A Smoother Transition from Red 40 or Carmine to Natural Red in Cakes

Case Study

Summary

As industrial cake manufacturers transition away from non-vegan or artificial food colours such as carmine and Red 40, there is a growing opportunity for manufacturers to embrace natural alternatives that align with clean label ingredient expectations and evolving regulations.

These natural colour solutions often face challenges in the bakery sector due to their sensitivity to heat during baking and their pH level. ZEUS™ ColourMax baking powder addresses these challenges by creating optimal conditions for natural pigments during baking. It ensures consistent leavening while stabilising colour performance, enabling manufacturers to achieve vibrant reds with lower colour dosages, reducing costs without compromising quality.

What ZEUS™ ColourMax Can Do For You

- Enable the switch from synthetic or non-vegan reds to natural, through a smoother development process
- Achieve a vibrant external and crumb colour that customers expect, driving sales
- Reduce natural colour dosage levels below standard recommendations to support cost optimisation
- Deliver optimised leavening for improved structure and volume

Our ZEUS™ ColourMax can be used with a wide range of clean-label colours from natural sources.

Background

Colour plays a critical role in the consumer perception of baked goods. In products such as cakes, muffins, and premixes, vibrant reds are traditionally achieved using synthetic dyes such as Allura Red AC (Red 40 / E129) or natural insect-derived pigments such as carmine (E120). These ingredients have historically been popular due to their heat stability, strong colouring, and relatively low cost, making them ideal for high-temperature and neutral pH bakery processes.

However, evolving consumer expectations, regulation changes, and global shifts toward cleaner labels are increasing. This is pushing manufacturers to explore alternative solutions to these colours. Across multiple markets, the use of synthetic dyes and animal-derived colours is being challenged by:

- **New legislation**
- **Stricter labelling requirements**
- **Changing consumer preferences**

In the UK, manufacturers must carry the mandatory warning "may have an adverse effect on activity and attention in children" if the product contains E129 as a colour. Although not banned, the warning label has had a major commercial impact. Many European manufacturers voluntarily reformulated products to remove these colours to avoid the label, accelerating the shift toward natural alternatives.

This stance is spreading globally, with countries such as the US implementing legislation to remove petroleum-based dyes in food products and major manufacturers such as Conagra Brands, Inc., and General Mills, Inc pledging to remove these colours in their long-established brands.

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The Challenge

For industrial cake and premix manufacturers, the transition away from Red 40 and carmine can involve both regulatory compliance and technical reformulation.

Using plant-based reds offers an appealing natural alternative, but they can present technical challenges in bakery applications, as we discussed here. Many natural pigments, such as betanin from beetroot, are sensitive to both heat and pH conditions. During baking, this sensitivity can lead to pigment degradation, causing vibrant reds to fade or shift toward brown tones.

To maintain the desired colour intensity, manufacturers can increase the dosage of the colourant, which can significantly increase ingredient costs. Another common approach is to adjust the formulation by lowering the cake's pH with additional acid to help stabilise the pigment. However, modifying acidity can negatively influence the leavening system. Higher acid levels will trigger earlier gas release during mixing or baking, which will impact batter stability and ultimately affect the rise, structure, and overall quality of the finished cake.

The Solution

Our solution is ZEUS™ ColourMax baking powder, a leavening technology designed to create the right conditions for natural red colours in baked products.

When a standard baking powder is used, natural colours can degrade during baking as heat and pH changes affect the pigment. By replacing the standard baking powder with ZEUS™ ColourMax, cakes are evenly and reliably leavened while also providing a more suitable environment for natural colours. This helps maintain brighter, more stable red shades in the final bake.

Natural colours are often used at higher dosages than synthetic or insect-derived colours to achieve the same visual impact. Increasing these levels can raise the ingredient cost of the recipe exponentially. With the switch to ZEUS™ ColourMax baking powder, we have demonstrated that natural colour dosages can be reduced, compared to recommended dosages, while still achieving strong, vibrant results.

The table below shows a typical colour dosage in an industry recipe:

Colour Dosages – Total Recipe %

Red 40	Carmine	Natural Red (Recommendation for this Colour)	Natural Red with ZEUS™ ColourMax
0.1%	0.2%	5.0–7.0%	0.5%

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Synthetic/Non-Vegan Colours

Red 40 – 0.1%
Standard Baking Powder



Carmine – 0.2%
Standard Baking Powder



Natural Colours – Beetroot (Betanin)

Beetroot Red – 0.5%
Standard Baking Powder



Beetroot Red – 0.5%
ZEUS™ ColourMax



Switching from a more traditional, standard baking powder to ZEUS™ ColourMax in this recipe provided clear benefits, such as:

1. Maintaining a **vibrant red crumb** to rival the synthetic and non-vegan options
2. Improved crumb structure, **maintaining product quality** and consumer preferences
3. A **90% reduction** in natural colour cost compared to the recommended dosage

Additional benefits that ZEUS™ ColourMax provides, to further future-proof your recipe:

Phosphate-free | Aluminium-free | Low-sodium

Conclusion

ZEUS™ ColourMax baking powder enables manufacturers to successfully transition to natural red colours without compromising performance or cost. By stabilising pigments during baking and supporting consistent leavening, it delivers vibrant, reliable results while reducing the need for high natural colour dosages, helping balance clean label goals with product quality and efficiency.

If you'd like to learn more about how ZEUS™ ColourMax can help optimise the natural colours in your products, get in touch with our experts today at info@kudosblends.com or +44 (0)1299 271 333.