

## Sensory analysis of intense pulsed light treated milk powder and wheat flour

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Does IPL change the sensory properties of the food?  
And if so, How?

- Powdered milk
  - As powder
  - As reconstituted
- Refined wheat flour
  - As powder
  - As a cooked flour + water white sauce

### Materials and Methods

- Powders produced by Professor Ruan and his team involved with building the IPL apparatus
- Experiments to study the effects of different operating conditions.

### Participants

#### Members of our trained panel

- PROP tasters
- Trained to use calibrated scales for aroma and for taste/ flavor intensity
- Established the evaluating procedure
- Generated lexicon for describing IPL-treated milk powder and flour.

Lexicon for powdered milk



Aroma 1	Aroma 2	Taste	Flavor	Texture
Overall Int.	Smoky	Saltiness	Overall Int.	Stickiness
Cardboard	Sour milk	Sweetness	Milk Fat	
Sour milk	Vanilla	Sourness	Cardboard	
Animal	Burnt	Bitterness	Nutty	
Barn		Umami	Smoke	
Metallic			Musty	
Chemical			Beef Broth	
Sulfur			Burnt	

Sample Preparation

- ❑ Powders packaged in glass jar covered with foil and lid
- ❑ Stored at -20 °C
- ❑ Reconstituted milk prepared by mixing 50 g milk powder with 450 ml water at room temp. Allowed to sit for 20 min before tasting.
- ❑ White sauce prepared by mixing 18 g of wheat flour into 500 ml of water, heating to 95 °C, then holding for 15 min.

Sample Presentation



Evaluation Procedure



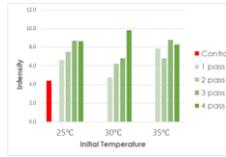
- ❑ Line scale (0 = none, 20 = intense)



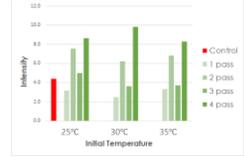
## Results – milk powders

Several sensory attributes were noticeably increased due to the IPL treatment.

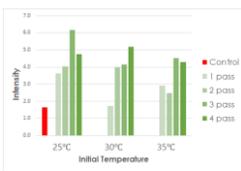
### Overall Aroma



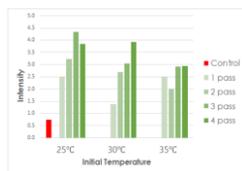
### Cardboard Aroma



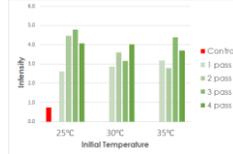
### Animal Aroma



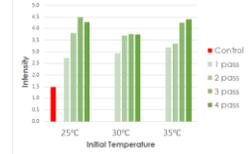
### Sulfur Aroma



### Burnt Aroma



### Burnt Flavor





### Appearance

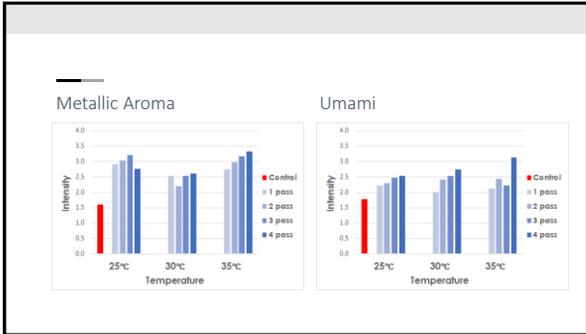
Results of 2-out-of-5 test

Pair of Samples	Correct answers	Total answers
Control vs 4p35C	0	9

Samples were separated in two groups according to the similarity in appearance

### Results – reconstituted milk

Notable differences between the control and the treatments, but somewhat smaller magnitude than seen for the milk powders.





Results – refined wheat flour and white sauce

Products tested

**IPL treated wheat flour**

vs. **No treatment**

vs. **UV treatment**

Lexicon

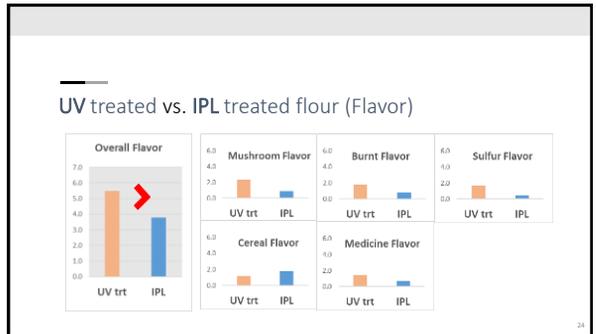
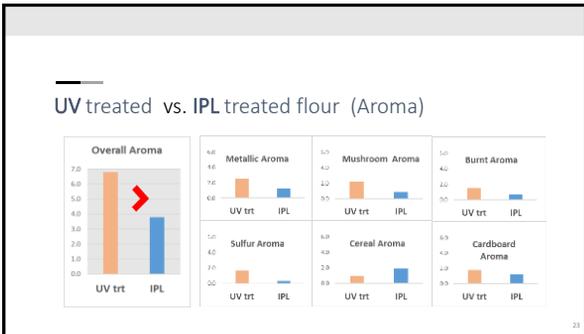


Aroma		Taste	Flavor		Texture	Aftertaste
Overall	Sulfur	Salliness	Overall	Chalky	Graininess	Sourness
Metallic	Nutty	Sweetness	Mushroom	Cardboard	Stickiness	
Hay	Cereal	Bitterness	Burnt	Medicine		
Yeasty	Chalky	Umami	Soy			
Mushroom	Cardboard		Sulfur			
Burnt	Medicine		Nutty			
Soy			Cereal			

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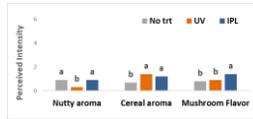
Results – refined wheat flour

- No differences between the untreated control and any of the IPL treatments
- The UV treatment had higher intensities than the control for 14 of the sensory attributes.





## Results – white sauce



- IPL treatment had more cereal aroma and more mushroom flavor than the control.
- The UV treatment had more cereal aroma intensity and less nutty aroma than the control.
- Changes can be expected to occur when the product is further heated, combined with other products, stored.....

## Takeaways

- 1 IPL-treatment produced considerable flavor damage compared to untreated milk powders. Many of these differences remained when the milk powders were reconstituted.
- 2 Sensory quality of IPL treated flour was similar to the unprocessed wheat flour
- 3 UV-pasteurized flour had more flavor damage than IPL-treated flour.
- 4 Changes in sensory properties will depend on the product