

Industrial Biotechnology in Estonia

Business viewpoint

Biotechnology – enabling
technology

Platform

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Biotechnology sector in Estonia – incubating sector

Incubation phase should be completed by 2013, and the turnover of the sector should be 800 million EUR

Estonian Biotechnology Strategy 2008-2013

Table 2.5: Biotech companies in Estonia

Company	Field of activity	Location	Founding year	No. of employees				VC acquired
				1-2	3-4	5-9	>10	
Core biotech companies ¹⁾								
AS PROEKSPERT/BIOEKSPERT ²⁾	Software development and consulting	Tallinn	1993				X	
Asper Biotech	Genotyping – service and products	Tartu	1999				X	X
BioData OÜ	Bioinformation services	Tartu			X			
CELECURE AS	Development of cancer drug	Tallinn	2002			X		
EGEEN INC.	Pharmacogenetic clinical trial support	Tartu	2001			X		X
FitBiotech	DNA vaccines and diagnostics	Tartu				X		
INBIO LTD.	Development of novel biotherapeutics for cancer	Tallinn	1999			X		
LabAs Ltd.	Production and purification of mono-and polyclonal antibodies	Tartu	1991			X		
PROSYNTEST Ltd.	Production of active pharmaceutical ingredients	Tallinn	1989				X	
Quattromed LTD	Providing analytical lab systems and services	Tartu	1999				X	
Visgenyx Ltd.	Service for production of knock-out animals	Tartu	1999			X		

Table 2.5 continued

Company	Field of activity	Location	Founding year	No. of employees				VC acquired
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Extended biotech companies								
Applied Phenomics LLC	Platform technologies	Tartu	2002		X			
AS Kevelt	Medical diagnostics and chromatographic carriers	Tallinn						
Bignose AS		Tallinn						
CDN Ltd.	Production of labelled cell material, biofermentation	Tallinn	1994	X				
Estbiotech OÜ		Tartu	2001			X		
IASGEN OÜ	DNA amplification	Tartu	2000	X				
Immuntron OÜ		Tartu			X			
Lumifor		Tartu		X				
Naxo Ltd.	Molecularbiology for medical diagnostics	Tartu	1997		X			
OÜ Mikrotaim	Micropropagation of 7 different types of plants	Rapina	2001	X				
SOLIS BIODYNE OÜ	Production of thermostable DNA polymerase	Tartu	1996		X			
TorroSen OÜ	Commercialising the new technology of biosensors	Tartu	1999		X			
Vulpes AS		Tallinn						

1) Here we attempted to define core biotech companies in accordance with the definition used by Ernst & Young for Entrepreneurial Life Sciences Companies (ELISCO)
2) Those firms highlighted were interviewed during the project.

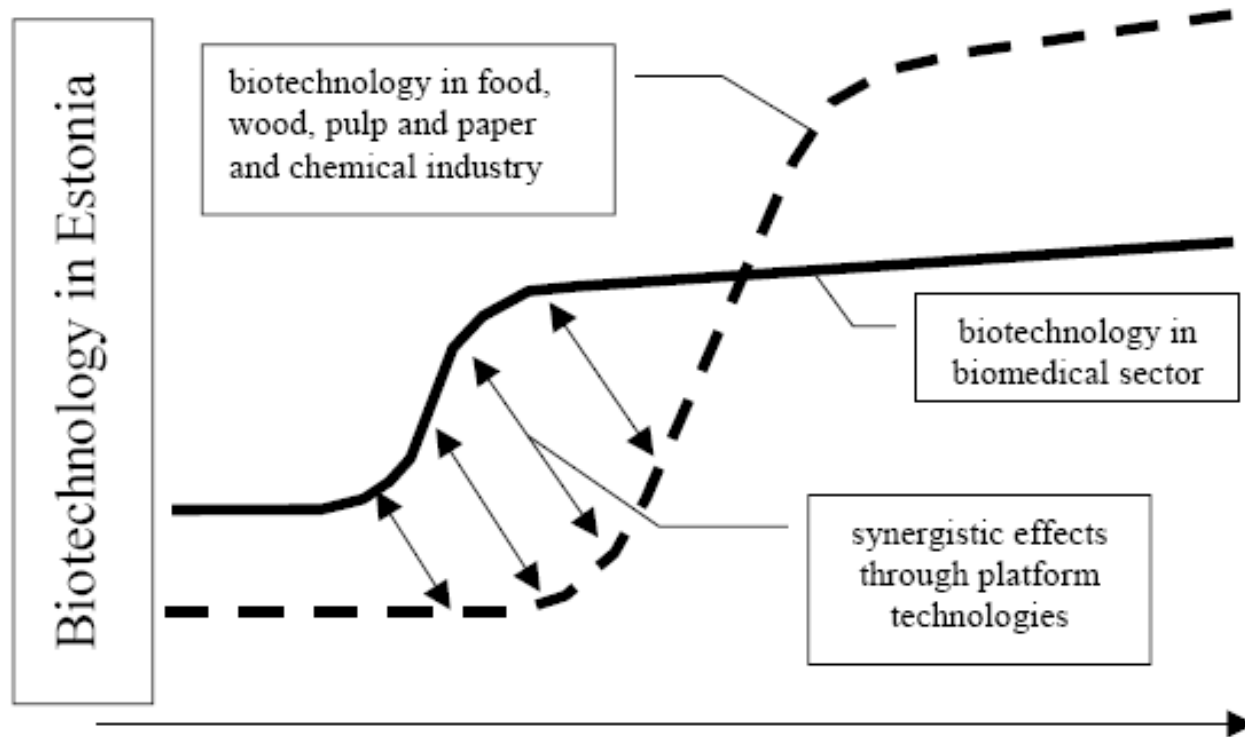
25 - 2002

55 - 2007

Priorities

Figure 4.1

Dual stage master plan for biotechnology development in Estonia



“Double-triple” of successful development



Factors of success:

- Universities - entrepreneurial research universities
 - **doctoral studies**
- Competence Centers – vehicles of targeted applied research and support of product development
- Successful enterprises (of critical size) carrying out product development NB! regularly (continuously) – **the situation is not that bad....but if the biotechnology sector turnover is about 280 million EEK (about 17 million EUR), then investments to R&D should be about 1.7 million EUR**

The combined funding of biotechnology research from the public and private sources indicates that the ratio between fundamental and applied research and product development is 11:5:1, which is the exact opposite of the suggested rule of thumb 1:10:100 for the distribution of funding in developed industrial countries.

- EU support measures – Framework Programs etc.,

FP7 Capacities Work Programme - Research Potential, Activity 4.1 “Unlocking and developing the research potential in the EU’s convergence and outermost regions”, REGPOT-2008-1

Systems biology, synthetic biology NB!

- State policy – support measures (CC-program, Centres of Excellence), technology development, public procurements’ policy

IT policy as an example, as a comparison:

- Banks,
- Mobile phones,
- Internet,
- Skype,
- ID-card infrastructure,
-

Success stories? – Probiotics ME-3, Special yeast products, rapid cell diagnostics methods (systems biology, synthetic biology),...

Big initiatives:

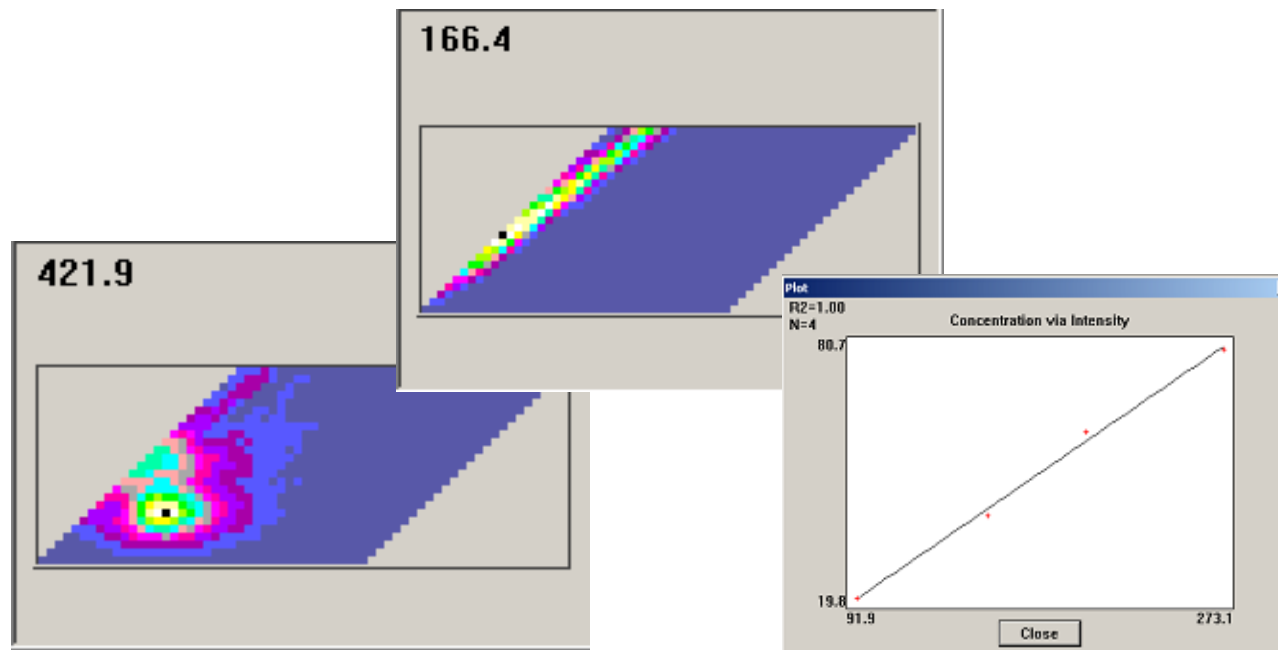
- Estonian Genome Project?,
- Green Estonia (Green energy???)

Development Programs – Energy, Biotechnology

Example I

Spectral Fluorescence Signature method:

- Right-angle fluorescence
- Front-face fluorescence



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LASER DIAGNOSTIC INSTRUMENTS INTERNATIONAL INC.

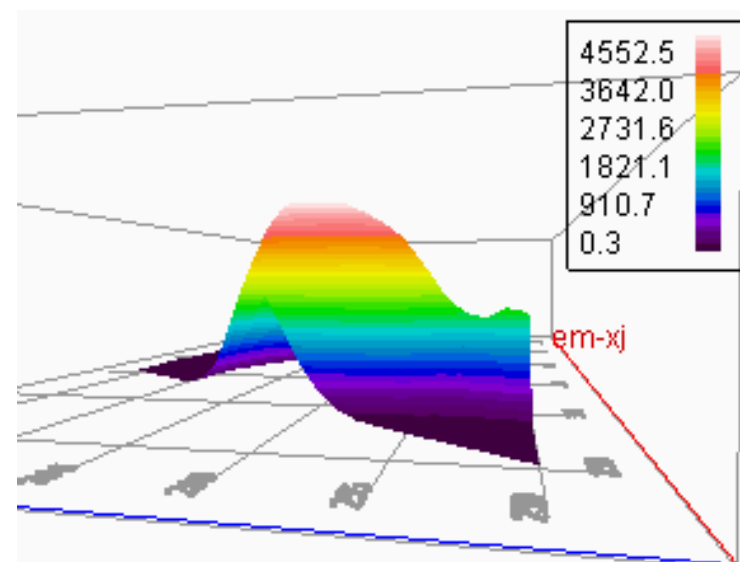
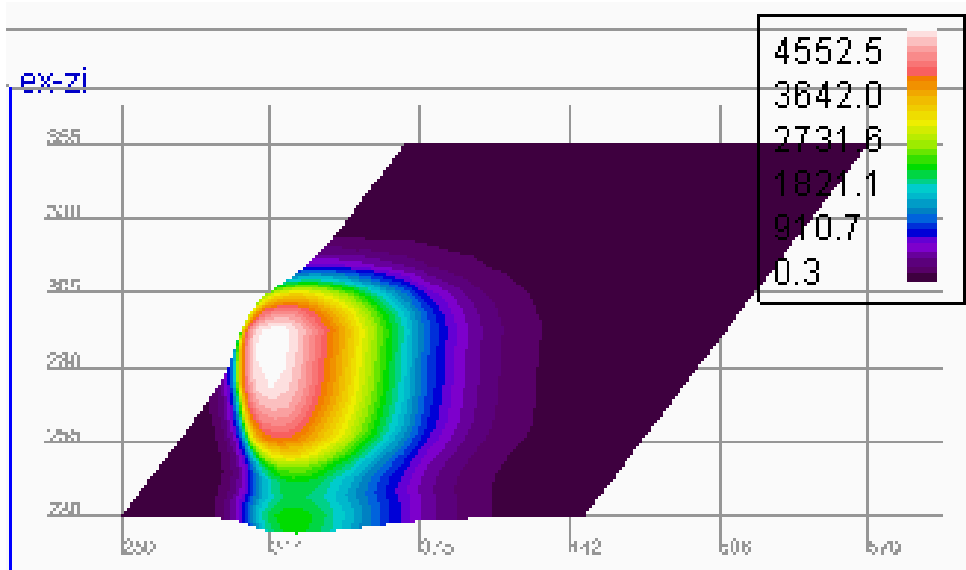


Projects 1.1., 1.2., 2.1., ...

Fluo-Imager – Right-angle fluorescence measurements



SFS-spectra of milk



Express method for testing milk coagulation is under development, patent is pending

Front-face fluorescence methods are under development



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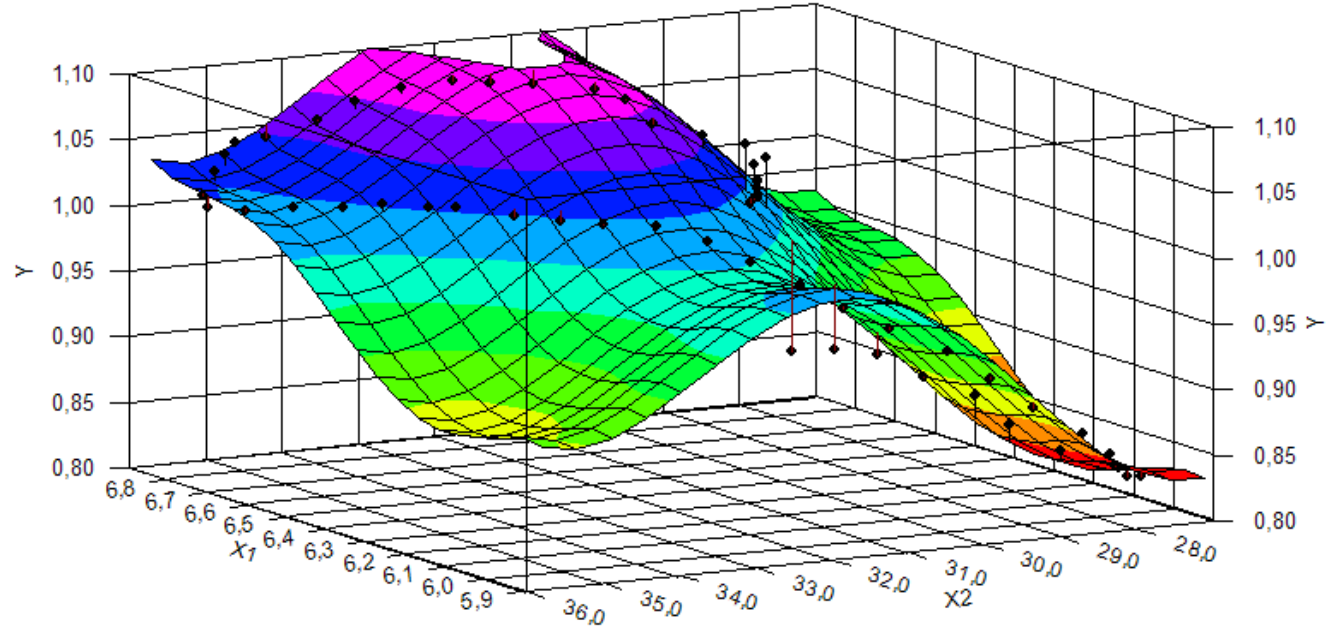


TFTAK

Example II

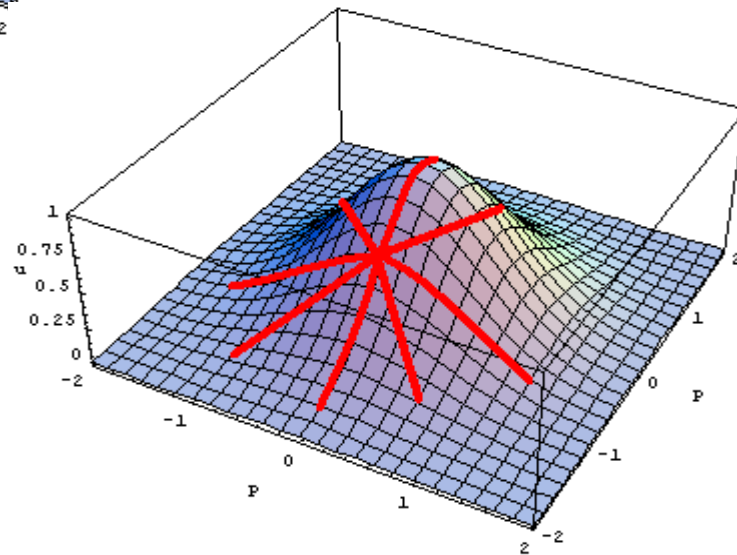
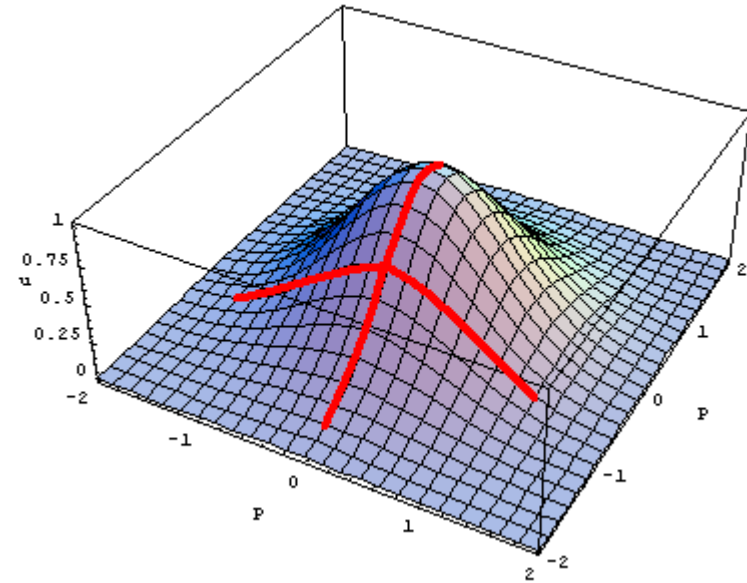
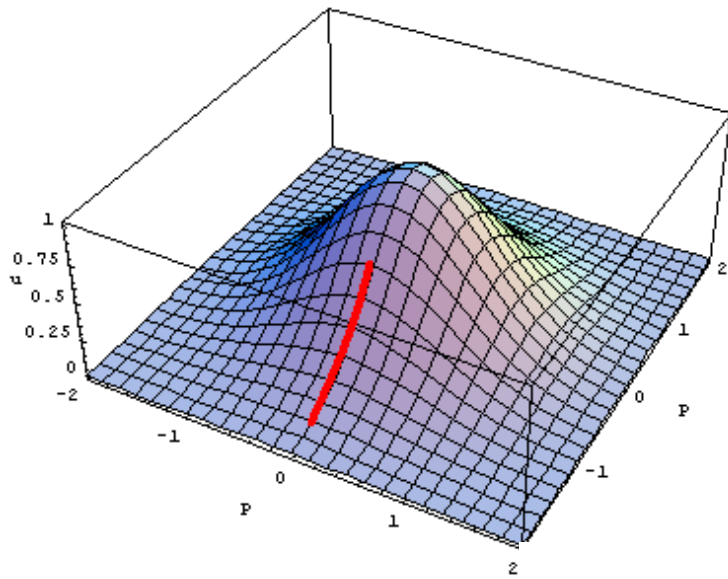
The basic controversy – genome sequencing is taking one afternoon – characterization and diagnostics of cells is taking months if not years

Study of growth space of microorganisms

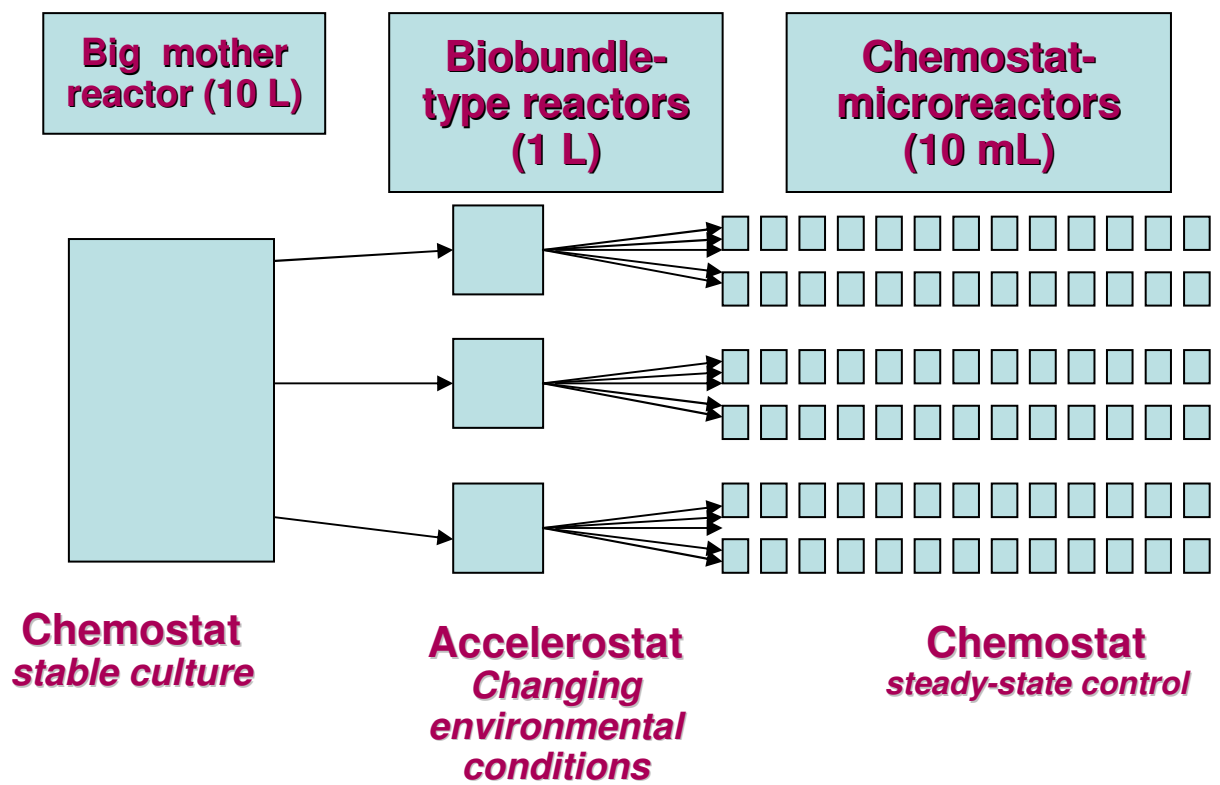


$$\mu = f(pH, T, C_S, C_P, a_i, \dots)$$

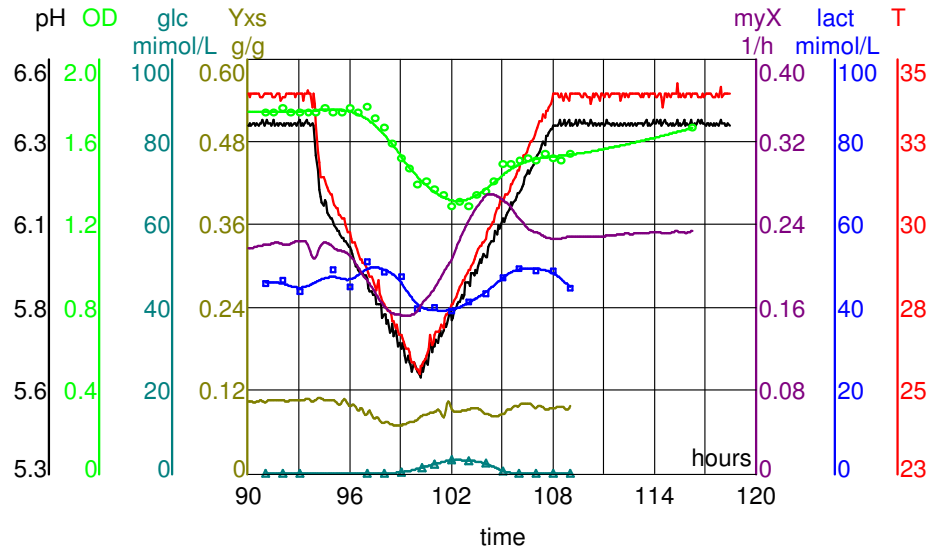
Development of “mother-daughter” cultivation schemes



Development of “mother-daughter” cultivation schemes



Simultaneous change of pH and T



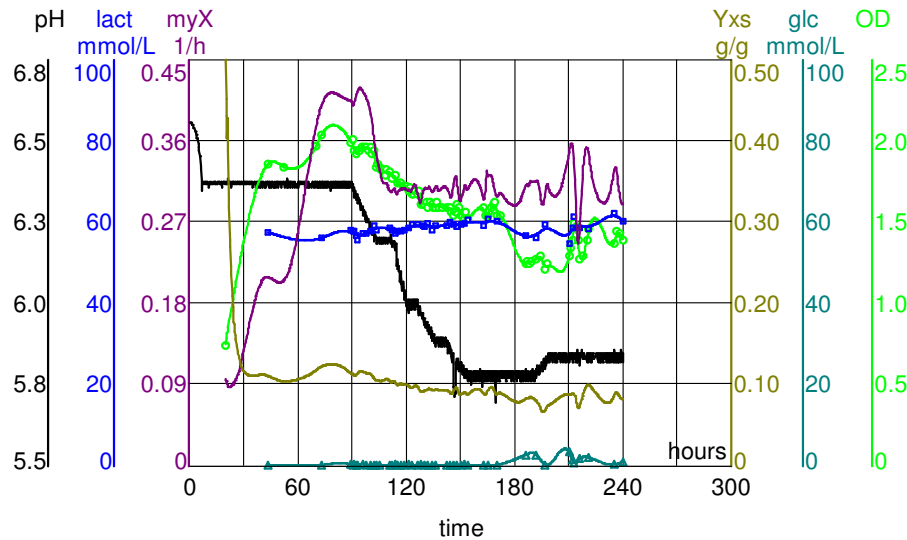
**D-stat
experiments with
Lc. lactis IL1403.**

D-stat

$$D = 0.2 \text{ h}^{-1}$$

$$a_{\text{pH}} = 0.1 \text{ U h}^{-1}$$

$$a_{\text{T}} = 1^{\circ}\text{C h}^{-1}$$



$$a_{\text{pH}} = 0.06 - 0.025 \text{ U h}^{-1}$$

lact and glc – lactate and glucose concentration in fermenter, mmol l⁻¹, D – dilution rate, h⁻¹, myx – specific growth rate, h⁻¹, YXS – biomass yield based on glucose consumption, g-dwt g-glucose⁻¹, OD – optical density at 600 nm.



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Thank you!