Access more oil than you thought possible

Novozymes India Oils & Fat Team

22nd July 2021

Rethink Tomorrow

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Speakers

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TOPIC :

Market Insights

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TOPIC :

Quara Boost for Rice Brain Oil

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TOPIC :

Quara Boost for Soybean and Mustard

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You want to gain as much oil yield as possible...
because oil is a high-value product
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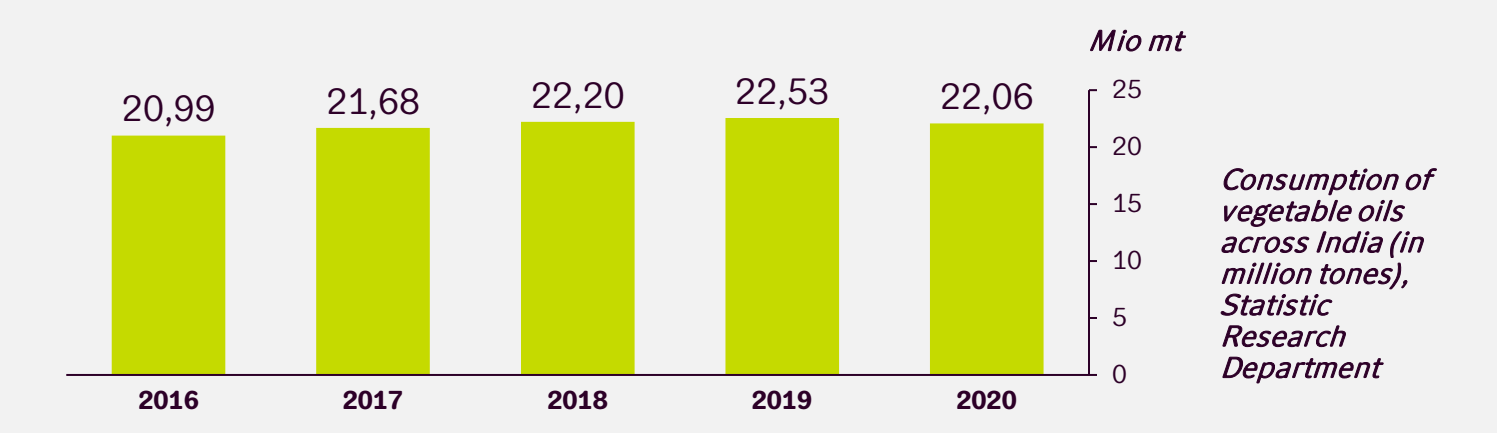
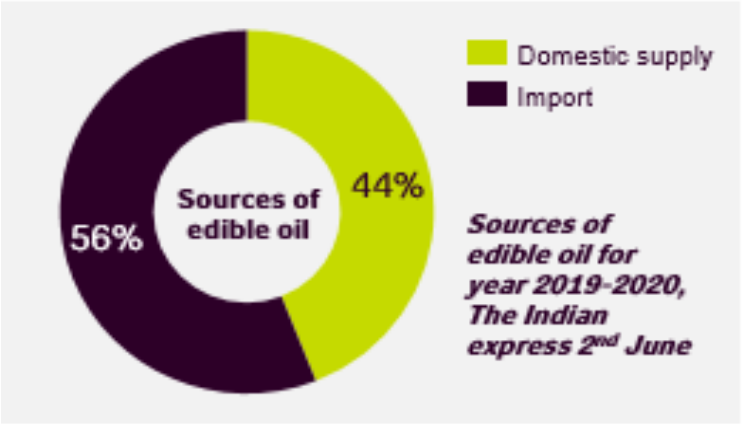
Quick glance on India edible oil market

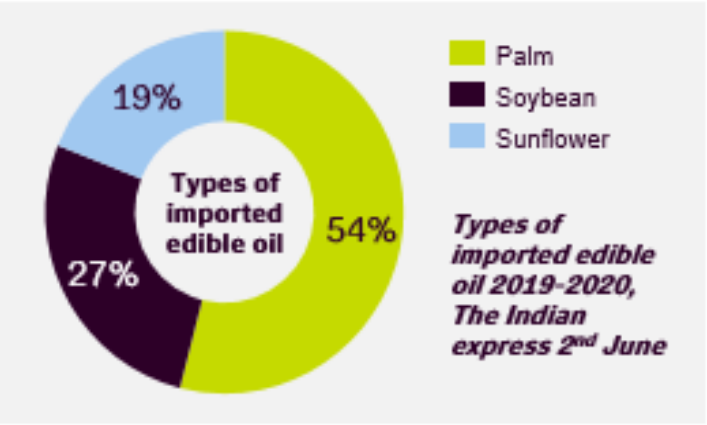
- With rising incomes and changing food habits, consumption of edible oils has been rising over the years
- Annual per capita consumption of edible oils increased by 40% to 8 kg and 20% to 10 kg in rural and urban areas respectively from 2005 to 2012, and has doubled to the level of 19kg and 20kg over the past 5 years
- Mustard oil is mostly consumed in rural area, refined oils like sunflower and soyabean oil is higher in urban areas
- It is widely known that India is heavily relying on the importation to supplement its domestic requirements. In 2019-20, India imported about 13.35 million tonnes of edible oils worth Rs 61,559 crore, or about 56% of the demand, mainly comprised of palm from Malaysia and Indonesia; soybean from Argentina and Brazil; sunflower from Ukraine and Argentina



Consumption of vegetable oils across India (in million tones), Statistic Research Department



Sources of edible oil for year 2019-2020, The Indian express 2nd June



Types of imported edible oil 2019-2020, The Indian express 2nd June

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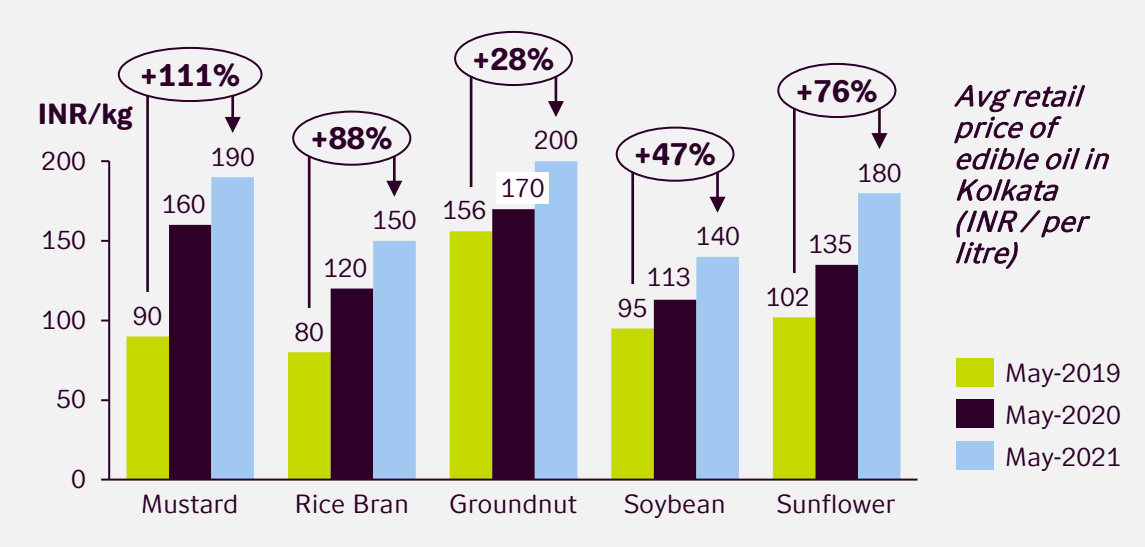
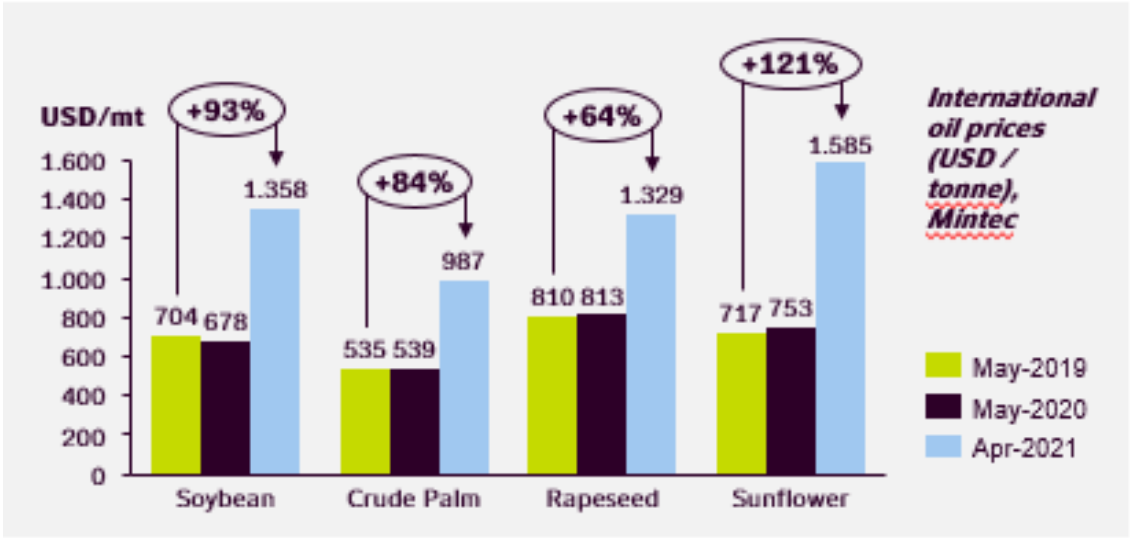
Price of edible oil on a continuous uptrend trend





- India edible oil prices hit all time high in May 2021
- The retail prices of major edible oils in India have risen between 18%- 33% during last one year
- The increase in domestic prices is basically a reflection of international prices, because India meets 56% of its domestic demand through imports

Soybean

expanded demand during the COVID-19 pandamic, biodiesel use growing in the USA / Brazil and imports increasing in key markets such as South Kore and India

Crude palm

the lower output due to labor shortages in Malaysia, slow recovery in Indonesia from the impact of droughts and floods and growing demand of biodiesel

Sunflower

tight availability in the Black Sea region, significant 5M tonnes production lost (2M tonnes of oil) in Ulraine and Russia (60% of global production)

Rapseed

poor harvest in Canada and Europe, drastic drop of inventory held by major exporters to an eight-year low, high demand from China

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What could an...
...up to
2%
extra oil
yield...
...mean for your business?
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What are enzymes?

Enzymes are biological catalysts and are nature's problem solvers

Natural

Enzymes are nature's tools – they speed up vital biological processes

Proteins

Enzymes are proteins present in all living cells. For example, they help digest foods

Catalytic

Enzymes are catalysts – enabling milder processes and saving energy and water

Specific

Enzymes are highly specific in their reactions and the substrates they target

Biodegradable

Enzymes are fully biodegradable and break down to harmless amino acids

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Quara® Boost
Access more oil
than you thought
possible
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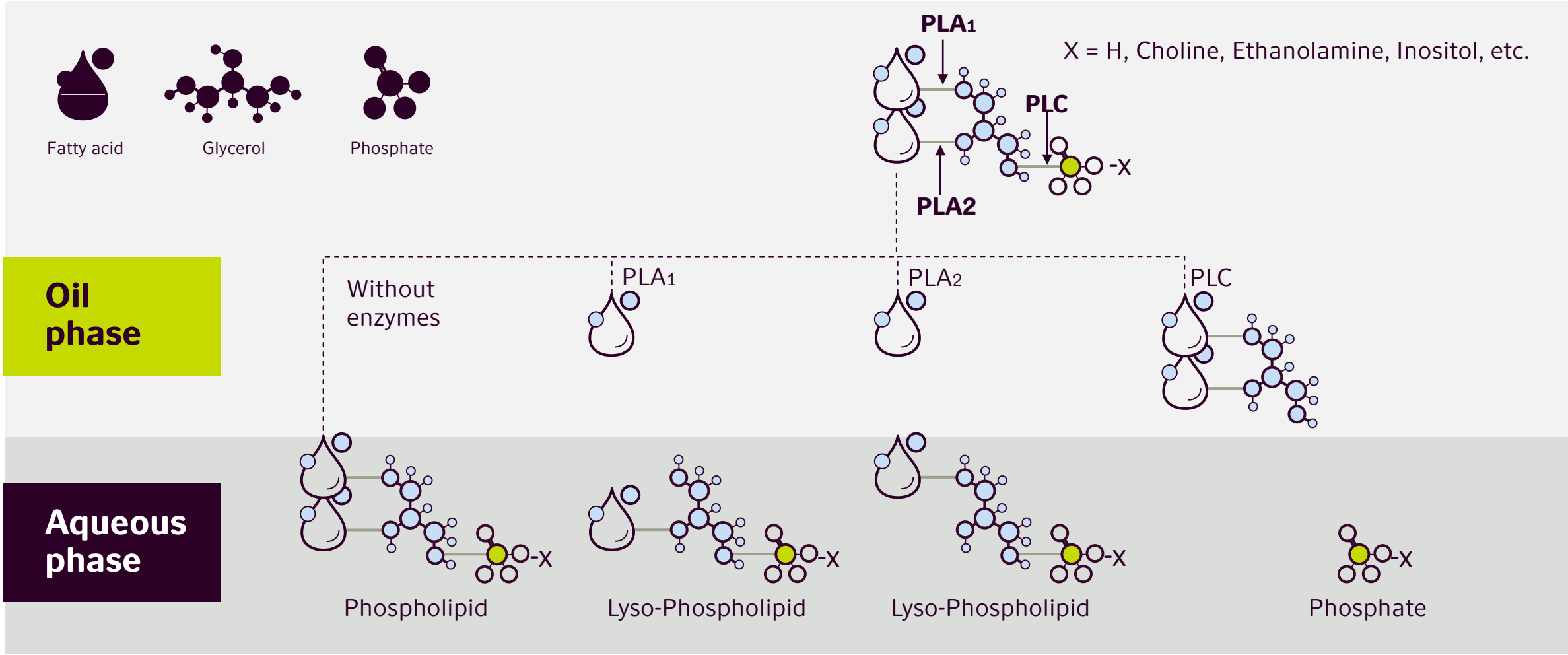
Understanding the Phospholipases reaction mechanism



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How Quara Boost can help to increase the yield of your Rice Bran oil?

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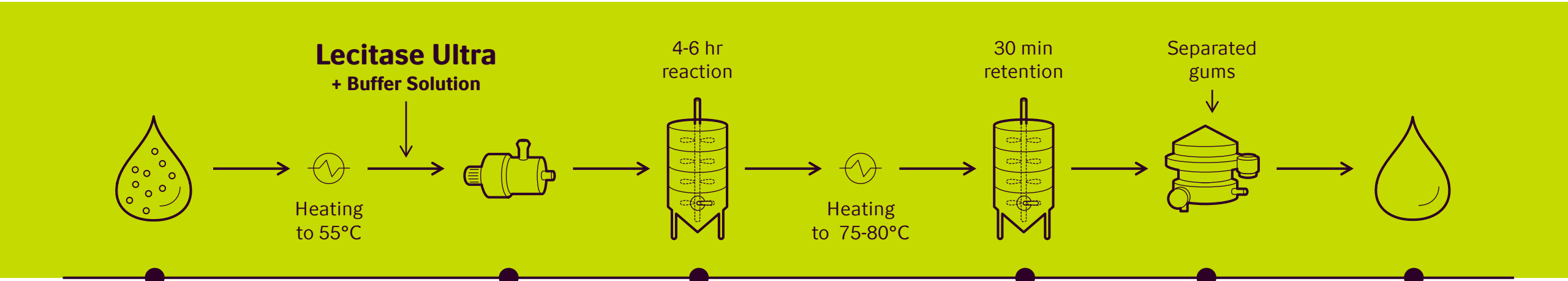
Existing Enzymatic Degumming with Lecitase Ultra



Operating conditions:

- 55°C
- 1.5% water
- 4-6 hr reaction time
- 50-60 ppm enzyme

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Phospholipid Composition of Rice Bran Oil

Oil losses in degumming are caused by phospholipids (P) acting as emulsifiers.

Phospholipid type	Rice Bran Oil
PC	**38.2%**
PE	**33.3%**
PI	**10.8%**
PA & other	17.9%

Global AVG %P composition by P NMR

The PLC enzyme is hydrolyzing PC, PE, and PI.

That represents around 80% of the total Phospholipids content.

(the P composition depends on the region and period of the year)

And it converts Phospolipidis to Diacylglycerides (DAG)

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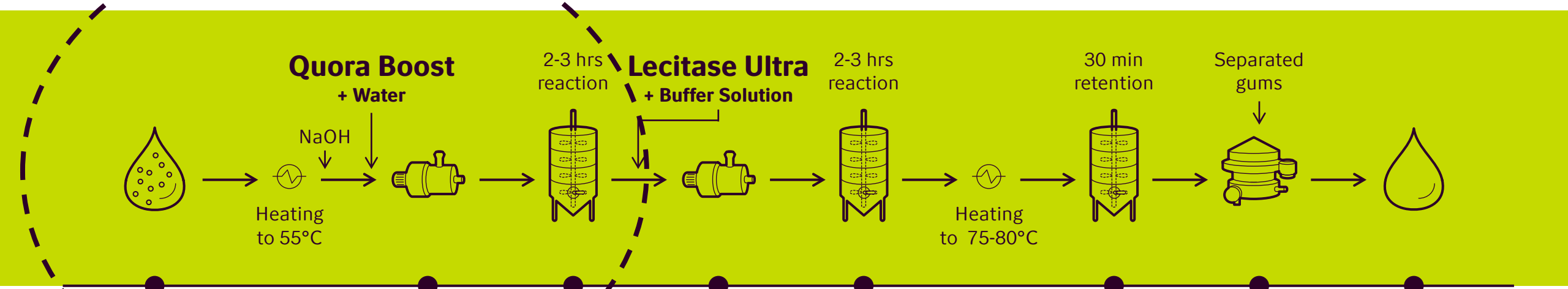
Improved Enzymatic Degumming with combination of Quara Boost & Lecitase Ultra



Operating conditions:

- 55°C
- 2-3% water
- 4-6 hr reaction time
- 100-150 ppm Quara Boost
- 50-60 ppm Lecitase Ultra

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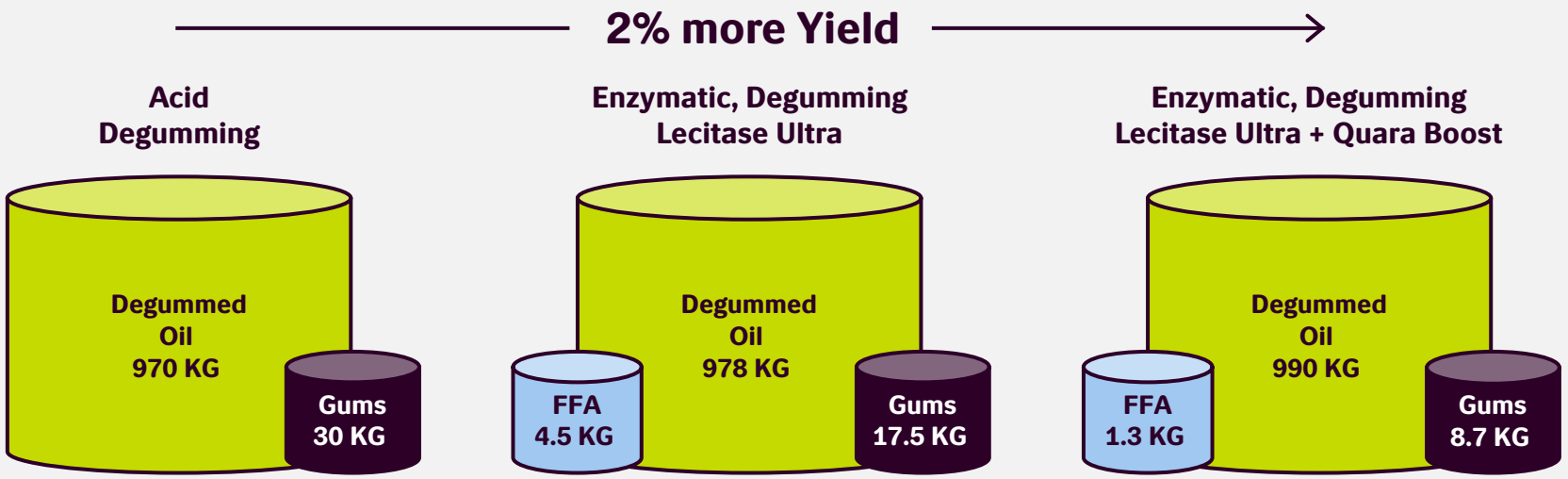
Yield benefit with different degumming options

Basis :
1 MT oil with 1.5 %
Phospholipids



Enzymatic Process offers

- Consistently Lower P content
- Higher yield by converting gums in FFA & Di-glycerides
- Reduces gums volume & oil carry over
- Lyso-gums can be dried and used for feed application
- Over all 0.8% - 2% Extra oil yield with Increased FAD recovery

Losses illustration is without factoring the losses because of other impurities like HIS, Moisture etc

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How Quara Boost can help to increase the yield of your Soybean and Mustard oil?

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Increase oil yield of Soybean and Mustard

Oil losses in degumming are caused by phospholipids (P) acting as emulsifiers.

Phospholipid type	Soybean	Mustard
PC	**31%**	**37%**
PE	**23%**	**20%**
PI	**21%**	**22%**
PA & other	9%	9%
Others	13%	12%

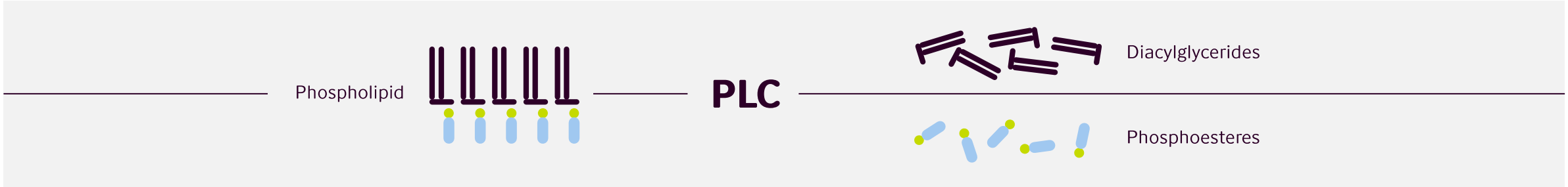
Global AVG %P composition by P NMR

The PLC enzyme is hydrolyzing PC, PE, and PI.

That represents around 75% of the total Phospholipids content.

(the P composition depends on the region and period of the year)

And it converts Phospolipidis to Diacylglycerides (DAG)



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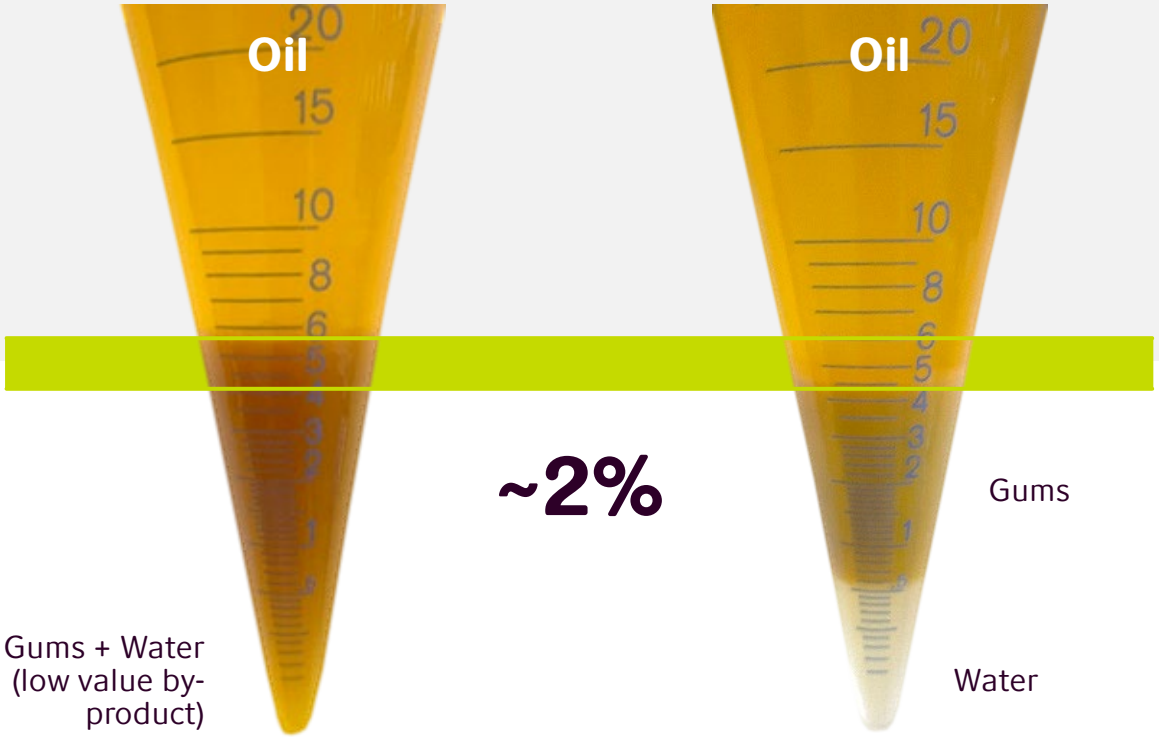
Less impurities, more profits

Water degummed

PLC degummed



Lower neutral oil loss in gums

Dried Gums: Water degummed

Dried Gums: PLC degummed

Oil usually wasted with gums

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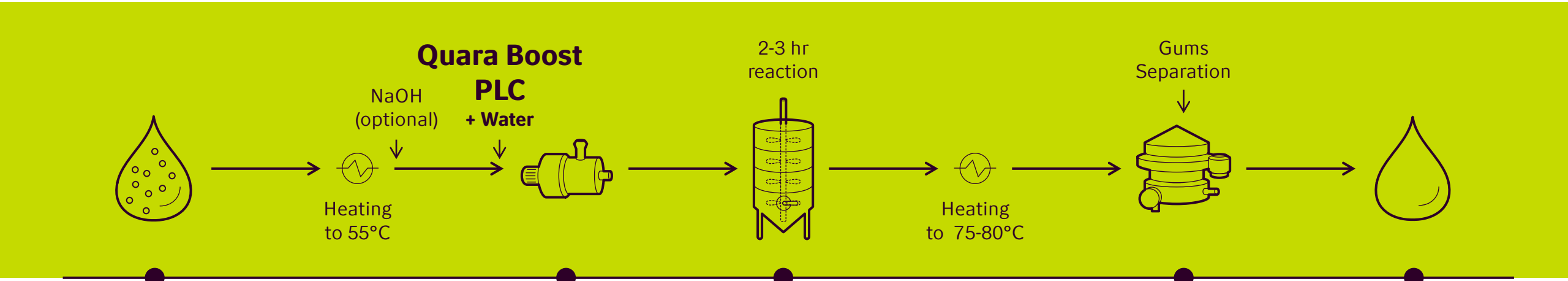
Water degumming process with Quara Boost PLC



Operating conditions:

- 55°C
- pH: 5.5
- 1.8-3% water
- 150-200 ppm enzyme
- 2-3 hr reaction time

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Yield Comparison –
Water Degumming Vs Quara Boost Degumming

Basis :
1 MT oil with
2.5 % Phospholipids

Enzymatic Process offers

- Higher yield by converting gums in to Di-glycerides
- Reduces gums volume & oil carry over
- Over all 2% Extra oil yield

When there is gap of min 40 ₹/kg in Oil & Lecithin Prices , it Potentially saves approx. 400 ₹ / MT

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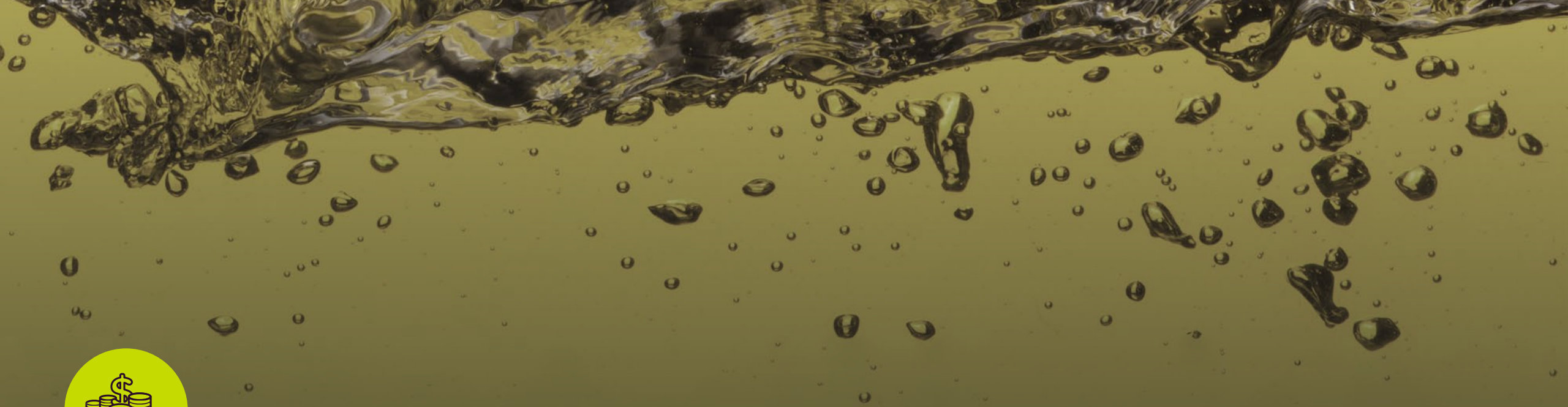

More profitable Alkaline Refining with Enzymes

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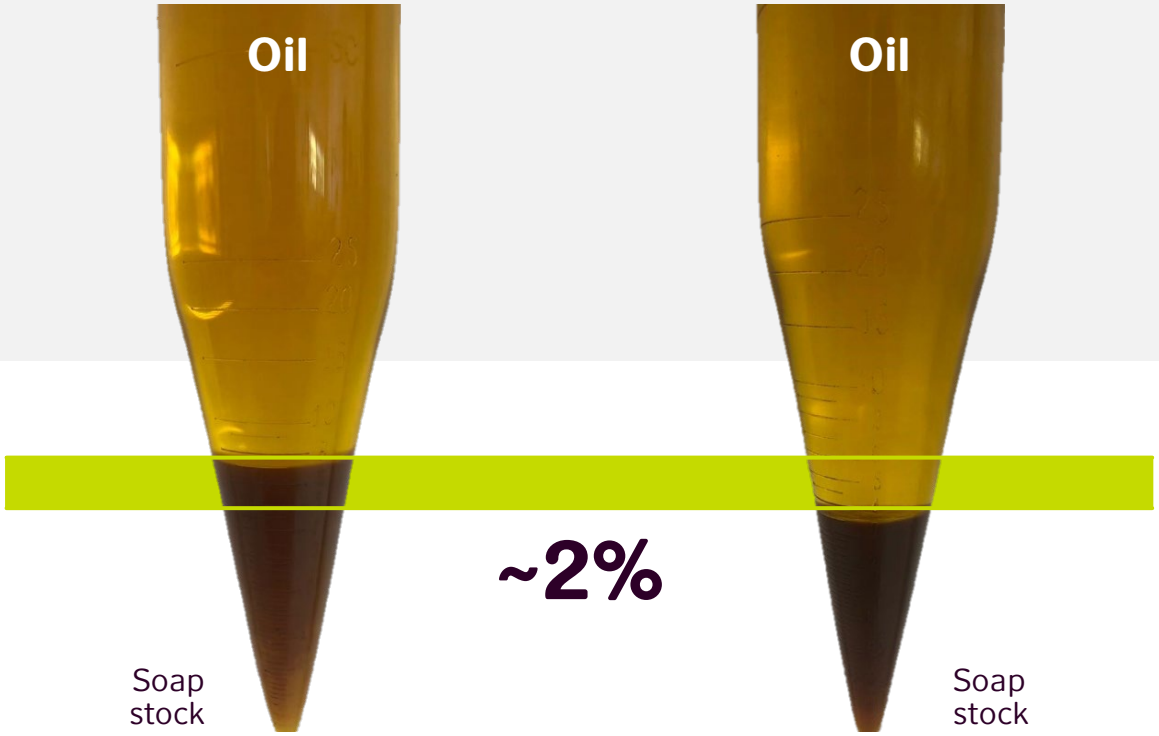
Less impurities, more profits

Alkaline refined

Quara Boost assisted Alkaline refined



Less by-product and lower oil loss

Dried soap stock:

Dried Gums after PLC reaction

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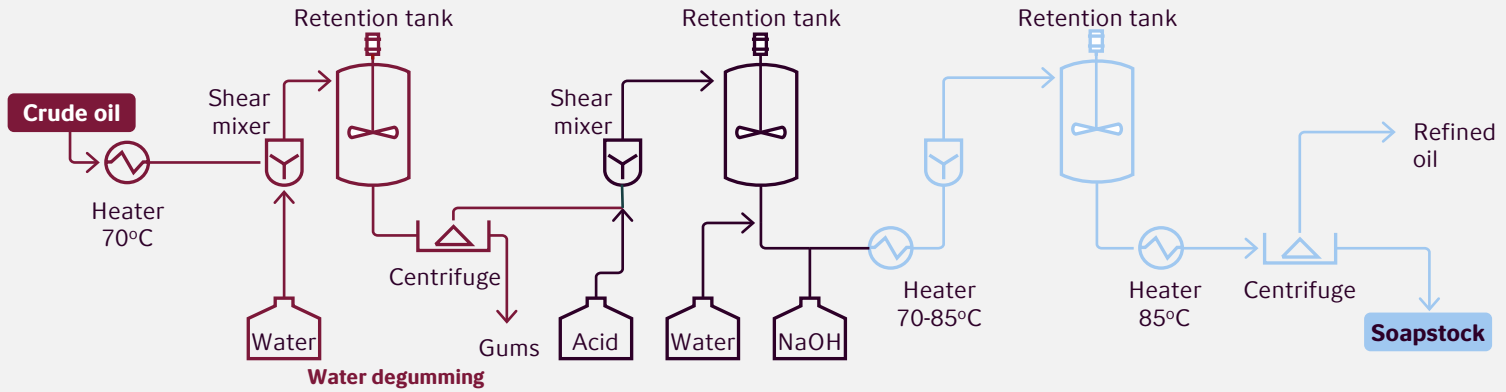
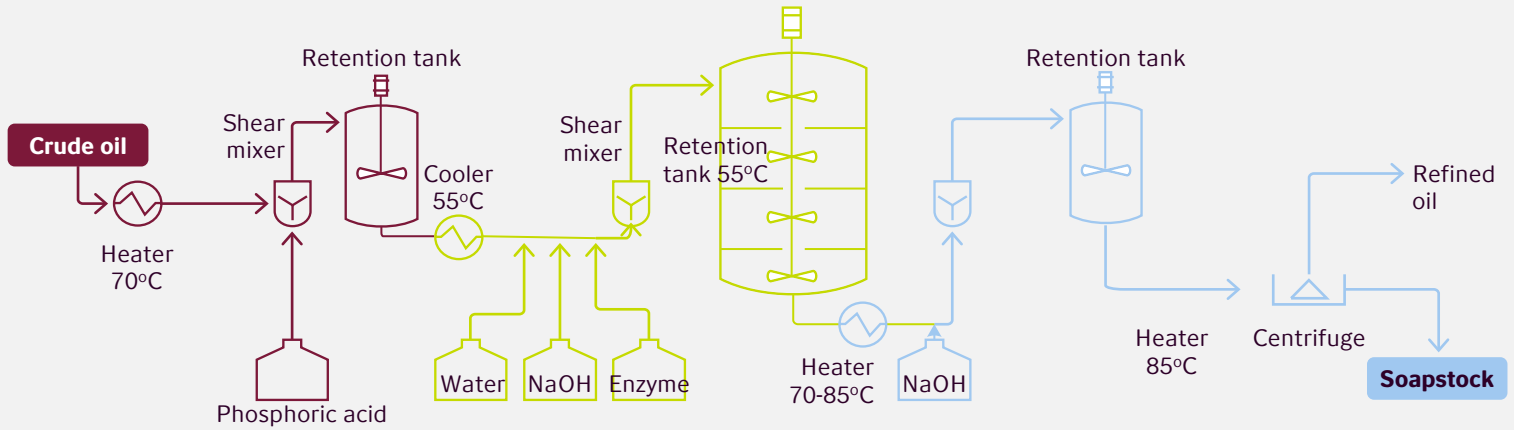
… using your existing equipment

Existing Alkaline refining



Improved Alkaline refining with Quara Boost



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Yield benefit with different alkali refining options

Basis :
1 MT oil
with 2.5 % Phospholipids

Enzymatic Process offers

Higher yield by converting gums in to Di-glycerides

Reduces gums volume & oil carry over

Over all 2% Extra oil yield

Less soapstock generated, reduced load of Acid oil Plant/ETP ,

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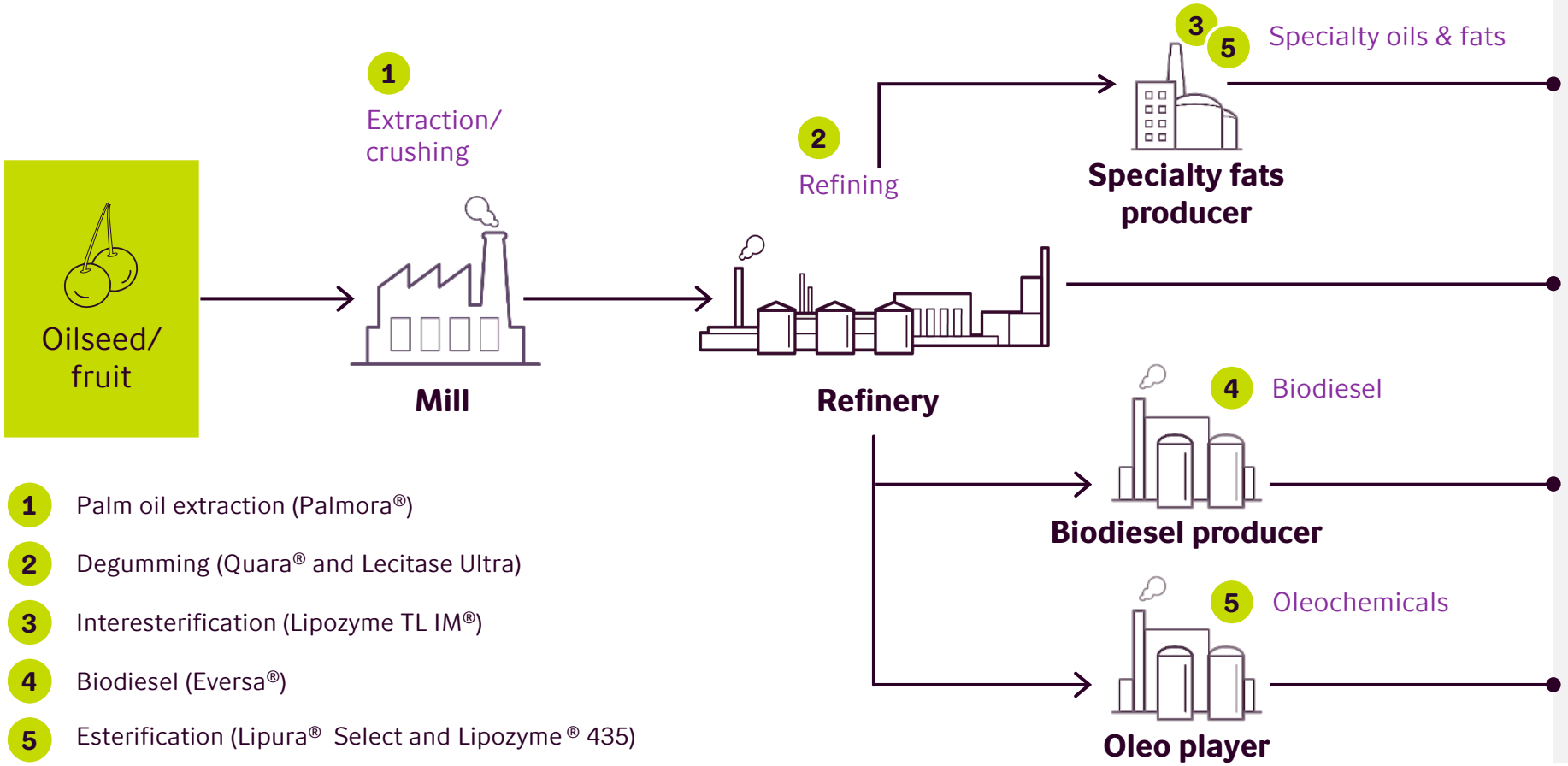
Novozymes offers multiple solutions across oils and fats value chain and applications



1. Palm oil extraction (Palmora®)
2. Degumming (Quara® and Lecitase Ultra)
3. Interesterification (Lipozyme TL IM®)
4. Biodiesel (Eversa®)
5. Esterification (Lipura® Select and Lipozyme® 435)

End products

- Cooking oil
- Margarine & shortenings
- CBE, OPO, etc.
- Omega 3 TG

- Biodiesel
- Pure glycerine
- Soap stock splitting

- Fatty acids
- Food & non-food additives
- MCT

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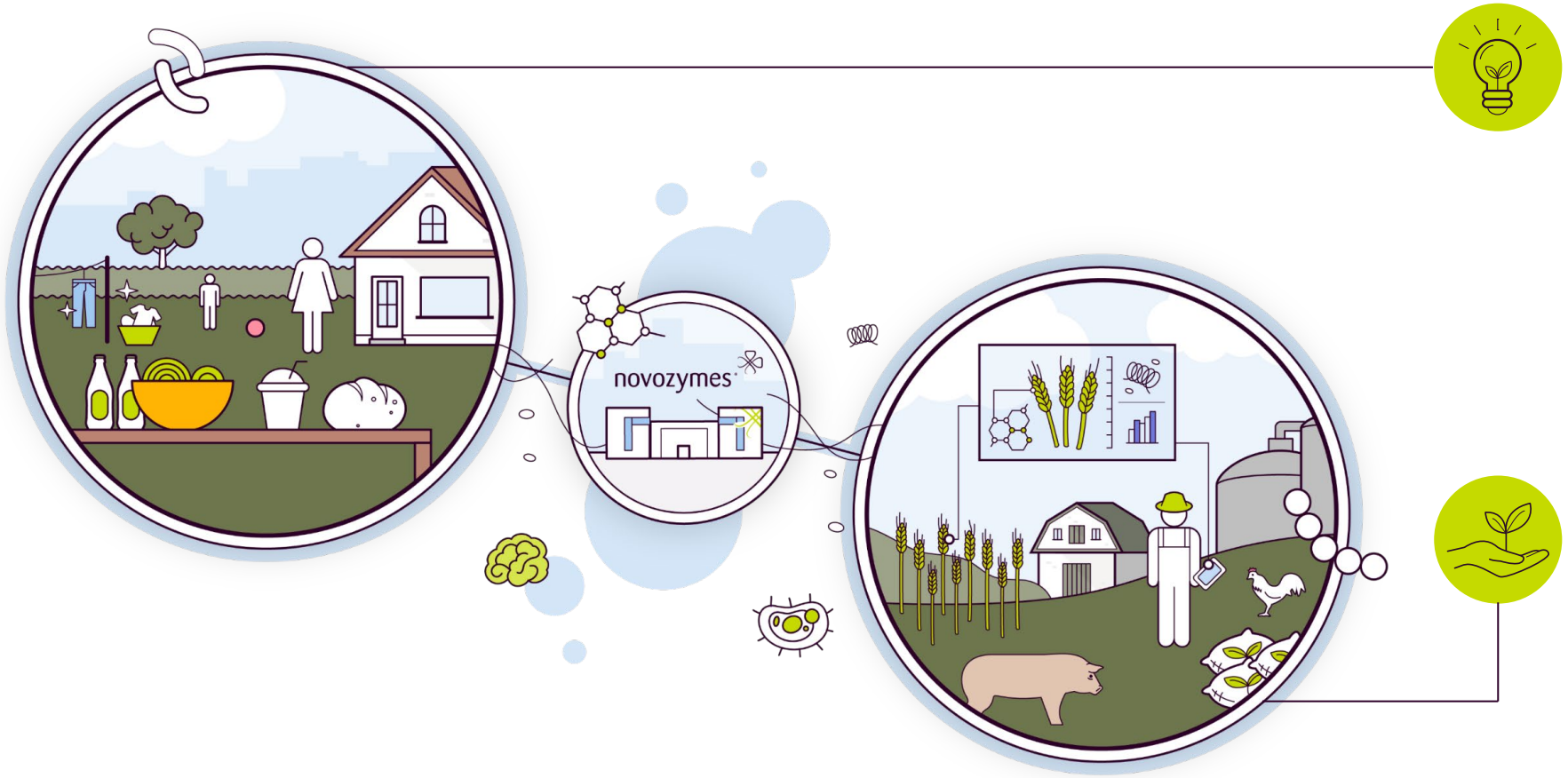
Our products are used in +30 industries across

140 countries

We launch 15-20 new products annually



Consumer Biosolutions

Consumer Biosolutions unites consumer-facing industries at the front of the value chain such as Household Care, Baking, Beverages, Food and Protein, with a focus on making consumer products better, healthier and higher performing, based on clear end-consumer needs.

Agriculture & Industrial Biosolutions

In Agriculture and Industrial Biosolutions, we focus on improved performance in agriculture and industrial processes, including higher yields, less waste and better health for plants and animals.

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Rely on
Novozymes
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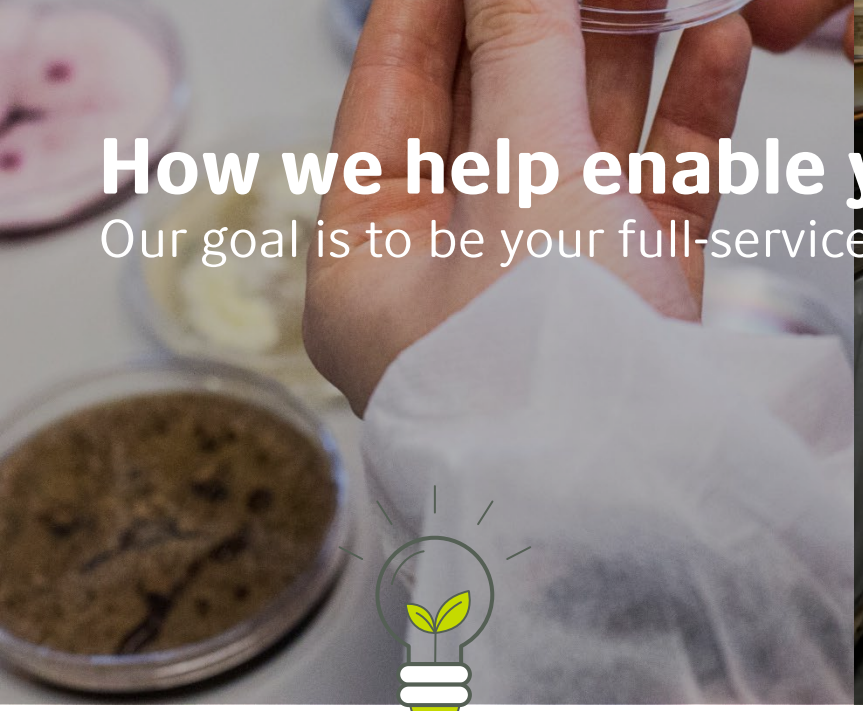

How we help enable your success

Our goal is to be your full-service provider of innovative solutions

Innovation leadership

Forefront of technology
to secure your leading edge

Strong R&D organization and close connects into customer needs for **continued product development**

Tailored solution development
for market and customers

Best-in-class production & logistics

High-quality,
consistent enzyme efficacy
across the globe

Ensured supply from
a global network of plants

High capacity,
deliver on time, on specification

Strong customer-focused support

Highly skilled sales and service teams
to support you in the long-term

The latest insights of consumer needs and market trends from our commercial experts

Help with developing new product claims
to capture critical market opportunities

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We are here to help build your business today and tomorrow

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