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Novel strains of *Penicillium roqueforti* for cheese production.

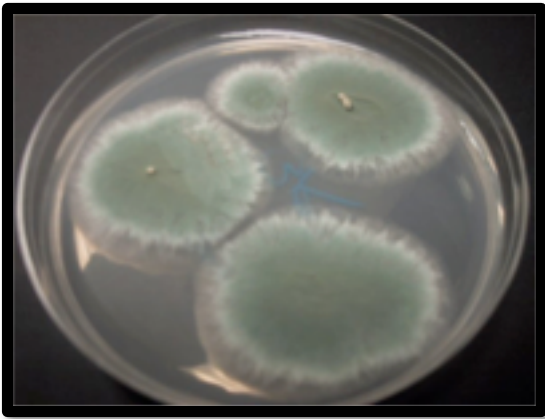
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MYCONEOS LIMITED

Society of Dairy Technology
ANNUAL DINNER & SYMPOSIUM
Monday 23rd July 2018



PENICILLIUM ROQUEFORTI

Penicillium Roqueforti is a fungus (mould) widespread in nature and essential for the production of blue cheese.



The cheese takes its colour and flavour from the spores and volatiles are released:

- Protease enzymes
- Lipase enzymes
- Secondary metabolism
- Sporulation

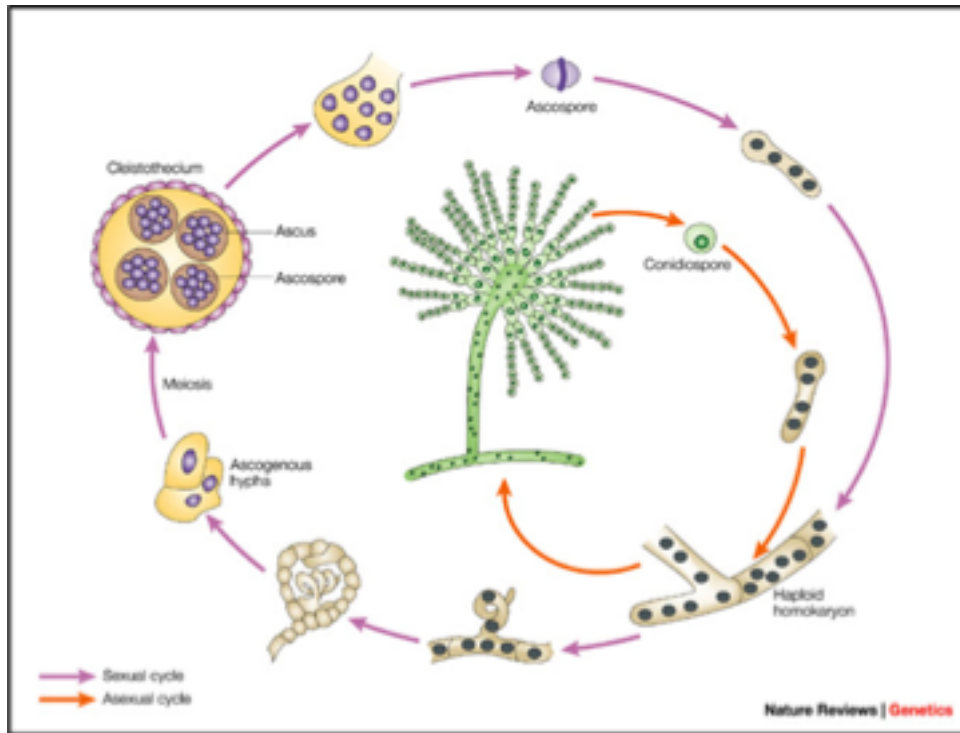


These volatiles create great tasting cheese:

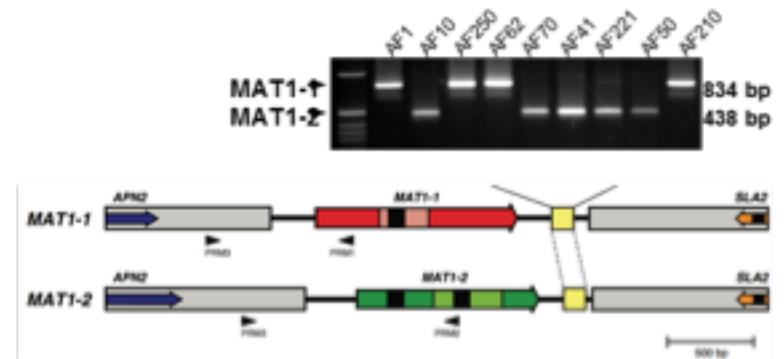
- 120-200+ flavour compounds
- **Mycotoxins**
- Texture
- Colour



PENICILLIUM ROQUEFORTI HAS A SEX



PCR-DNA based mating-type diagnostic test

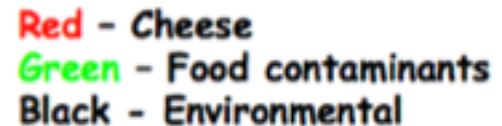


'Sex Test' mating-type MAT-1 and MAT-2 in *P. roqueforti*

2013 Discovery that *Penicillium roqueforti* has a sex.

O'Gorman CM, Fuller HT, Dyer PS (2009). Discovery of a sexual cycle in the opportunistic fungal pathogen *Aspergillus fumigatus*. *Nature* 457: 471-474

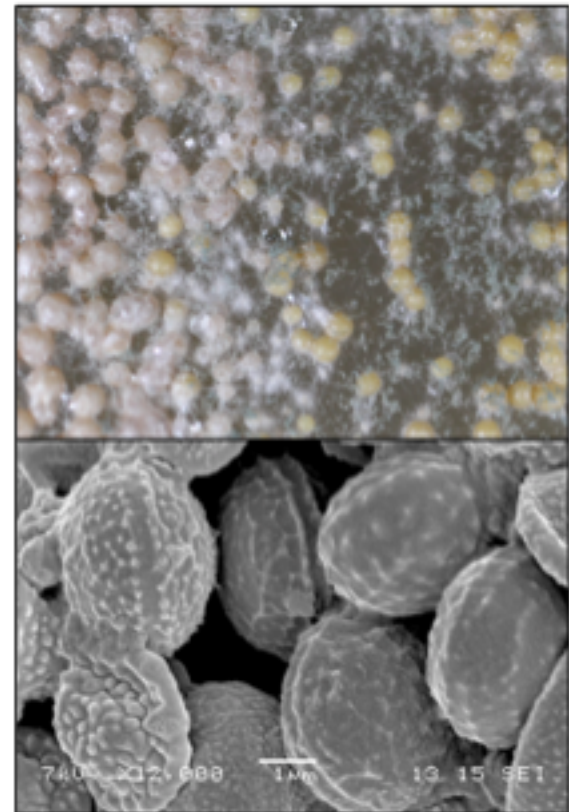
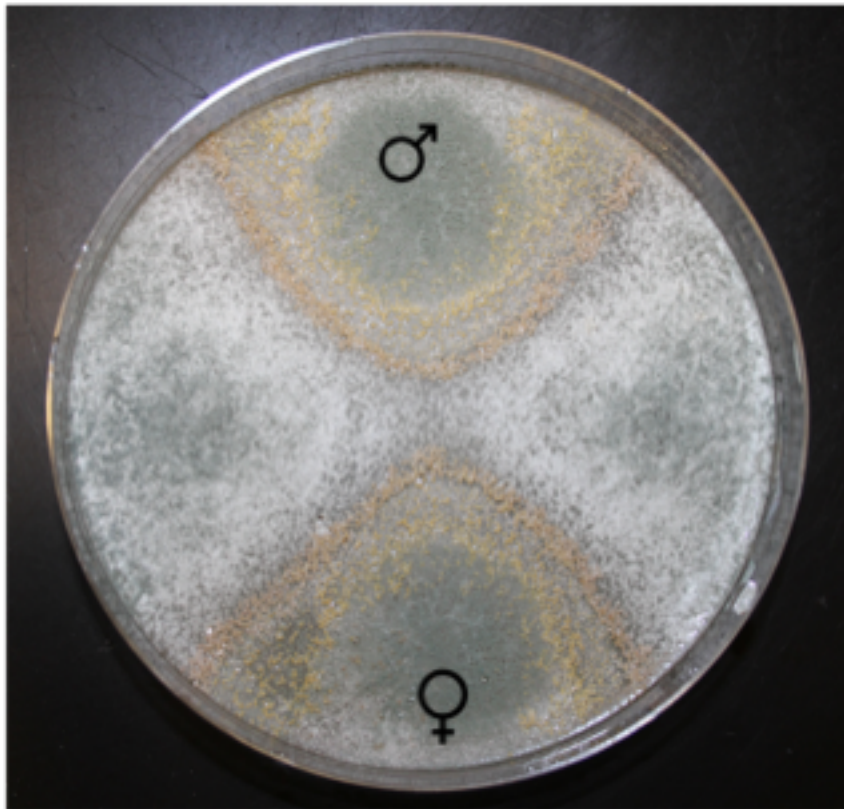
Stilton the other



The tradition of asexual mold cultivation has been the same for years and there are only 3 core cultures that exist

MAKING IT HAPPEN

- 2014 Discovery finding the right conditions for reproduction
- Natural Sexual reproduction introduces genetic variation into a population of fungi. New moulds !!!!

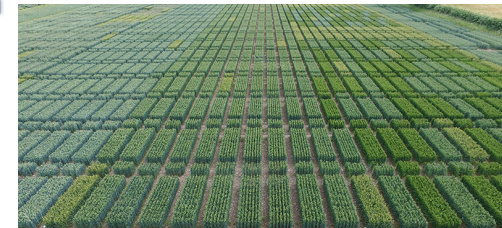
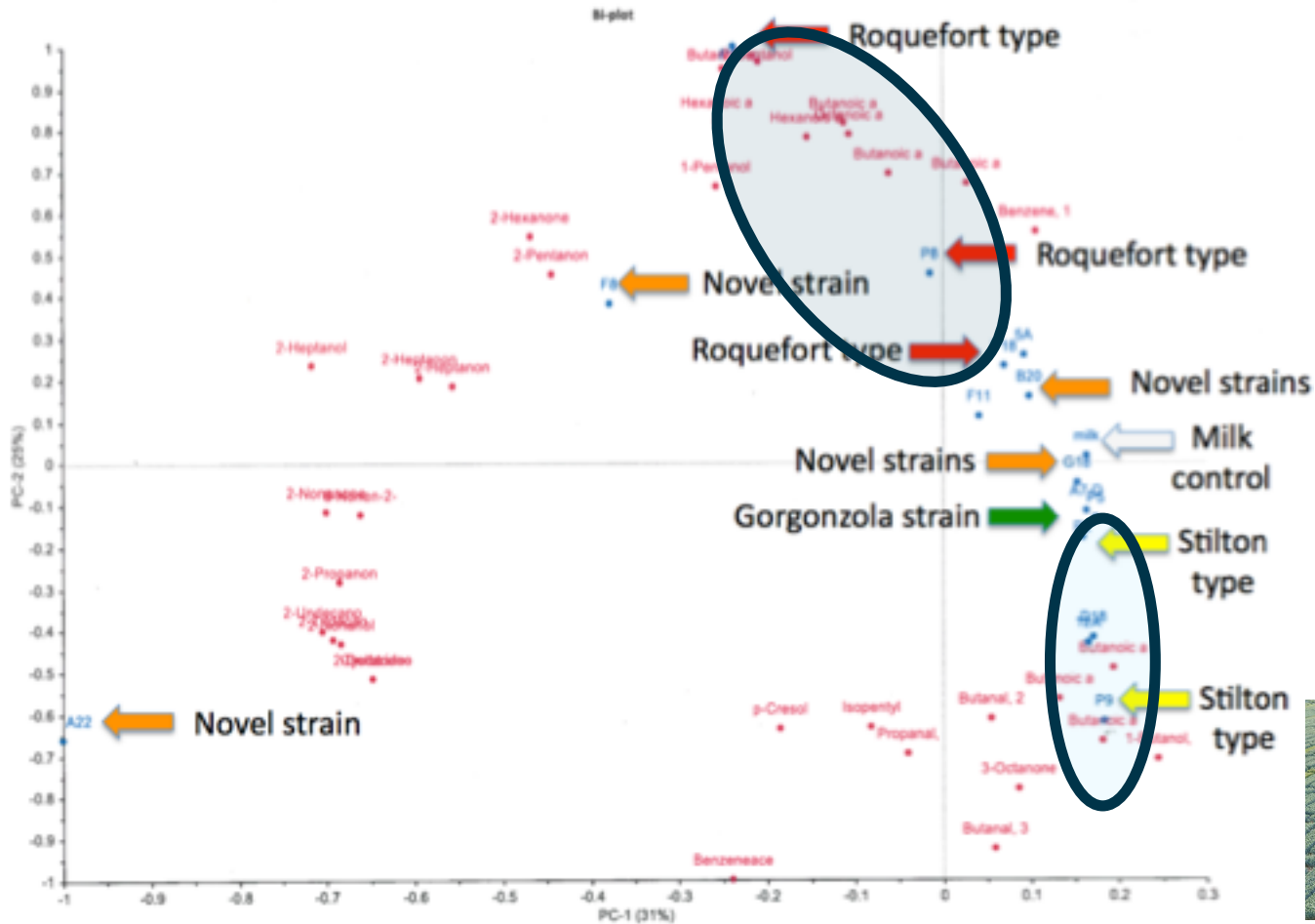


STRAIN DEVELOPMENT (BREEDING)

- 150+ Novel strains identified from sexual crosses between Stilton x Roquefort, Stilton x Gorgonzola, Roquefort x Gorgonzola type-strains. All checked for potential novel flavours in lab model cheese system.
- All checked for mycotoxin production.
- Approximately 60 'interesting' ones used in small-scale cheese production
- Cheeses also checked again for mycotoxin levels.
- Screened by cheese manufacturers, professional cheese tasters, retailer and University of Nottingham panel (n=20-30).



FLAVOUR ANALYSIS



Creating sexual offspring with novel flavours including mild, and totally new tastes
Can breed for traits - taste

TASTE TRIALS

These novel cultures have been trialled by some of the UK's finest and most respected cheese makers and tasters.



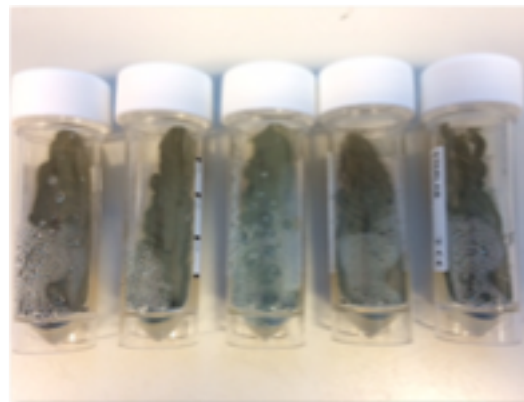
In a recent tasting session held at the University of Nottingham's farmer's market, six of the thirteen samples that were tasted scored above current Stilton production cultures for taste. The milder samples received positive feedback from a younger and more female audience compared to typical blue cheese consumer demographics.

'NATIVE' AND 'NOVEL' CULTURES

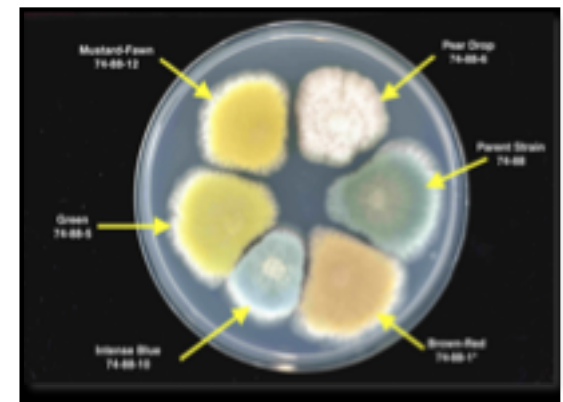
One artisanal cheese manufacturer wanted a 'local' strain



The trial included a local symbiotic culture whereby the culture was bred in the same location as the cheese producer.



DNA characterisation checks made sure we had the correct 'food' relevant species, ten natural cultures were the tested through cheese production.



This gives us the ability to isolate good candidates and even generate colour derivatives using natural pigmentation pathways.

BLUE-CHEESE INNOVATION

Formed **Myconeos** to deliver a 'natural' range of novel and unique *Penicillium roqueforti*.

In a category that has seen little innovation or differentiation for decades, this presents cheese producers with 'a new toolbox' and the ability to be truly unique within the blue cheese market.

- Bespoke design
- Product development



NEW CULTURES

	STANDARD (5A)	MILD (B20)	NATURAL (12A)	STRONG (A22)
Characteristics	Robust and tangy, medium flavour, with sweet and nutty undertones	A mild and well-rounded blue with hints of sweetness and floury undertones	Aromatic and earthy, medium flavour, with tangy and nutty undertones	Strong blue with a salty and savoury flavour
Colour	Blue-green	Blue-green	Blue-green	Blue-green
Proteolytic activity	Med/High	Med/Low	Low	High
Lipolytic activity	Low	Med/Low	Med/Low	Med/High
Growth rate	High	Med/Low	Med/High	Med

New cultures can be purchased imminently and combined with our exclusive services will help you to create products that are truly unique.

Acknowledgements

- BBSRC
- Rory Stone *Highland fine cheese*
- Martin Moyden *Moydens*
- Robin Skailes *Cropwell Bishop*
- Ken MacFarlane *JKM Foods Ltd*
- Prof. Ralph Early *Harper Adams University*
- Jackie Carson Long *Sainsburys*
- Alan Marson *New Food Innovation Ltd*
- Paul Dyer, Richard Simpson, Maria Hendrick *Myconeos*

QUESTIONS WELCOME

SALES AND DISTRIBUTION

CONTACT US BELOW TO REGISTER YOUR INTEREST FOR THE NEW CULTURES AND EXCLUSIVE SERVICES AVAILABLE TO MAKE YOUR PRODUCTS TRULY UNIQUE.



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