farms* here in Bali. The average pH for the sugar batches is just under 5. The pH level of sugar is 7, as it is neither acid nor base. This means that the coconut palm sugar meringue will have a significantly lower pH.

We also measured overrun by whipping with a Kitchen Aid 5KPM50; holding time at common pastry identification of "stiff" peaks; weeping during resting time; and whether we thought the meringues were delicious. Our team of myself and two researchers carried out hundreds of meringue tests over the year. A cumulative forty years of meringue making were in the house. We measure stability as the meringue's ability to retain water, and therefore "usable" volume and mass. The meringues did not collapse at all, but the water leakage indicated weaker bonds.

Here is our recipe for Balinese Meringue:
352 g Water
298 g Coconut palm sugar, Big Tree (preferably ginger flavor)
350 g Egg white

Methodology

Fig. 1 shows the Balinese Meringue making process: Blend the ingredients in a vase blender. Strain and process in the Bravo Trittico (We used the Executive 183 – a unit which allows pasteurization in one chamber, followed by batch freezing in a second chamber.) to 84 °C. Mix with a hand held immersion blender for 1 min (we used a Cuisinart CSB77HK). Open the valve and allow the base to drain to the chilling section. Then freeze while churning to −9 °C. Extract the base, which will resemble a sorbet, and transfer it to the bowl of a stand mixer (we used a Kitchen Aid 5KPM50). Whip at high speed for 10 min, using a stem thermometer to ensure the temperature does not rise above 4 °C. Our overrun was 292.34%. This was the lower value of our two sets of tests.

At this point, you may pipe into meringue shells and dehydrate at 63–65 °C for 2–4 h, and then at 43 °C 12 h (Fig. 2). Alternatively, you can "quenelle" into liquid nitrogen for immediate service, taking care just to freeze the exterior (Fig. 3). It can also just be used as a dessert topping. If not using immediately, this meringue can be stocked in a freezer, and rewhipped as necessary (we used a Sub Zero residential grade freezer for storage).

Results of the culinary concept

Percentage protein

1. **Comparison between different concentrations of Egg White Protein with standard table sugar**.

The first test was conducted to determine the desired level of Egg White Protein (EWP). EWP was calculated as 10% of liquid egg white. The solids were held constant by adjusting the sugar content (Table 1). Fig. 4(a) shows the comparative overrun between the three different quantities of EWP in our "Meringue." The same process (described above in methodology section) was followed for all three bases. Fig. 4(b) shows the stability of the "Meringue" at ambient temperature (22 °C) by measuring the drainage over time.