

Novel chyMosin

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CHY-MAX[®] M

The best is now Better!

Improving the quality
of **food** and **health**
for people all over the world



CHY-MAX® M in a nutshell

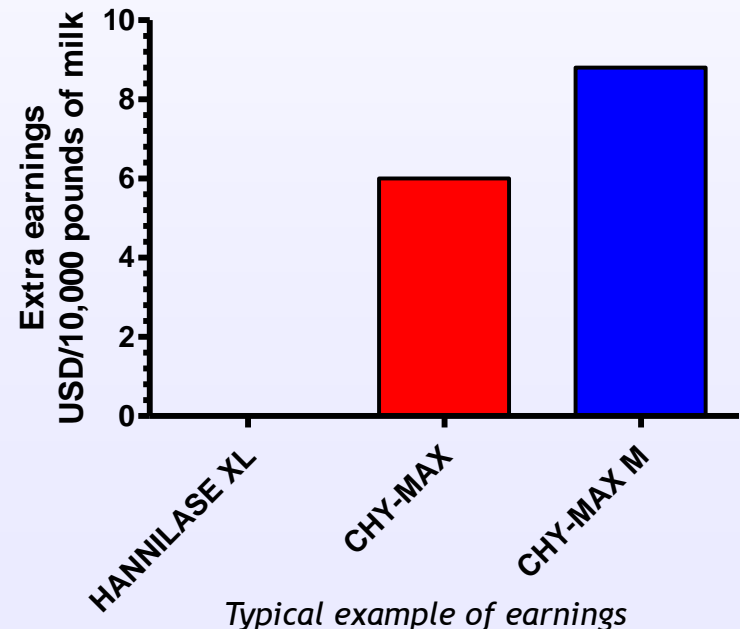
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What is
CHY-MAX® M?

Why is
CHY-MAX® M
interesting?

CHY-MAX® M is a novel chymosin developed to Maximize profits

- ▶ New natural chymosin
- ▶ Produced by fermentation
- ▶ Most specific milk clotting enzyme
- ▶ More robust bringing more consistency in production



Why is CHY-MAX® M the best?

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CHY-MAX® M provides
5 major benefits to cheese and whey producers

CHY-MAX® M

More
Coagulation
efficiency

More
cheese yield

More
Mild and rounded
flavors

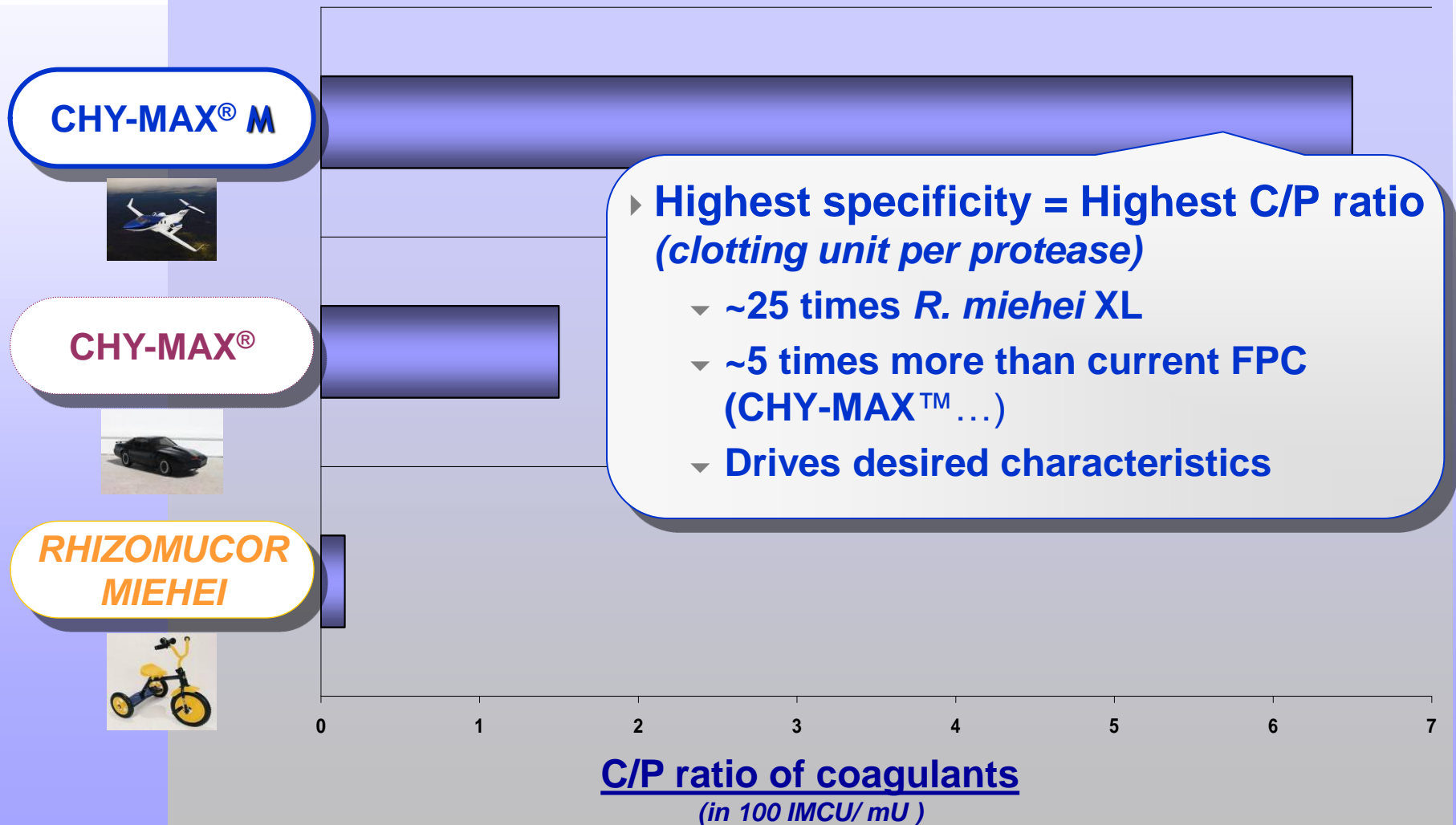
More
Process
control

More
whey value

5 major benefits

How is it possible? CHY-MAX[®] M is More specific...

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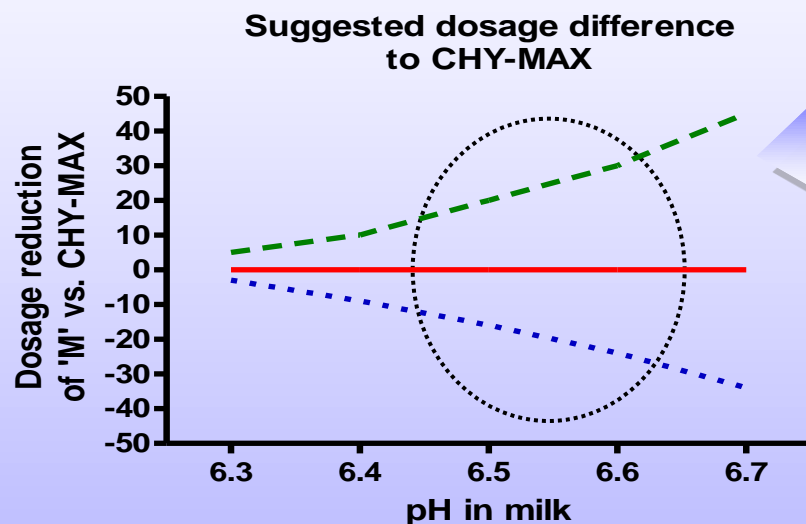


More milk clotted or clotted faster...



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Dosage difference between CHY-MAX[®] M and *Rhizomucor miehei* or FPC products currently available



► Difference depends on:

- ▼ Enzyme type
- ▼ pH
- ▼ Temperature
- ▼ ...

Coagulant family	Coagulant name	Current dosage (IMCU/100Kg)	Difference with CHY-MAX TM
<i>RHIZOMUCOR MIEHEI</i>	<i>HANNILASETM XL or XLG (XP)</i>	4.887	+38%
<i>FPC</i>	<i>CHY-MAXTM M</i>	2.618	-26%
<i>FPC</i>	<i>CHY-MAXTM</i>	3.544	0



Note: Trials performed in the ATC. Milk pH was 6,55-6,60.

Higher cheese yield @ same milk volume




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Yield difference is main financial driver for our customers

*Yield difference is difficult to measure as many variables are involved...
...but achieving the large number of tests needed, statistical significance is there*


CHY-MAX® M cheese yield

- 
- ▼ Compared to **HANNILASE® XL** +0.5-1.0%
 - ▼ Compared to **CHY-MAX®** +0.1-0.3%

5 to 10 additional Kg
of cheese per ton!

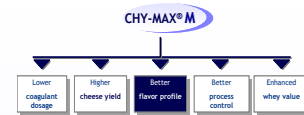
2 additional Kg
of cheese per ton!

Consequences on whey content?

- 
- ▼ Less casein fractions in whey as they are already in the cheese...
 - ▼ ...consequently you will get a “cleaner” or purer whey.

Whey value is
maintained or improved
depending the
application of the whey

Cleaner in taste



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Due to its extremely low proteolytic activity
CHY-MAX[®] M brings better flavor & enlarges the shelf life of cheese

*The low P/C ratio CHY-MAX[®] M leads to a lower degree of casein breakdown resulting in slower accumulation of medium size peptides**

Explain the claims made from
flavor panels where CHY-MAX[®] M gives



▶ 'cleaner' flavor, less metallic



▶ less bitterness



▶ more milk fat taste



▶ less variation



Explain that shelf life of fresh cheese
is enlarged (less proteolytic degradation)

Interesting for
mild cheddar
cheeses



Lower softening
of e.g.
Pizza cheese



E.g.: sensory results in Cheddar (Ir/US)



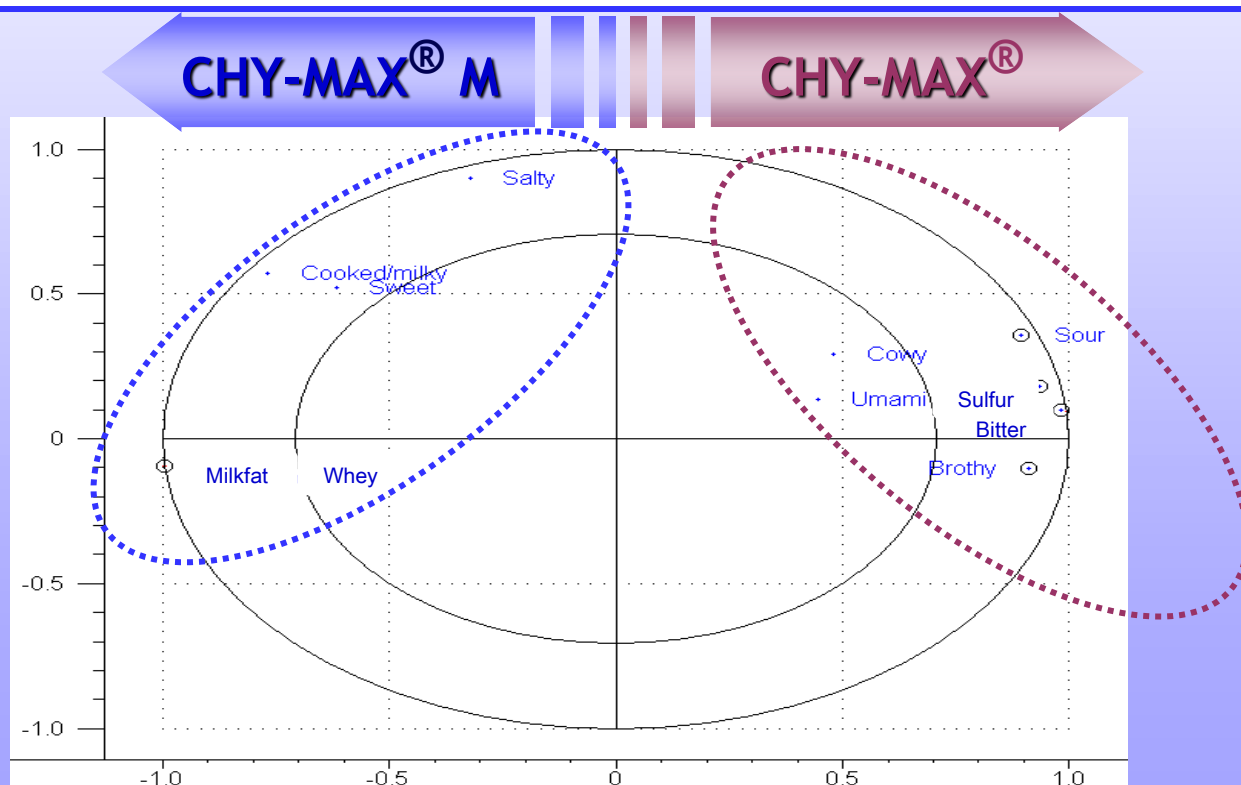
Ripening
cultures

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Cleaner taste/ favor with “M” compare to CHY-MAX® (and even more with other coagulants)

- Lower on Bitterness, Brothy, Sulfur & Sour (Cowy, Umami) descriptors
- Higher on Milk fat, Whey, Cooked/milky & Sweet descriptors

(Underlined descriptors were significantly different of to two coagulants)



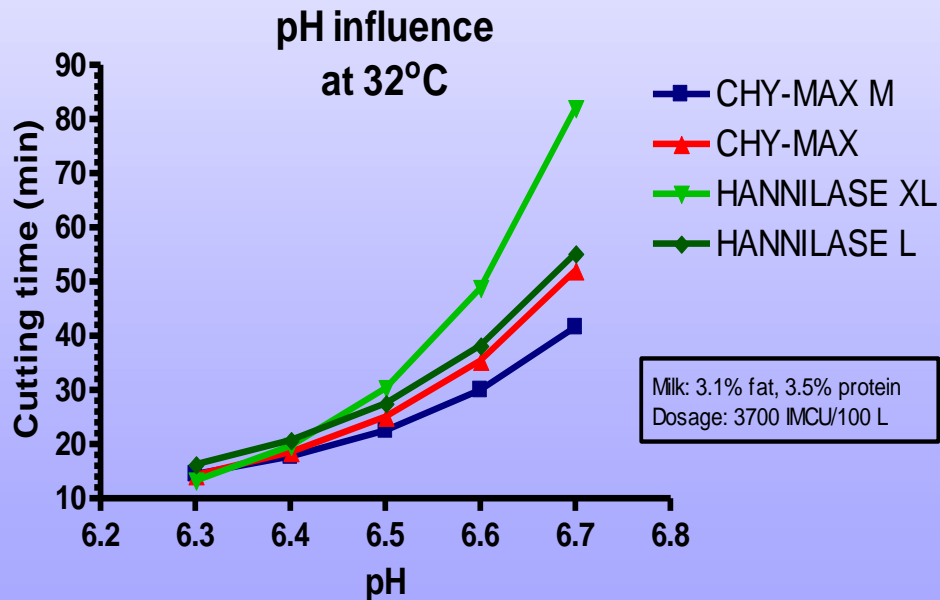
Better process control



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CHY-MAX® M is more robust to process variations (pH, T)

It gives less variation in curd firmness (if cutting is time controlled), which affects e.g. cheese yield, final moisture...



- ▶ CHY-MAX® M is less influenced by pH
 - ▼ e.g. vs. XL and L types
 - ▼ e.g. vs. classic FPC (here CHY-MAX®)

Enhanced whey value



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CHY-MAX® M has been developed to maximize whey value



- Due to its very high specificity (for κ -casein), CHY-MAX® M does not breakdown valuable components of your whey (protein, peptides or oligopeptides of interest) helping you to optimize quality and value of your whey...



- CHY-MAX® M is Kosher, Halal & Vegetarian certified (as for CHY-MAX)
 - ▶ *Whey products have the same certification*
 - ▶ *No need to have separate whey streams*



- CHY-MAX® M gives you a lactose with a pharmaceutical grade (as for CHY-MAX)

XL or XLG -type versus CHY-MAX® M

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Cost benefit shifting to CHY-MAX® M

Enter boxes!

Yield & dosage differences	
Dosage difference	Reduction
shifting to CHY-MAX® M	35%
Cheese yield benefit	Increase
shifting to CHY-MAX® M	0,60%

Customer Input

Cheese production	[Cheese pounds]
Yearly estimate	60.000.000
Amount of coagulant (million IMCU per year)	[MIMCU/year]
Current requirement	12.600
CHY-MAX® M	8.190
Prices of coagulants	[USD/MIMCU]
XL-type	\$17,0
CHY-MAX® M	\$34,4

Calculations (per year)

Dosage benefit	[MIMCU]
	4.410 \$74.970
Cost in use difference	[USD/MIMCU]
	-17,4 -\$142.506
Yield benefit	[Pounds]
	360.000 \$684.000
Reduced whey value	[USD per pound of cheese]
WPC35	-0,00272 -\$163.455

Grand totals	[USD/year]
Shifting to CHY-MAX® M	\$453.009

Benefit per IMCU	[EUR]/MIMCU
Cost benefit per MIMCU	\$55,3
Return On Investment per MIMCU	161%

Break-even calculation	[yield increase]
Break-even yield increase	0,60%

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shifting from
to

XL-type	0,210
CHY-MAX® M	0,137

MIMCU per
10,000 pounds of milk

10,000 pounds -> 10,060 pounds = 0.6% increase

Cheese price

1,9	USD/pound
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Assumptions

100 pounds of milk goes into:
approx. 10 pounds of cheese and 90 pounds of whey
Increased yield is calculated to be extra protein retention only
Extra protein in the cheese will no longer be present in the whey
No production costs of whey processing are considered

See 'Whey value' worksheet

[USD] per vat
\$30,2

40.000 pounds/vat

Click button

Break-even calc

CHY-MAX® versus CHY-MAX® M

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Cost benefit shifting to CHY-MAX® M

Enter boxes!

Yield & dosage differences

Dosage difference	Reduction
shifting to CHY-MAX® M	20%
Cheese yield benefit	Increase
shifting to CHY-MAX® M	0,20%

Customer Input

Cheese production	[Cheese pounds]
Yearly estimate	60.000.000
Amount of coagulant (million IMCU per year)	[MIMCU/year]
Current requirement	9.540
CHY-MAX® M	7.632
Prices of coagulants	[USD/MIMCU]
CHY-MAX®	\$27,5
CHY-MAX® M	\$34,4

Calculations (per year)

Dosage benefit	[MIMCU]	1.908	\$52.470
Cost in use difference	[USD/MIMCU]	-6,9	-\$52.470
Yield benefit	[Pounds]	120.000	\$228.000
Reduced whey value	[USD per pound of cheese]		
WPC35		-0,00091	-\$54.512

Grand totals

Shifting to CHY-MAX® M	[USD/year]	\$173.488
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Benefit per IMCU

Cost benefit per MIMCU	[EUR]/MIMCU	\$22,7
Return On Investment per MIMCU		66%

Break-even calculation

Break-even yield increase	[yield increase]	0,20%
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shifting from
to

CHY-MAX®	0,159
CHY-MAX® M	0,127

MIMCU per
10,000 pounds of milk

10,000 pounds -> 10,020 pounds = 0.2% increase

Cheese price

1,9	USD/pound
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Assumptions

100 pounds of milk goes into:
approx. 10 pounds of cheese and 90 pounds of whey
Increased yield is calculated to be extra protein retention only
Extra protein in the cheese will no longer be present in the whey
No production costs of whey processing are considered

See 'Whey value' worksheet

[USD] per vat

\$11,6

40.000 pounds/vat

Click button

Break-even calc

Why CHY-MAX® M is interesting for cheese producers?

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If you use
microbial

CHY-MAX® M compared to HANNILASE® or any microbial rennet is:

- Higher cheese yield & quality
- More expensive per gallon
- More expensive per cheese vat
- Lower cost per kg/ pound of cheese (based on higher yield)
- Excellent return on investment

If you use
FPC

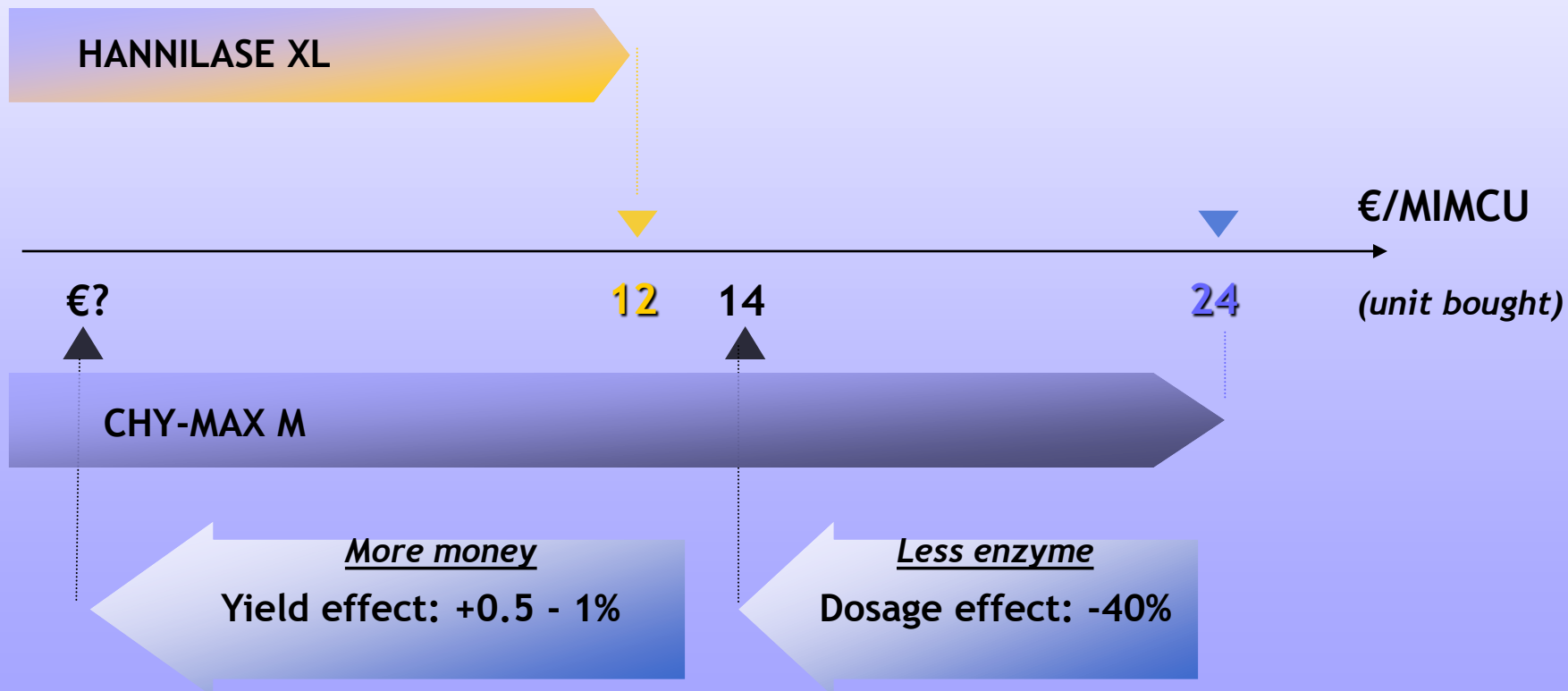
CHY-MAX® M compared to CHY-MAX® or any other FPC is:

- Higher cheese yield & quality
- More expensive per gallon
- Same price per cheese vat (dosage reduction)
- Lower cost per kg/ pound of cheese (based on higher yield)
- High return on investment

How do you save money buying CHY-MAX[®] M?

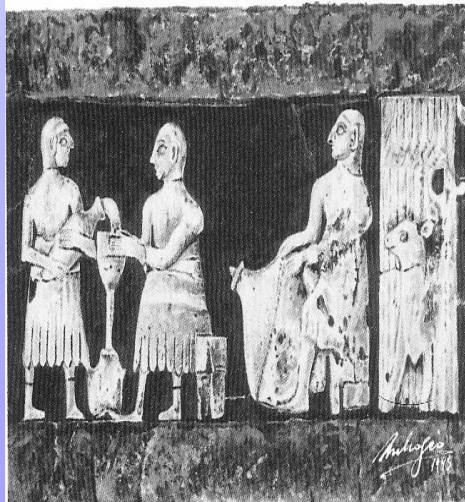
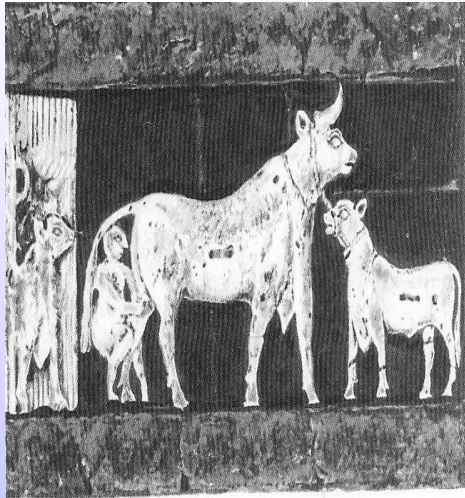
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CHY-MAX[®] M is more expensive per MIMCU...
...but helps you to use less enzyme and make more money!



CHY-MAX® M is a major break-through in coagulants

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- ~4000 BC Bedouin discovery of clotting in vells
- 127 BC first mention of coagulant in records
- 1874 standardized rennet by Christian D.A. Hansen
- 1972 intro microbial coagulants in US
- 1989 launch CHY-MAX®
- 2005 launch YieldMAX® as coagulation aid
- **2007 launch CHY-MAX® M**



Summary

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- ⇒ CHY-MAX® M is most specific coagulant available
- ⇒ CHY-MAX® M is pure and contains no side-activities
- ⇒ CHY-MAX® M is natural and is not GM/ not a GMO
- ⇒ CHY-MAX® M comes in one product, the 1,000 IMCU/ml,
- ⇒ CHY-MAX® M has the highest benefit-in-use
 1. *Lower dosage that compensates for higher price*
 2. *Higher yield that delivers profit*
 3. *Better flavor/less bitterness/longer shelf life for some cheeses*
 4. *Better process control*
 5. *Highest whey value*

Thank you for your attention!!

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CHY-MAX™ M
nature's best
now better!!

