



Food Solutions

Catering for 'flexitarians'!

Designing next generation meat-free products

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Catering for 'flexitarians'!

Today's consumer is increasingly likely to be one of the new wave of flexitarians – non-vegetarians who nevertheless regularly enjoy a meat-free meal. With rising demand for high quality vegetable protein-based products, there's a growing opportunity for food manufacturers to create meat substitutes that cater for consumer demands as well as stand up to tough processing requirements.

Yet alongside that trend comes a growing demand for 'allergen-free' products – and with many existing meat alternatives containing soy, gluten and egg, recipe designers are faced with a dilemma. **METHOCEL™ stabilizers from Dow contain specific solutions to help address that challenge, as internal test results demonstrated within this White Paper explain.**

With many people looking for alternative sources of proteins in order to reduce meat consumption - or to avoid food allergens such as egg - METHOCEL™ portfolio offers food producers easy-to-use and cost-effective solutions to replace eggs and other stabilizers. With the entire product family suitable for vegetarian and vegan formulations, the cellulose-based products help to improve texture, bite, structure and mouthfeel of reformed and emulsified vegetarian options at the same time as offering a cost-effective solution to egg replacement.

So, are you ready to meet METHOCEL™ and find out more?

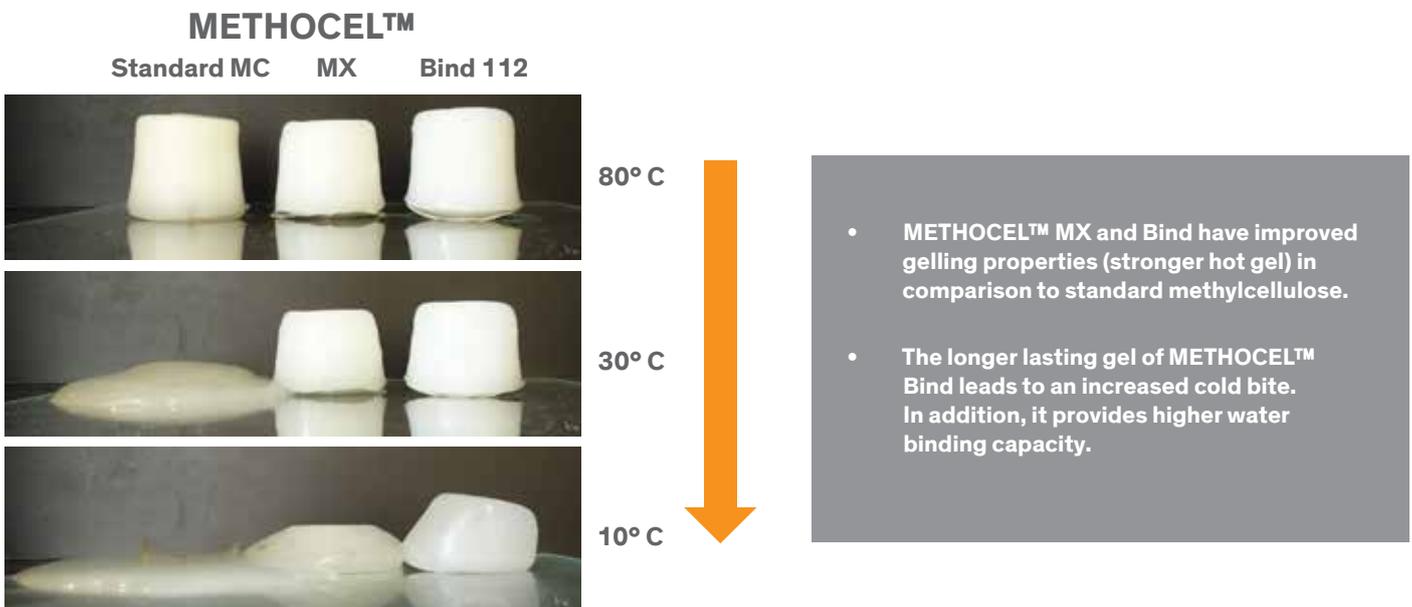
Meet METHOCEL™: supporting creation of new wave vegetarian and vegan products

METHOCEL™ product line is composed by cellulose derivatives™ with ability to provide high performance binding, foaming, heatsetting and stabilization to several food applications.

Differentiated methylcellulose grades from Dow have outstanding binding and stabilizing properties, making them incredibly useful in design of vegetarian and vegan products. With latest innovation METHOCEL™ Bind now joining established grades such as **METHOCEL™ MX** and **METHOCEL™ SuperGel**, food manufacturers have access to a new class of stabilizers, supporting rising demand for high quality vegetarian options.

Differentiated METHOCEL™ grades: enabling stronger hot gels and long lasting gelling behavior

The combined properties of **thermal gelation** (strong gels at hot temperature), **emulsification** and **water binding capacity** make these differentiated METHOCEL™ grades a superior option for emulsified and reformed vegetarian products:



Key benefits of METHOCEL™

- Viscosity at cold temperature increases cohesion and facilitates the forming process
- Excellent hot structure for great bite and stability
- Water is released during thermal gelling, carrying flavors and leading to a juicy bite and succulent mouthfeel
- Water retention capability helps provide freeze/thaw stability
- Cost effective stabilizer to replace egg white

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METHOCEL™ versus egg white: comparing binder options

With their excellent binding ability, METHOCEL™ MX, Bind and SuperGel solutions can be used to replace egg white in many vegetarian and vegan applications, offering a cost-effective alternative whatever the matrix used - whether vegetable proteins, cereals, legumes, vegetables or nuts.

Egg white	METHOCEL™
Not vegan	Vegetarian and vegan
Permanent gel	Reversible hot gel
Dry to eat	Succulent whether hot or cold
Microbiological difficulties	Microbiologically stable and pure
Chill storage required for fresh eggs	Dry long life storage
Food scares (avian flu, feed issues)	Plant based product
Allergen	Non allergenic
Label friendly subject to egg issues	E-number declaration (E461)
Cost-in-use: high and fluctuates	Reduced cost-in-use
Availability problems	Reliable availability

Application example: egg white replacement in reformed soy patties

Several internal trials were performed to compare METHOCEL™ Bind and MX performance versus egg white in soy patties. The overall results confirmed the ability of both products to successfully replace egg in this application.

METHOCEL™ and high gel egg white powder were tested as stabilizers to produce soy based patties on a laboratory scale. Chilled water (~0° C) was used to ensure the optimal dissolution of METHOCEL™.

1. Cold structure – forming process

Patties are usually formed and then transported on a conveyer belt before frying: stability of the formed food is key during this forming and transportation process.

The binding ability was tested by forming raw patties with a burger press. Stability was tested by placing the patties on a beaker for five minutes.



1% METHOCEL™



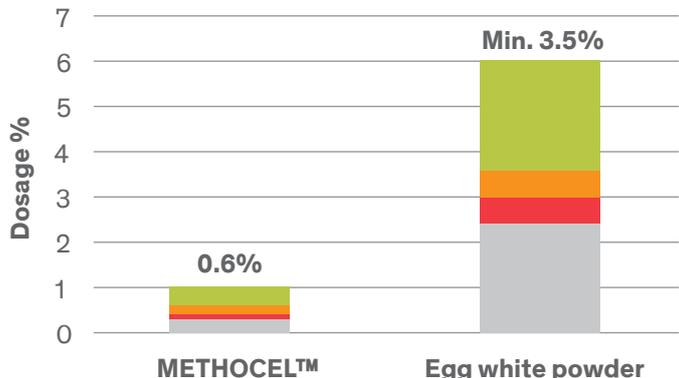
3% high gel egg white

- All METHOCEL™ products (1%) provided stability to the raw soy patties.
- The egg white patties (3%) were very crumbly and collapsed immediately.

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2. Hot stability – pan-frying process

Different concentrations were tested to determine the optimum dosage levels needed to provide hot stability.



Dosage optimization study based on Beaker test with pan-fried patties

Internal trials, Germany – April 2016

Beaker test with pan-fried patties

Internal trials, Germany – April 2016

- Untested dosages
- Patties not stable
- Patties partially stable (> 5min)
- Patties stable (> 5min)

- METHOCEL™ requires significantly lower dosage levels in comparison to egg white powder.

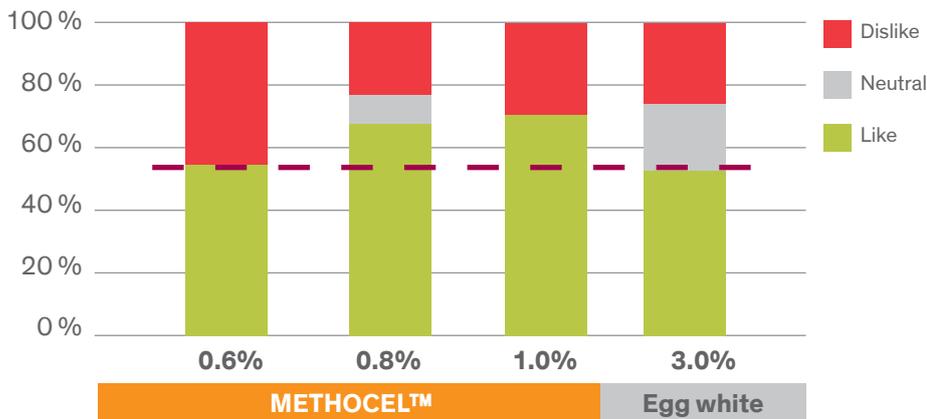
This represents a reduction in stabilizer cost of up to 50%.

- Recommended METHOCEL™ dosage 0.6 – 1%.

3. Sensory evaluation

The soy patties containing either METHOCEL™ or egg white powder were also evaluated in an internal consumer panel. The samples were evaluated at warm eating temperature, immediately after frying.

The method used was a nine-point Hedonic scale (overall liking) with 16 non-trained participants based in Germany: eight men and eight women, aged between 18 and 60.



- Soy patties prepared with METHOCEL™ or egg white powder were liked similarly.

Sensory evaluation (nine-point Hedonic scale) of pan-fried patties

Internal trials, Germany – April 2016

The results showed **no significant differences** in overall liking for all tested soy patties. Another sensory evaluation performed with the same samples using the “Just About Right Scale” showed that the soy patties containing METHOCEL™ were perceived to have a juicier mouthfeel than the ones containing egg white. These results suggest METHOCEL™ offers advantages in comparison to egg white in terms of dry mouthfeel.

Conclusions

Internal trials carried out at Dow confirmed the ability of METHOCEL™ to successfully replace egg white in meat-free patties, reducing stabilizer cost by up to 50%.

In summary:

- METHOCEL™ is a plant-based stabilizer suitable for vegan and vegetarian applications which provides similar binding performance of egg white at a lower cost.
- METHOCEL™ provides better cold stability than egg white, facilitating the forming process.
- The dosage levels of METHOCEL™ needed to stabilize the soy patties at hot conditions were significant lower (0.6-1%) in comparison to egg white (min. 3.5%).
- The sensory results showed no significant differences in overall liking for soy patties formulated with METHOCEL™ or egg white. However, samples containing METHOCEL™ were described to have a juicier mouthfeel.

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