

## Whole Muscle and Chopped and Formed Beef Jerky

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### Summary

- One half of a strip of whole muscle (WM) or chopped and formed (CF) beef jerky was cut into an intact hexagonal shape with a diameter of approximately 3.2 cm (Treatment 1), while the second half of each strip was diced into pieces approximately 0.4 cm X 0.4 cm (Treatment 2).
- The intact hexagonal shape or diced pieces were placed in a water activity ( $a_w$ ) sample cup so that the bottom of the cup was thoroughly covered.
- An intact hexagonal shape (Treatment 1) of WM jerky had a higher average  $a_w$  by 0.01 units ( $P < 0.001$ ) than diced pieces (Treatment 2) of WM jerky.
- However, using an intact hexagonal shape or diced pieces of CF jerky did not influence  $a_w$  results.

### Background

For product to be labeled as jerky, it must have a moisture-protein-ratio (MPR) of 0.75:1 or less. The USDA/FSIS jerky compliance guideline recommended that MPR be used for the determination of drying, while  $a_w$  is critical for controlling growth of pathogens. Due to the ability of *Staphylococcus aureus* to produce toxin at an  $a_w$  as low as 0.85 as well as incidence of *Salmonella* spp. in jerky, FSIS stated that jerky should be dried to an  $a_w$  level of  $\leq 0.80$ . However, a standardized method for preparing samples for  $a_w$  determination has not been defined for jerky.

### Preliminary Study

- WM beef jerky from four retail suppliers was evaluated to determine the effect of sample preparation on final product  $a_w$  levels.
- Preliminary results showed that sample preparation influenced  $a_w$  levels by 0.015 units ( $P < 0.001$ ).

### Objective

- To determine if sample preparation (intact hexagonal shape or diced pieces) of WM and CF beef jerky would influence finished product  $a_w$  measurements.

### Materials and Methods

- WM and CF beef jerky from two suppliers was purchased from retail stores (six bags per lot and two lots per supplier).
- A strip of WM or CF jerky was cut in half to produce paired samples for Treatment 1 and Treatment 2.
- Treatment 1 (Figure 1) consisted of a strip of WM or CF jerky cut into an intact hexagonal shape with a diameter of approximately 3.2 cm while Treatment 2 (Figure 2) consisted of dicing the second half of the strip into pieces approximately 0.4 cm X 0.4 cm.

### Materials and Methods (cont.)

- Pieces were then placed to thoroughly cover the bottom of  $a_w$  sample cups.
- $a_w$  was measured using an Aqualab CX2  $a_w$  meter (Figure 3).
- Duplicate readings were taken of each sample, with three samples/treatment/package.
- Data were analyzed using the mixed procedure of SAS (Version 9.1, SAS Inst., Cary, N.C.).

Figure 1. Treatment 1 (intact hexagonal shape) in  $a_w$  sample cup.



Figure 2. Treatment 2 (diced pieces) in  $a_w$  sample cup.



Figure 3. Model CX2 water activity meter (Aqualab, Pullman, WA)



### Results

- $a_w$  level was higher by 0.01 units for samples prepared as an intact hexagonal shape (Treatment 1) compared to diced pieces (Treatment 2) for WM jerky ( $P < 0.001$ ), regardless of supplier (Table 1).
- Similar  $a_w$  values were observed for samples prepared as an intact hexagonal shape (Treatment 1) or diced pieces (Treatment 2) in CF jerky, regardless of supplier (Table 2).
- All products evaluated had  $a_w$  levels below the FSIS jerky guidelines of  $\leq 0.80$ .

Table 1. Means and standard deviations of  $a_w$  results for whole muscle (WM) beef jerky based on sample preparation and supplier.

Whole Muscle Beef Jerky	Sample Preparation	
	Intact Hexagonal Shape (Treatment 1)	Diced Pieces (Treatment 2)
Supplier 1	0.767 ± 0.012 <sup>a</sup>	0.756 ± 0.020 <sup>b</sup>
Supplier 2	0.728 ± 0.019 <sup>a</sup>	0.718 ± 0.026 <sup>b</sup>

<sup>ab</sup> Means are significantly different ( $P < 0.001$ ) across columns.

Table 2. Means and standard deviations of  $a_w$  results for chopped and formed (CF) beef jerky based on sample preparation and supplier.

Chopped and Formed Beef Jerky	Sample Preparation	
	Intact Hexagonal Shape (Treatment 1)	Diced Pieces (Treatment 2)
Supplier 1	0.709 ± 0.062 <sup>a</sup>	0.710 ± 0.062 <sup>a</sup>
Supplier 2	0.650 ± 0.017 <sup>a</sup>	0.652 ± 0.016 <sup>a</sup>

<sup>a</sup> Means are not significantly different ( $P < 0.001$ ) across columns.

### Conclusions

- Jerky processors should use the more conservative technique of preparing samples using an intact hexagonal shape (Treatment 1) rather than diced pieces (Treatment 2) when measuring  $a_w$  of WM beef jerky, especially if the  $a_w$  value is near the margin of safety.
- Either of the two sample preparation techniques evaluated, an intact hexagonal shape (Treatment 1) or diced pieces (Treatment 2), could be used to measure  $a_w$  of CF beef jerky without influencing the final  $a_w$  result.

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### References

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