APPLICATION NOTE 202003

Homgenization of Candy or Sweets for Porcine DNA Testing using the Bead Ruptor Elite

Protocol Snapshot

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Summary

Both Halal and Kosher standards forbid the consumption of products of porcine origin- including all foods, cosmetics and personal care products.

Pork based additives are more common that you might think- gelatin and other gelling agents are used in many processes as stabilizers, binders, thickeners, emulsifiers, and foaming agents. Gelatin, specifically, is found in foods like jellies, ice cream sweets or confectionary, cookies, and cakes, as well as in pharmaceuticals including capsules, tablets, lozenges, and creams or topical/transdermal medicines. Gelatine is made from the protein collagen. Collagens can be extracted from the skin, bones, and connective tissues of many animals [1, 2].

Porcine-derived collagen can be detected by extracting DNA prior to analysis using real-time PCR based genetic testing or peptide LC-MS/MS methods. Prior to DNA extraction, samples must be homogenized and fully dissolved. The traditional method for homogenizing a food sample is by hand, using a mortar and pestle. Only one sample at a time is milled, and the mortar and pestle must be thoroughly cleaned with hazardous reagents to ensure that there is no carryover between samples.

The Bead Ruptor Elite provides a high-throughput homogenization alternative. It is capable of processing 24 samples simultaneously, or up to 960 samples per hour. The system imparts high force on samples that results in a complete homogenate, suitable for further sample preparation and downstream analyses. Marshmallows, taffy, and gummy bears are sample matrices that are particularly challenging due to their sugary, chewy, sticky, gummy consistencies.

The Bead Ruptor Elite completely dissociates a variety of confectionary treats, including marshmallows and chewy, taffy candy, in as little as 60 seconds. Samples can be further prepared for porcine DNA analysis using the Tissue DNA Purification Kit or a similar DNA extraction kit.

Materials and Methods

Materials

- Bead Ruptor Elite (PN 19-040E)
- 2mL Tube Carriage Kit (PN 19-010-310)
- Hard Tissue Homogenizing Mix (PN 19-628)

with optional

- Tissue DNA Purification Kit, 50 preps (PN 26-007)

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Procedure

Weigh approximately 100 mg of marshmallow, White Rabbit taffy, or other candy/food samples and place in 2 mL Hard Tissue Homogenization tubes (PN 19-628). Add 500 µL of deionized water or other non-foaming diluents or buffers. Process using the Bead Ruptor Elite with 2 mL Tube Carriage, speed 5 m/s, 2 x 30 second cycles, with 10 second dwell time (Table 1).

Sample Type	Mass	Bead Kit	Optional Diluent	Speed (m/s)	Time (sec)	Cycles	Dwell Time (sec)
Marshmallow, Taffy or other elastic confectionary	~10- 100 mg	19-628	0.5 mL	5.0	30	2	10
Marshmallow, Taffy or other elastic confectionary	~100- 500 mg	19-628	0.5 - 1.0 mL	5.0	30	2	10

Table 1: Sweets/Candy Sample Homogenization Summary

Results

The tubes containing the gummy samples were run on the Bead Ruptor Elite using a pre-filled Hard Tissue Homogenization Kit (PN 19-628), at a speed setting of 5 m/s for 2 x 30 s cycles, with 10 second dwell.

Using 2 mL reinforced homogenization tubes on the Bead Ruptor Elite, wet milling of the sticky, chewy candy samples produced a complete homogenate ready for pipetting or automated liquid handling. Deionized water and PBS were suitable diluents. The protocol is compatible with a wide variety of non-foaming, aqueous diluents, including lysis buffers of commercial DNA extraction kits.

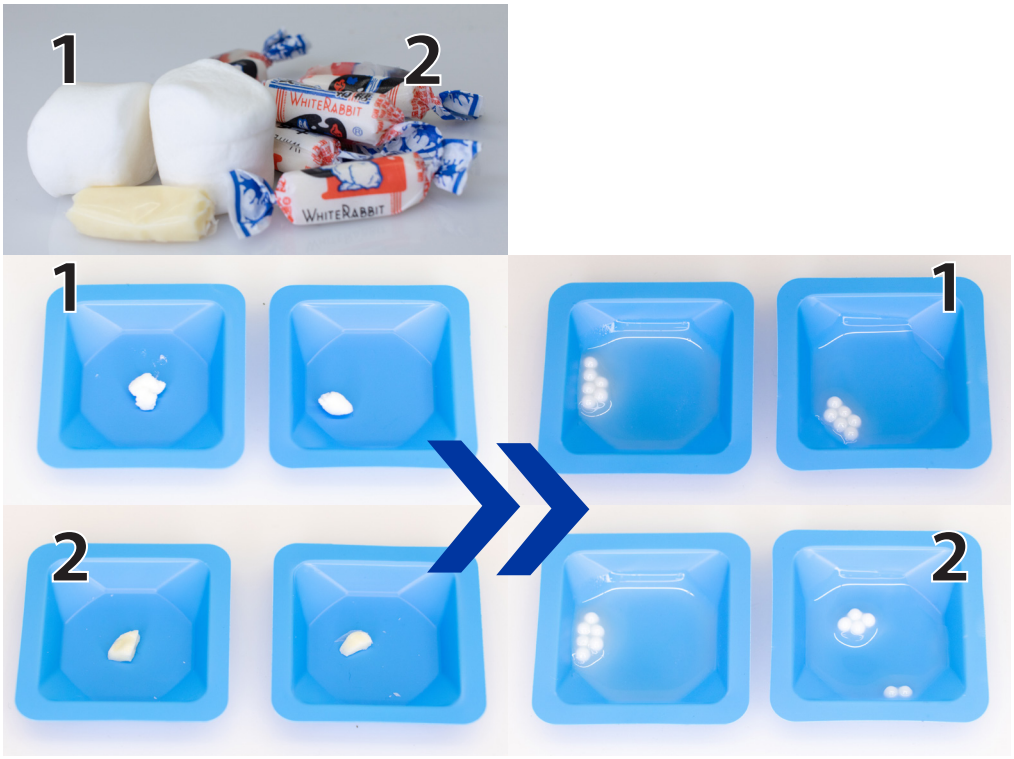

Figure 1: Images of sample before and after homogenization

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Conclusions

The Bead Ruptor Elite is fit for purpose for high speed, high throughput homogenization of difficult to process, gummy or chewy candy samples. Up to 960 marshmallow samples were processed in less than one hour using the Bead Ruptor Elite. The system ensures there is no sample carryover and reduces the use of hazardous cleaning solvents. Semi-automated sample homogenization with the Bead Ruptor produces a sample in standard 2 mL tube format that is ready for further sample preparation using manual techniques or even liquid handling robotics or automation. Compared to traditional mortar & pestle grinding methods, the Bead Ruptor Elite provides a more reproducible solution which is at least 5x more efficient than manual methods. Compared to basic bead beater and vortex mill systems, the Bead Ruptor Elite is robust, reliable and reproducible. The ergonomic, front load design and zero maintenance motor are robust and reliable.

References

[1] J Jaswir, Irwandi & Mirghani, Mohamed & Salleh, Hamzah & Ramli, Noriah & Octavianti, Fitri & Hendri, Ridar. (2016). An Overview of the Current Analytical Methods for Halal Testing. 10.1007/978-981-10-1452-9_27.

[2] Bailey, L. (2014). Food News International, Did You Know: How Halal food testing is done? https://foodnewsinternational.com/2014/08/01/did-you-know-how-halal-food-testing-is-done/

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