Eminate

Taking initial ideas to licensing deals

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Eminate Ltd

What we will cover today

- Introduction to Eminate Ltd
- Soda-Lo Case Study
- Future Developments?
- Questions / Discussion

Introducing Eminate Ltd

What is Eminate Ltd?

- Eminate Ltd is a wholly owned subsidiary of The University of Nottingham
- The company's purpose is to Identify, Develop, Protect and Exploit IP from Eminate R&D teams, Universities and SMEs
- We have a specific market focus:
  - Food & Ingredients
  - Engineering Powders and Coatings
- The company has offices, research labs and pilot scale production facilities in Nottingham

What does a multinational want?

- Open Innovation = someone else (University, SME, etc)
  - Coming up with a novel Idea
  - Protecting it
  - Testing it / finding its limits
  - Making it at commercial scales
  - Selling it (repeatedly) to relevant customers
- University's are really good at the first half of this
- The second half is *not* core business

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9 Steps to From Lab to Licence

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- Sell “a few” Tonnes of product
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- Excite a multinational to take the thing off your hands
- Celebrate appropriately

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Which does the University do well?

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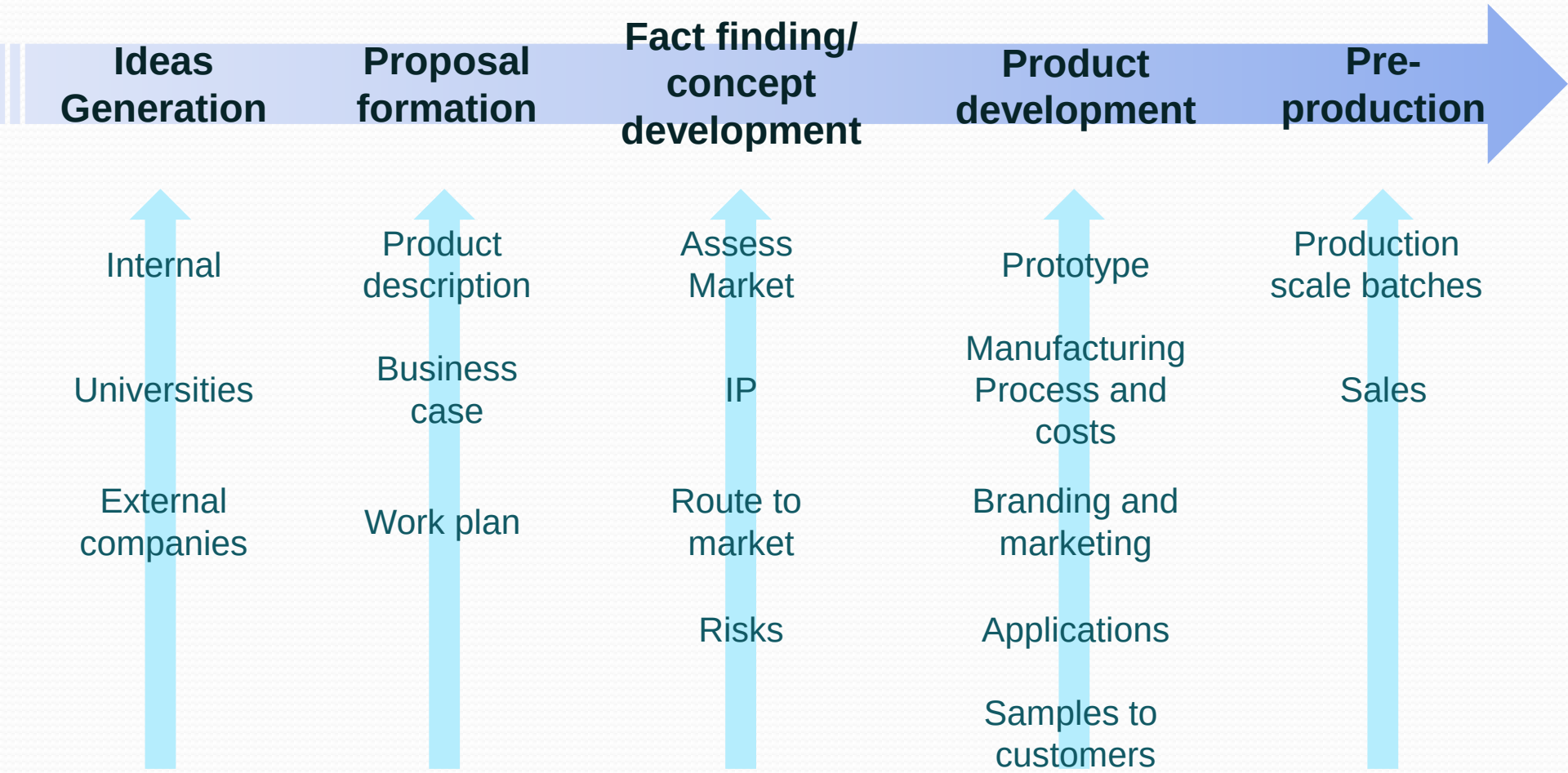
Internal Stages (0 – 3b)



Reasons for halting process?

- Weak business case
- IP landscape
- Too expensive to manufacture
- Can’t manufacture at scale
- Applications do not work
- Poor/negative customer feedback
- . . .

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Eminate Skills & Facilities

- Commercially experienced staff with knowledge of:
  - Food Science
  - Chemistry
  - Pharma
  - MicroBiology
  - Product Development (including chef, taste panels, etc)
  - Engineering Powders & Coatings
  - Running and growing spin-outs / start ups
- Board Members include FTSE 100 / 250 Execs
- Laboratory & Measurement Facilities (including SEM)
- Pilot Scale Production Facilities
- ISO9001 QMS (TBC)

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Current Engagement with SB

- We are currently engaging with some academics here at Sutton Bonington but always looking for new collaborations:
  - Collaborating with other SMEs at SB
  - TSB Project with Ian Fisk and Flavometrix
  - DEFRA LINK Award with David Gray
  - Working with Tim Foster to exploit IP
  - Talking with Judith Wayte re MSc supervision
  - Sponsoring PhDs which Tim Foster and David Gray

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The Development and Exploitation of Soda-Lo

A Case Study

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Reduction of sodium

- Food Standards Agency/Department of Health
  - Set targets to reduce salt (sodium) in processed food
  - Industry responded – by reducing sodium chloride using methods such as stealth, replacement with potassium or other ingredients
  - Finding it difficult to reduce levels further yet Clinicians advise lower levels of sodium needed

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Issue – Public Health vs Product

- Consumption of sodium is too high vs salt needed
  - Cardiovascular disease vs
  - Taste, function (e.g. Bread), shelf life
- Government/regulators pressuring Industry
  - e.g. FSA 2012 guidelines, EFSA/FDA following.
  - Many available solutions pose their own problems
    - Taste (key for brands)
    - Functionality (e.g. Bread)
    - Further ‘health’ issues (e.g. Potassium, Magnesium need label declaration)

Et voila . . . Soda-Lo

- The development of a new crystalline form of common salt
- Reduced particle size gives higher impact salt flavour and better distribution within food
- Hollow out particles to provide less salt
- Use standard industry processes
- Ensure clean label and natural ingredients
- Ensure long shelf life of free flowing powder

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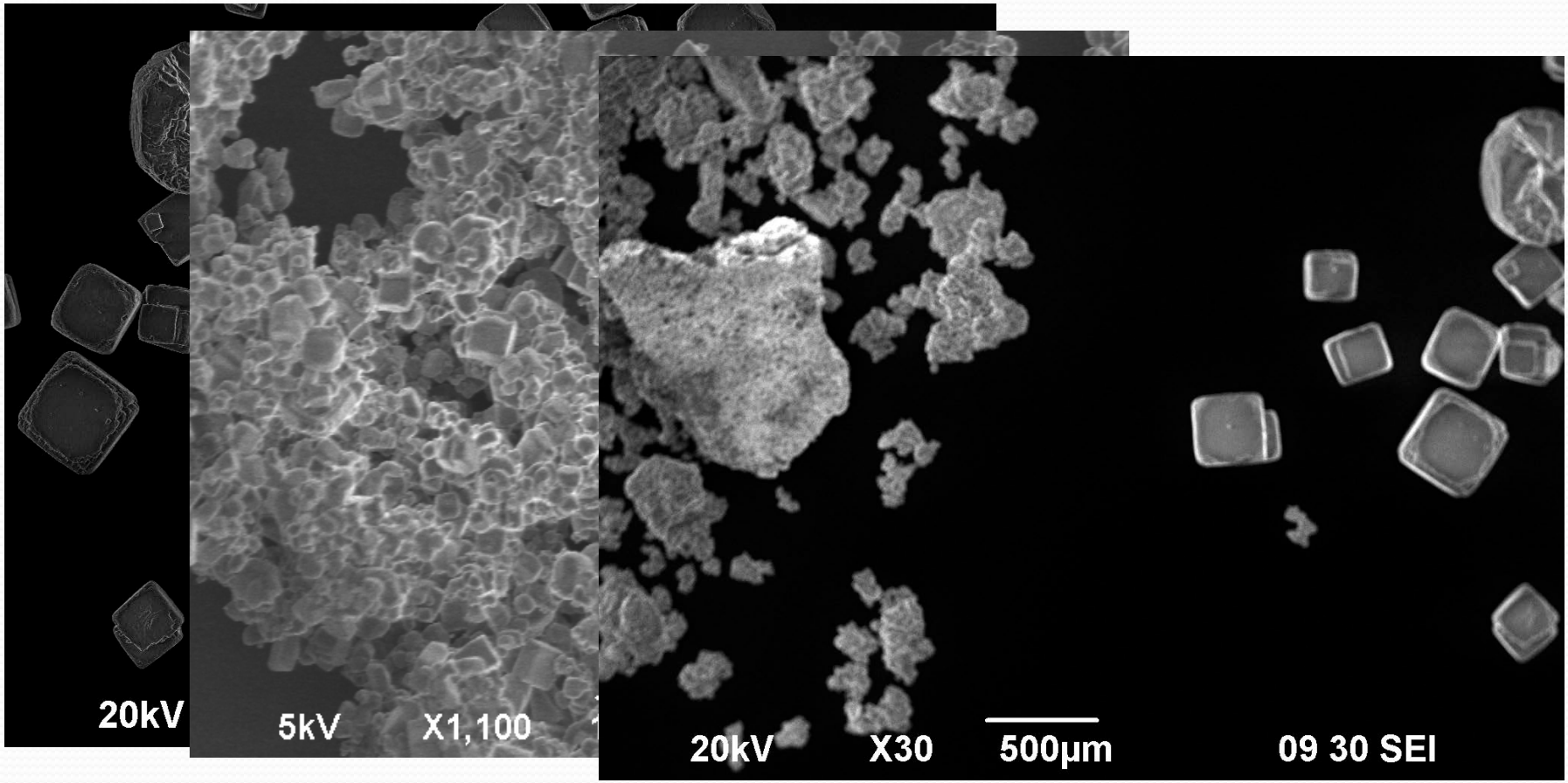
Table Salt >Milled Salt >Agglomeration



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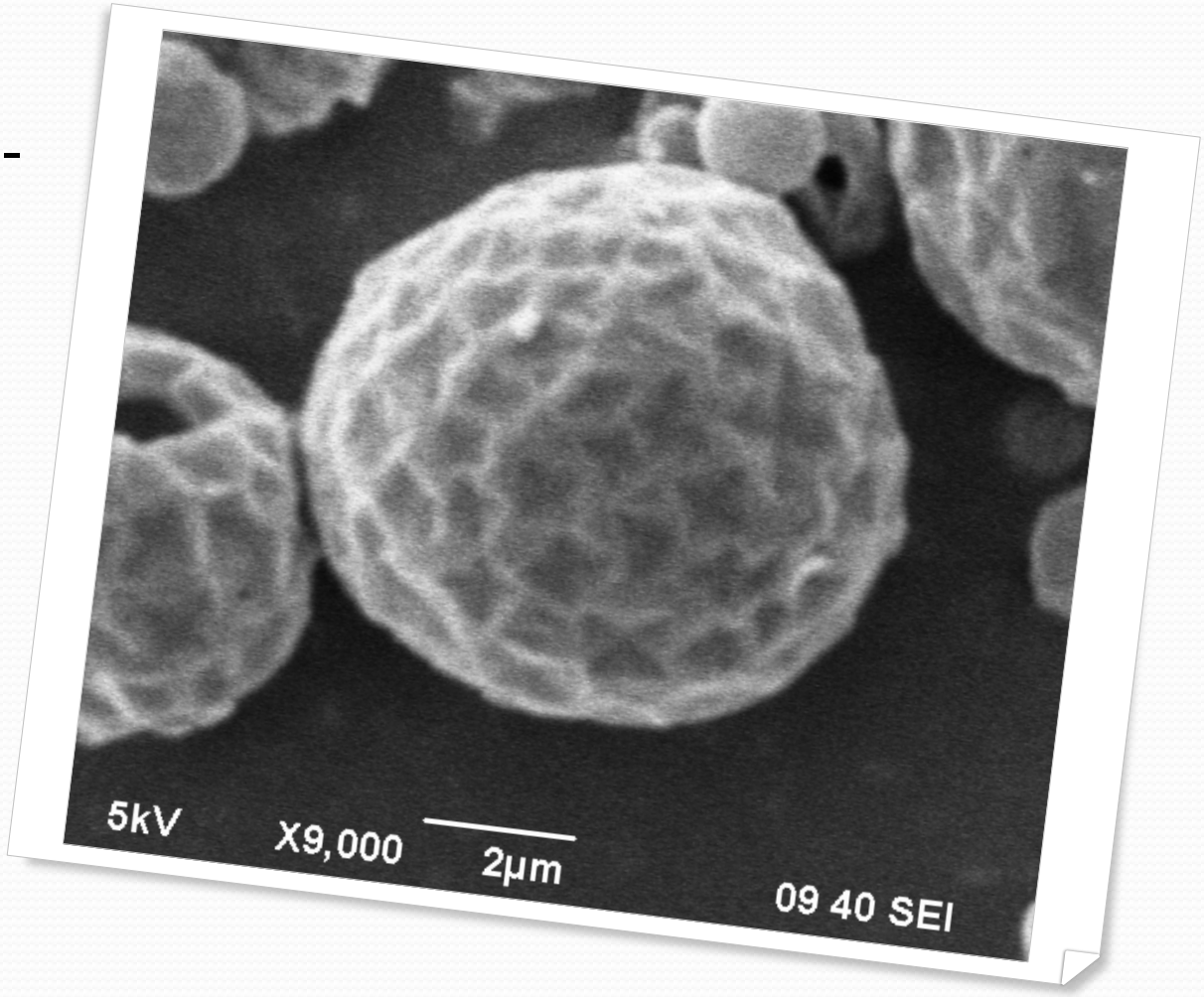
Soda-Lo

- Size of soda-lo 5-10um
- Hollow ball
- Standard Spray drying
- Sodium chloride and gum arabic



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Patent Situation

- A patent was filed in 2009 to cover this novel form of sodium chloride and its manufacturing process
- Currently our patent covers the sodium chloride ball
- With various different binders/carriers
- Examples of inner ingredients include pharmaceuticals, flavour and some functional ingredients
- This patent is currently being reviewed by individual countries before being granted (hopefully!)

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Customer Benefits

- "Soda-Lo" properties include:
  - Greater flavour impact than table salt – meaning you can use less in food
  - Remains free flowing – Doesn't deteriorate on storage
  - No issues of contaminating tastes - Additional flavours not needed to mask replacers, keeping ingredient list down
  - Clean label and natural - based on existing food ingredients

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Applications

"Soda-Lo" has been used in:

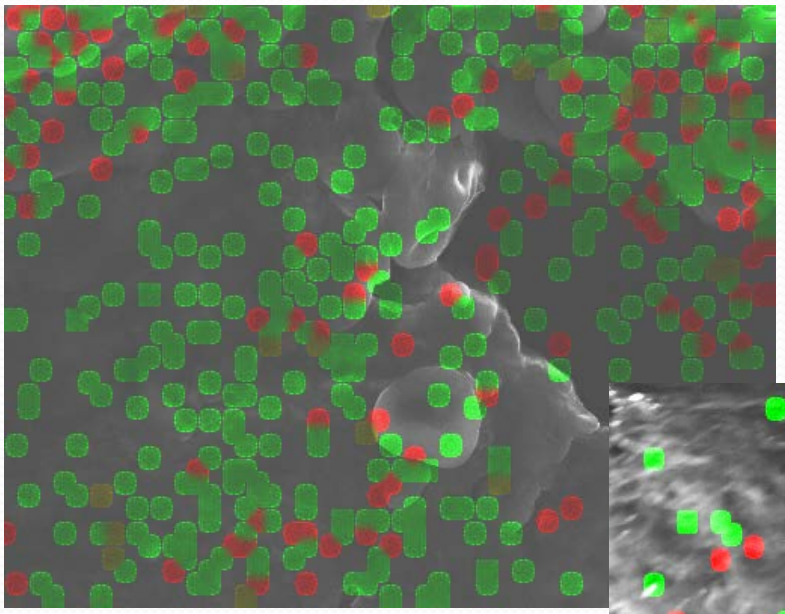
- Pasta
- Cheese
- Seasonings and flavours
- Sauces
- Snacks
- Bread and bakery
- Frozen non meat ready meals
- Sausages

Texture of bread made with Soda-Lo

1.8% Salt

0.9% Soda-Lo

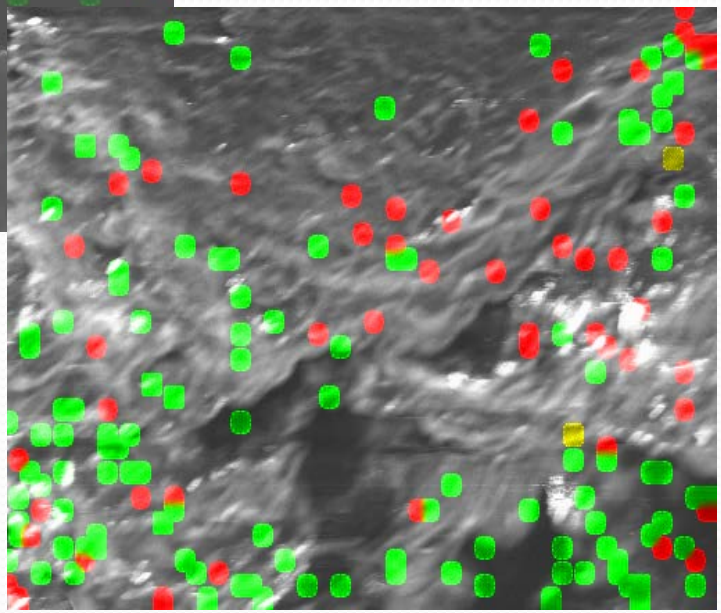
Distribution of sodium chloride in bread



Bread made with
"Soda-Lo"

EDAX images of bread,
Green = Chlorine
Red = Sodium
High magnification

Bread made with
normal salt



Case Study: SPARK Award Soda-Lo in Cheese

- Eminate and Reaseheath College worked together on a project to reduce sodium in hard cheese
- This project was supported by the Bioscience KTN SPARK award
- The project focussed on using Soda-Lo in cheddar cheese

Soda-Lo in Cheese

- Cheddar was made at Reaseheath college in their fully functional cheese production facility
- Cheese contained normal salt, Soda-Lo
- 2 levels of salt addition: 2% and 1.5%
- The cheddar was left to mature for 3, 6 and 12 months
- At each time point blocks of cheese were divided up and analysed for Nutritional content, Microbiology, Sodium content, Organoleptic tests

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Results

- Sodium content of the cheeses can be reduced
- All cheeses had similar values for protein, moisture, fat, pH and energy
- Yeasts and moulds increase when the normal salt was reduced from 2% to 1.5%
- Yeast and moulds did not increase as much when using Soda-Lo at 1.5%
- Internal taste trials suggest that the Soda-Lo 1.5% cheese had a similar taste profile to the salt 2%
- Customers have trialled the cheese in products such as pizzas and have opted to enter full trials on Soda-Lo in their products based on the results

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Soda-Lo Varieties

- Soda Lo 20:-Patented -up to 75% reduction in bakery
- Soda Lo 30:-Mixes Soda Lo 20 with milled salt for impact and low price. Multiple products @30%-50% reduction
- These varieties allow different taste profiles
- Bespoke blends can be produced for food applications

soda-lo™
salt microspheres

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Production Scale batches

- In house Eminate could produce 100g's of Soda-Lo
- Customers needed tonnes of product to replace salt in their products
- Eminate chose to manufacture Soda-Lo via a Toll Manufacturer
- A technology transfer was carried out between Eminate and our Toll manufacturers
- This involved a pilot scale batch and a large scale batch of Soda-lo being produced

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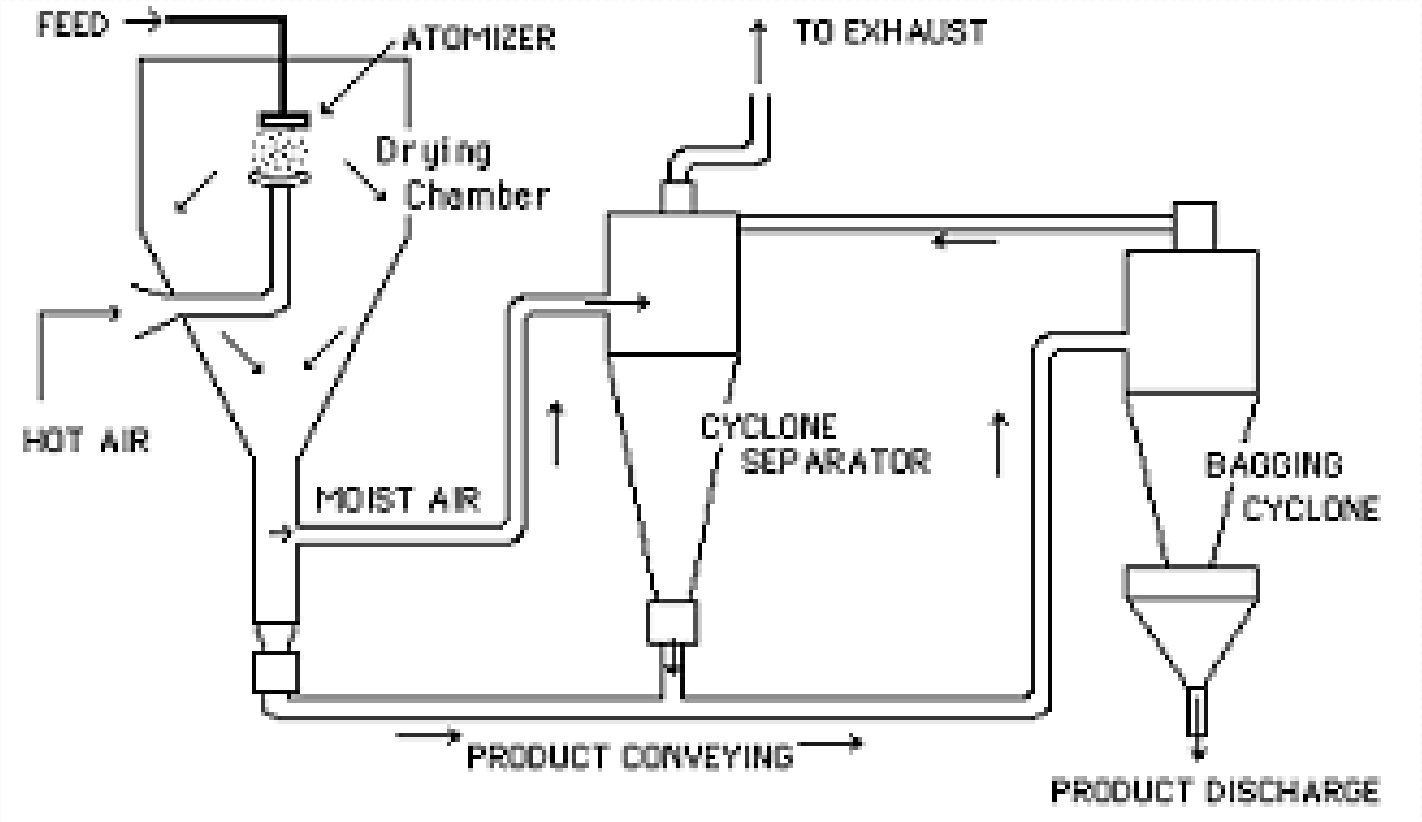
Spray Drying



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Initial Sales

- Initial sales were generated using distributors in USA and Australia
- Initial sales in the UK were generated by Eminate
- Samples and technical sales support was given to customers trialling Soda-Lo
- Editorial, trade shows and presentations were used to generate interest in Soda-Lo

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Repeat Sales

- Customers returning to buy a product is important as it demonstrates that the product works
- Repeat sales were achieved through:
  - Marks and Spencer for use in white bread
  - McColgans for use in pies
  - Dr Oetker for use in frozen pizzas

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Licensing

- Generate interest from large companies by:
  - Demonstrating protected product – IP
  - Demonstrating applications – use of the product, datasheets etc
  - Demonstrating ability to supply – scale up manufacture
  - Demonstrating USPs – initial sales
  - Demonstrating fit for purpose – repeated sales

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License

- Signed a world wide exclusive deal with Tate and Lyle in Nov 2011
- Use in food and beverages, including flavours
- The product was launched word wide in trade shows at Las Vegas and Frankfurt in Nov 2012
- Won ‘Most innovative ingredient’ at HiE 2012

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Future Developments?

Sodium Bicarbonate

- Eminate has responded to feedback from industry that much of the sodium in products comes from SODIUM BICARBONATE
- We have developed a form of sodium bicarbonate based on the Soda-Lo structure

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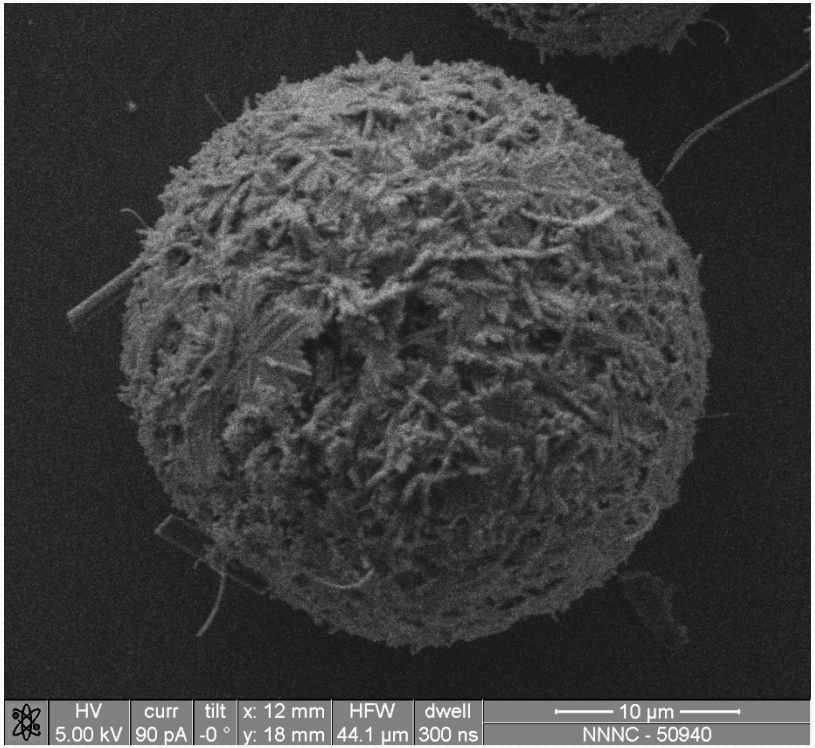
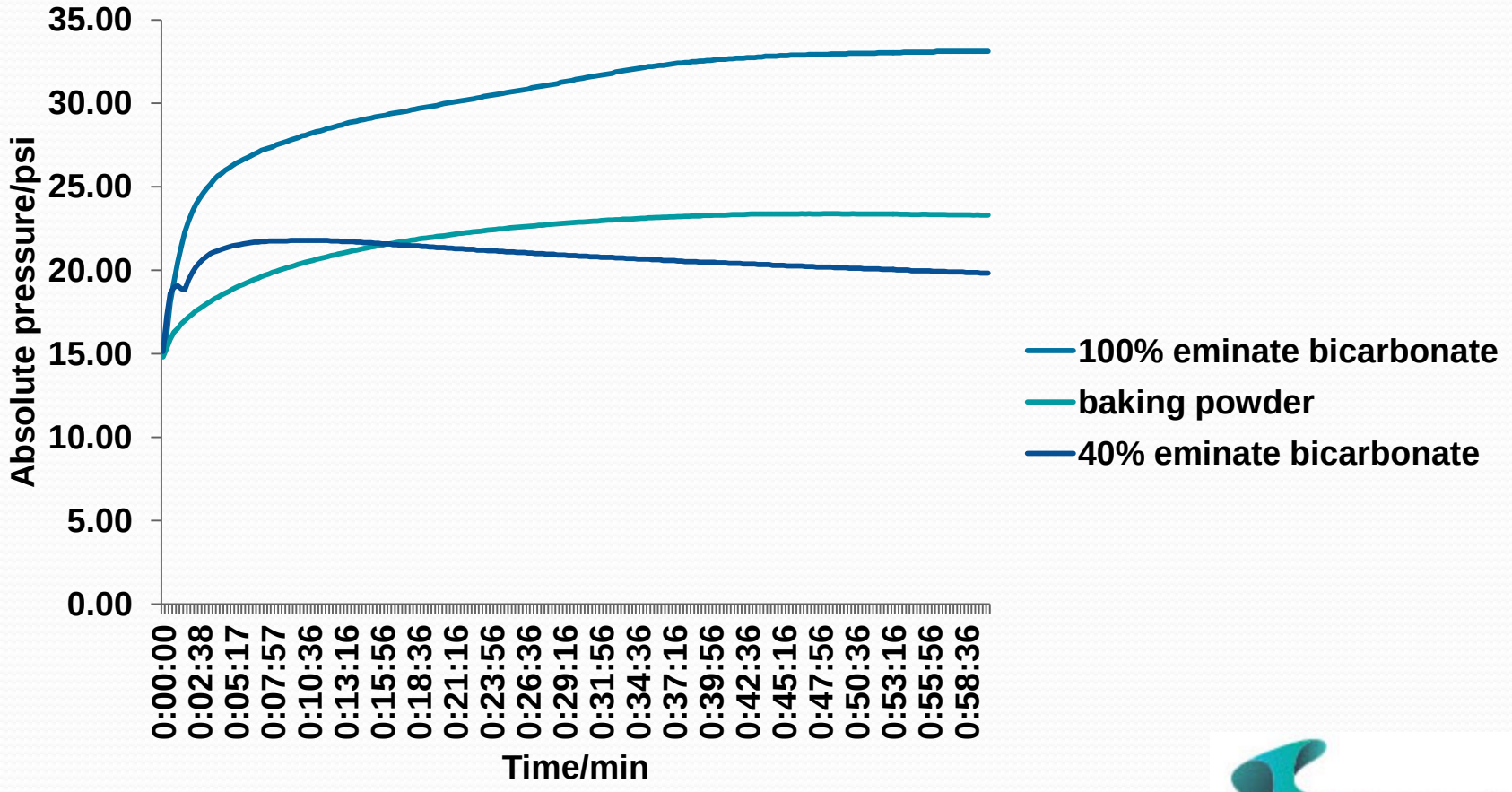
Sodium Bicarbonate

- Similar Processing to Soda-Lo
- Hollow ball of sodium bicarbonate
- Smaller size – 5-10um
- Increased activity



Sodium Bicarbonate



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Sodium Bicarbonate in Cakes

- Eminate have baked cakes using Sodium bicarbonate
- We have been able to reduce the amount of sodium bicarbonate by at least 40% with no adverse impact on taste or texture

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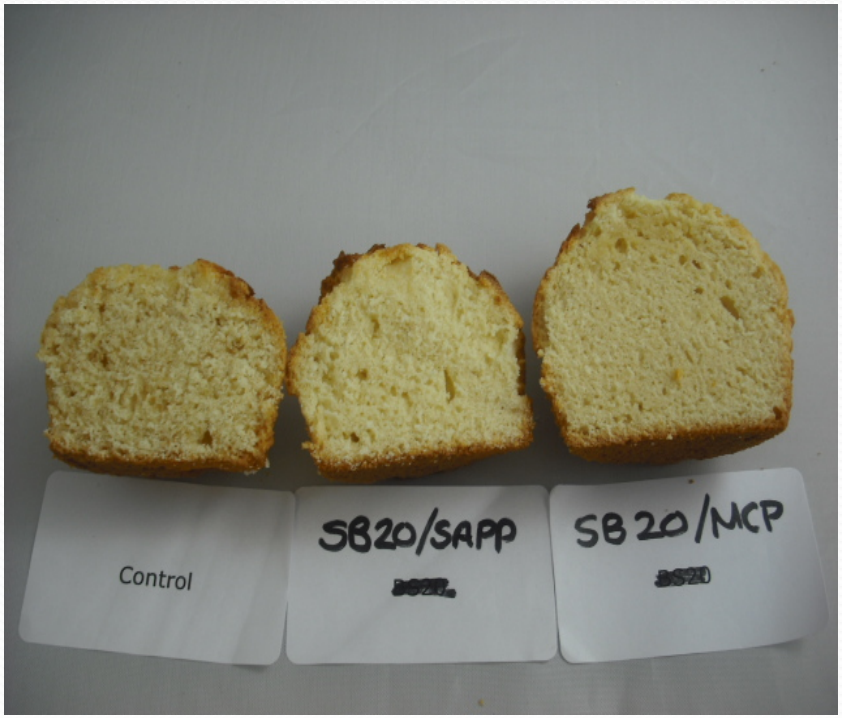
Muffins



Thixate Saitety

- As a satiety product
  - Further thickening/gelling in the stomach
  - Slowly breaks down in the stomach over time up to 4 hours
  - Aim to reduce calories consumed at next meal

  PLUS

  - Long term behaviour change (TBC)
  - Potential (slow?) release of nutrients / vitamins / ??

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Satiety Trials

- Early lab work complete
- Human tolerability study completed by end 2012
- Full Human trial planned to start early 2013
- Testing if taking a combination of a drink and a bar will reduce calories consumed
- Aiming to get an EFSA approved claim on satiety

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Other Ongoing Projects

- TSB funded:
  - FFINN – use of fermented grains in fish food
  - Probiotic – development of a tracer device to test the efficacy of probiotics
  - Reduction of campylobacter in poultry
  - Hydrogen storage
- Delivery of active ingredients across gut wall using nattokinase (School of pharmacy PhD student)
- Oil bodies from Algal sources

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