Study on colour stability in Tandoori Chicken
STUDY ON COLOUR STABILITY IN TANDOORI CHICKEN

The secret ingredient to improve the vibrancy & appeal of meat applications

Global meat production is projected to be 16% higher in 2025 than in the base period (2013-15). This compares with an increase of almost 20% in the previous decade. Developing countries are projected to account for the vast majority of the total increase, through a more intensive use of protein meal in feed rations. Low production costs and lower product prices have made poultry the meat of choice, for both producers and consumers in developing countries. Processed meat is any meat which has been modified to improve its taste or extend its shelf life. Innovative processing methods like salting, curing, fermentation and smoking have resulted in manufacturers creating products that meet consumer demand for longer shelf life in meat with great visual appeal.

Meat colour is significant to consumer acceptance of products hence natural food colours are used at various stages of the process to make it attractive, appealing, appetising, and informative. Over the past decade, manufacturers have started to switch from synthetic dyes such as FD&C’s to natural alternatives including the processed meat category. More than 26,000 meat products are launched globally, coloured using paprika, turmeric, annatto, beta carotene and redbeet. The most used natural colour in this category is paprika which gives a reddish orange shade to the final product.

When using natural colours in processed meat, technical challenges always persist. These challenges include cost in use, processing conditions, interaction with other ingredients, heat stability (undergo pasteurisation (~ 80°C)), light stability and colour change for various pH values and interaction with oxygen. The regulation in various countries approve various naturally derived colourings to be used in processed fish, meat & egg products. While natural colours for meat applications come with challenges (no different than other food products), Kancor and Mane works together to find the best solution.

Kancor and Mane have been able to uncover a variety of solutions to naturally colour meat and poultry products, through the line of natural colours - C-CAPTURE. It includes a wide range of colours such as turmeric (yellow), a host of carotenoids including annatto, paprika and beta-carotene (yellow, orange and reddish orange), beet juice concentrate (pink), fruit and vegetable juices (red to purple) to name a few. In addition, the company offers spirulina (blue), several sodium copper chlorophyllin (green) options, caramel and other customised blends depending on application, market location and desired hue. Kancor’s expertise in in-house extraction, isolation, purification and blending processes, creates shades that are consistent in hue and stable in virtually any food and beverage matrix.

Kancor’s colour stabilisation process is a synergistic play of carefully controlling the processing technology on one hand and the addition of an in-house functional ingredient like OxiKan on the other. Kancor uses advanced controlled size technology that creates formulations without the addition of extra ingredients, thereby minimising the instability caused by these ingredients interacting with each other and with the food matrix thus making each product as label-friendly as possible.

Meat and poultry processors prefer to use shades like yellow or reddish orange from annatto turmeric blends on the surface of cooked poultry to give it a more authentic and appealing look. Applications can be direct which include tandoori, barbeque, rotisserie or roasted. It can also be included to spice blocks, seasonings and marinades.
The below study compares synthetic dyes (Sunset yellow & Carmoisine blend) with C-CAPTURE’s Sunrise series.

**OBJECTIVE:**

An application trial in Tandoori chicken comparing sample 1 (coloured using C-CAPTURE Sunrise series - Annatto blend) and sample 2 (coloured using synthetic colour E110+E122)

1. To compare colour impartation between a sample of C-CAPTURE’s Sunlight series and sample using synthetic colour in actual application.

2. To establish a dosage pattern for Tandoori application.

3. To check colour stability after grilling.

**FORMULA - Tandoori Chicken**

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>INGREDIENTS</th>
<th>SAMPLE 1</th>
<th>SAMPLE 2</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Weight</td>
<td>%</td>
</tr>
<tr>
<td>1</td>
<td>Chicken</td>
<td>190.5</td>
<td>81.96</td>
</tr>
<tr>
<td>2</td>
<td>Seasoning</td>
<td>7.62</td>
<td>3.28</td>
</tr>
<tr>
<td>3</td>
<td>Curd</td>
<td>28.6</td>
<td>12.3</td>
</tr>
<tr>
<td>4</td>
<td>Lemon Juice</td>
<td>1.9</td>
<td>0.82</td>
</tr>
<tr>
<td>5</td>
<td>Ginger Garlic Paste</td>
<td>3.81</td>
<td>1.64</td>
</tr>
<tr>
<td>TOTAL</td>
<td></td>
<td>232.43</td>
<td>100</td>
</tr>
</tbody>
</table>

Formulation details – All colour samples were mixed with seasoning powder which was used to flavour the product. Dosage maintained in seasoning powder was 0.625%. This dosage will provide 250 ppm colour in the final product.

**OBSERVATION:**

1. It is clear from the above pictures that the colours of both samples in marinated stage and after grilling were almost the same with sample 1 using C-CAPTURE, giving a more orange appearance.

2. Dosage requirement for Tandoori application is 250 ppm in the final product.

3. Colour samples were found stable in grilling at about 120°C.

**CONCLUSION:**

1. It is clear from the above pictures that the colours of both samples in marinated stage and after grilling were almost the same with sample 1 using C-CAPTURE, giving a more orange appearance.

2. Dosage requirement for Tandoori application is 250 ppm in the final product.

3. Colour samples were found stable in grilling at about 120°C.
PROCEDURE:

Two samples were made:

Sample 1: Coloured using C-CAPTURE Sunrise series - annatto blend
Sample 2: Coloured using synthetic colour E110+E122

After preparation, samples were compared in terms of end product colour visually.

The trial consisted of the following steps:

1. Preparation of seasoning powder with C-CAPTURE colour sample, spices, salt and other additives.
2. Marinating and grilling of chicken
3. Evaluation and comparison

Each step is detailed below:

1. PREPARATION OF SEASONING POWDER

We prepared two seasoning powders:

Sample 1: Coloured using C-CAPTURE Sunrise series - annatto blends
Sample 2: Coloured using synthetic colour E110+E122

The two samples contained colour at a dosage of 0.625%. We used 4% seasoning powders for the marination of chicken and the dosage was kept the same for all.

2. MARINATION AND GRILLING OF CHICKEN

1. The chicken was rinsed in water.
2. Excess fat deposits were cut and removed using a knife.
3. Weighing of ingredients was done as per the formulation which was mentioned in the above section “Formula”.
4. Seasoning powder was divided into parts.
5. One part was used to coat chicken pieces. Another part was utilised for the preparation of Tandoori batter. The batter contains hung curd, lemon juice, half part of seasoning and ginger garlic paste.
6. Chicken pieces were coated with above mentioned seasoning powder first. Then it was coated with Tandoori batter. Marinating time was two hours.
7. The grill was preheated.
8. Chicken pieces were arranged on a roasting tray and grilled for 30 minutes.
9. The chicken was turned periodically during the grilling process.
10. After the grilling process, the chicken was evaluated organoleptically.