

Dairy Segment

Bovine Lactoferrin Testing Portfolio

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Product Manager · Meizheng

*Committed to safeguarding
global food health*

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01

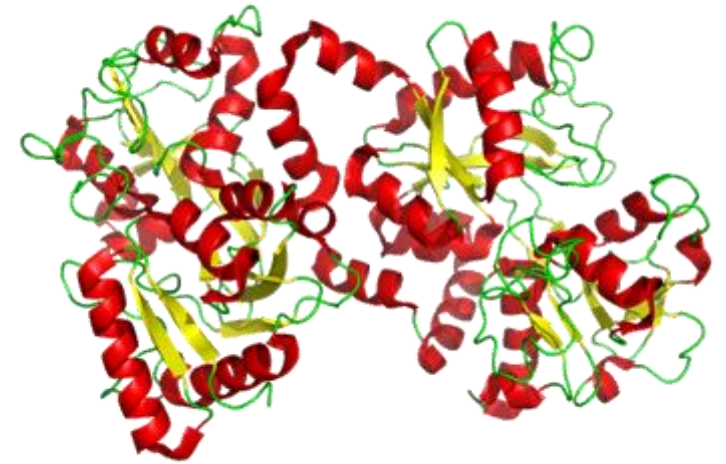
Background Knowledge

Natural Immune Factor!

Lactoferrin (LF) is a multifunctional protein of the transferrin family. It is a globular glycoprotein with a molecular mass of **about 80 kDa** that is widely represented in various secretory fluids, such as milk, saliva, tears, and nasal secretions. **Lactoferrin can be purified from milk or produced recombinantly.** Human colostrum has the highest concentration, followed by human milk, then **cow milk (150mg/mL)**.

Lactoferrin is one of the components of the immune system of the body; it has **antimicrobial activity** (bacteriocide, fungicide) and is part of the innate defense, mainly at mucosae.

Raw cow' s milk mainly contains two kinds of proteins: casein and whey protein, and bovine lactoferrin is a kind of whey protein which has a variety of biological activities.

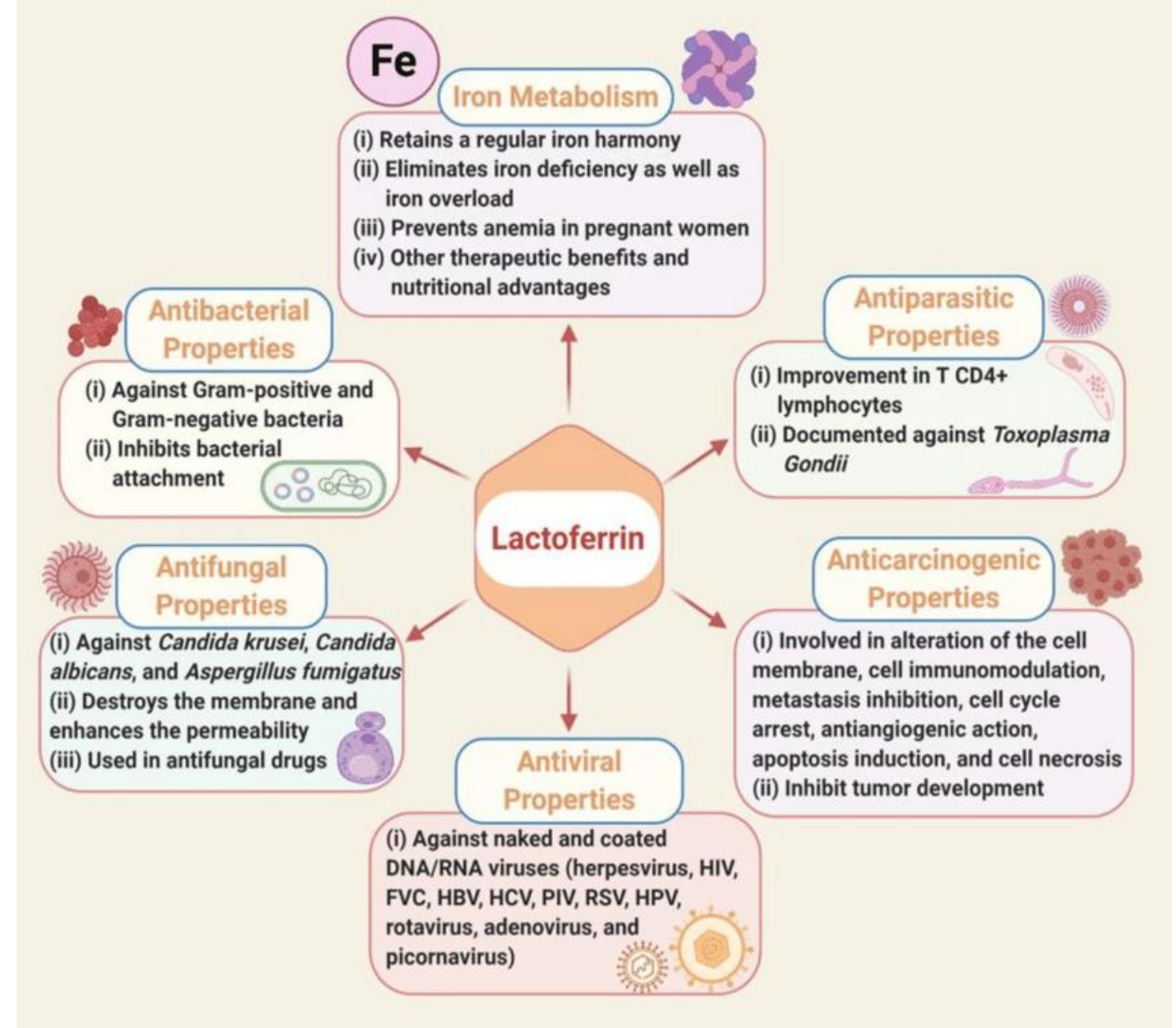


Lactoferrin Structure

Lactoferrin Function

An immune factor that stays naturally in milk.

- Belongs to innate immune system, can bind and transport of iron ions.
- Apart from its main biological function, lactoferrin is also an immunoregulator which has the positive activities of antibacterial, antiviral, antifungal, anticarcinogenic, and anti-allergic functions.
- Besides, lactoferrin can also accelerate absorption, as well as promote growth and development as a growth factor.



02

Regulations

Human lactoferrin (hLf) and bLf are not identical, however the differences in structure result in only small differences in cellular uptake and functionality, and bLf has been shown to provide physiological outcomes similar to those provided by hLf. The bLf has a history of safe consumption by humans and that can reduce the risk of infections in infants without potential adverse effects.

Different countries has different regulations to keep bLf as an safety food additive in different types of food.

bLF Adding Level as a Nutritive Substance in Infant Formula Products

Region/Standard	Maximum Allowable Limit	Typical Usage Level
Codex Alimentarius	Not specified (GMP-based)	100–300 mg/L
European Union (EFSA, 2012)	~2 g/L (natural levels)	100–300 mg/L
United States (USFDA 2017)	125 mg/L	100–300 mg/L
China (GB 10765-2021)	1 g/L	100–300 mg/L
Australia/New Zealand (FSANZ Act)	1 g/L	100–300 mg/L
Japan (MHLW 2022)	Not specified	100–300 mg/L



Meizheng can provide a **high performance testing portfolio** to help you to detect the exact adding value of bLf in different samples.

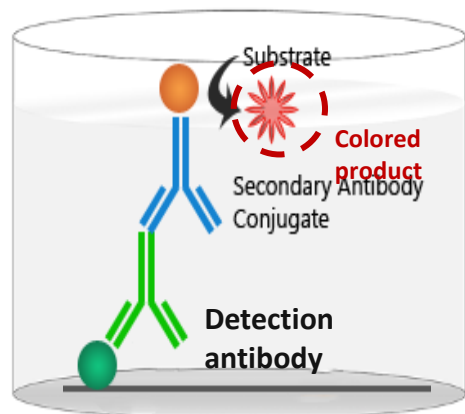
03

Testing Solution

Testing Method Summary

ELISA

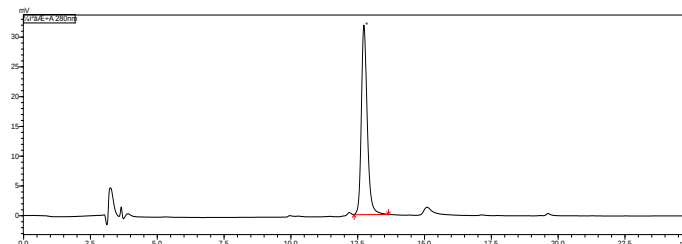
The rapid testing method to detect bLf in food matrices.



HPLC

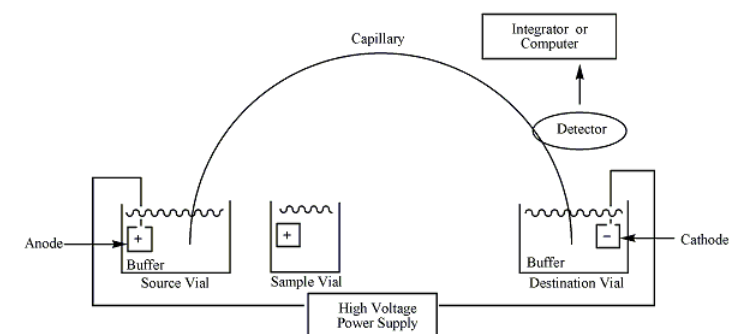
Analytical testing method to detect bLf in food matrices.

- ISO 20633:2015
- GB 5009.299-2024
- AOAC Official Method 2011.13



Capillary Electrophoresis (CE)

CE is a family of electrokinetic separation methods performed in submillimeter diameter capillaries and in micro- and nanofluidic channels.



Testing Solution



Rapid Test

Bovine Lactoferrin ELISA



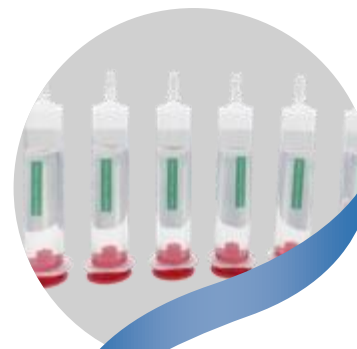
P/N: EC0256

- Rapid: 20min
- Matrix: milk powder, raw milk and pasteurized milk



Analytical Test

IAC for Heparin



P/N: QC0108/QC0140/QC0768

- Matrix: raw milk, pasteurized milk, yogurt, milk beverage, milk powder, whey powder, MPC powder, etc.



ELISA Test

Bovine Lactoferrin ELISA Test Kit

bLf ELISA



Catalog

- EC0256 (96 Tests)

Matrix & LOD

- Sensitivity: 0.5ppm
- Raw milk, Pasteurized milk: 15ppm
- Milk powder: 150ppm

Features

- User-friendly protocol, simplify procedures.
- Faster results – 20 minutes to get reliable results.

*Tailor-made brand service
is available according to
your needs!*



Workflow



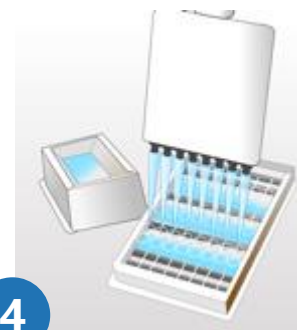
1
Sample Pretreatment



2
Add:
30 μ L Standards or samples,
50 μ L enzyme conjugate
70 μ L Antibody Solution



3
Incubate for 15 min at 25°C



4
Wash the plate



5
Add:
100 μ L of TMB Substrate



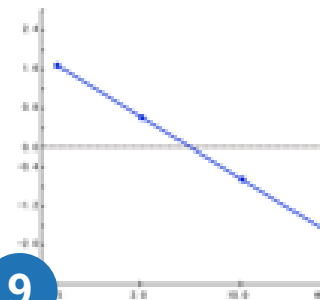
6
Incubate for 5min at 25°C



7
Add:
50 μ L Stop Solution



8
Interpret by Microwell Plate Reader



9
Analyze

Competitive Analysis

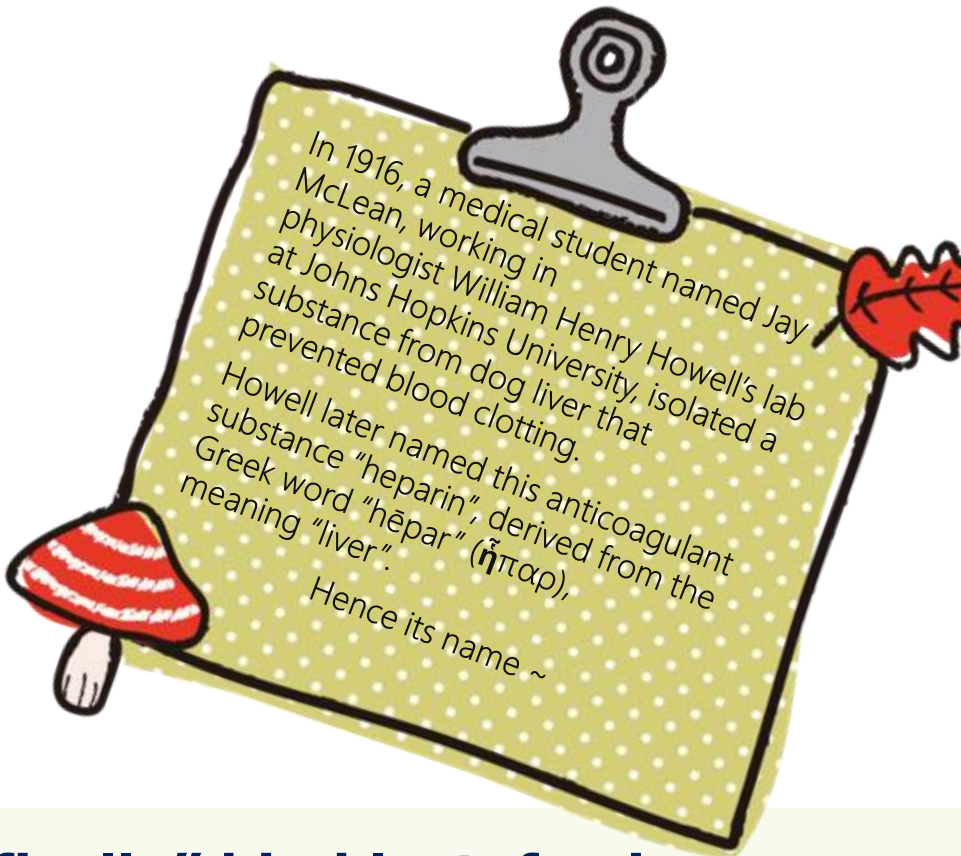
Item	Meizheng	R-Biopharm	Fudi-Biopanda
Method	Indirect competitive ELISA	Direct competitive ELISA	Sandwich ELISA
	one-step	one-step	two-step
Matrix & LOD	Raw milk, pasteurized milk: 15ppm Milk Powder: 150ppm	Infant milk powder: 156ppm	Depending on the amount of lactoferrin in the sample
Testing Time	15min+5min 	30min+15min	60min+60min+15min
Recovery Rate	95% 20/21 samples meet recovery standard	97% 11/21 samples meet recovery standard	88% 16/21 samples meet recovery standard
Performance	Accuracy: MZ > Biopanda > R-Biopharm Stability: MZ > Biopanda > R-Biopharm		

Heparin Column

➤ Heparin Column Enrichment and Purification Principle:

Heparin is a kind of poly-anionic acidic glycosaminoglycan. In this form, it serves as an **affinity ligand** and an **ion-exchange ligand**. It binds to some **structural glycoproteins** through **glycosidic bonds**. Meanwhile, the negative charges on the surface of heparin interact with positively charged proteins through ionization.

Lactoferrin is a structural glycoprotein. Under appropriate buffer conditions, lactoferrin and heparin form an affinity interaction through glycosidic bonds and ionic forces.



Under certain conditions, heparin can “specifically” bind lactoferrin.



***Tailor-made brand service
is available according to
your needs!***



□ Order Information

Catalog. No	Product Name	Specs
QC0108	IAC for Heparin	3mL, 50T
QC0140	IAC for Heparin	3mL, 25T
 QC0768	IAC for Heparin	12mL, 25T

□ Technical Data

Item	Description
Capacity	10mg
Volume	3mL, 12mL
Recovery	> 95%
Matrix	raw milk, pasteurized milk, yogurt, milk beverage, milk powder, whey powder, MPC powder, etc.

Great Performance of Enrichment and Purification

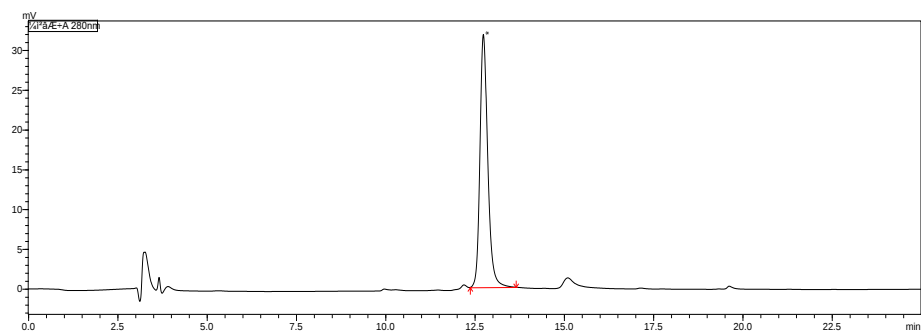


Figure 1. Chromatogram of lactoferrin standard

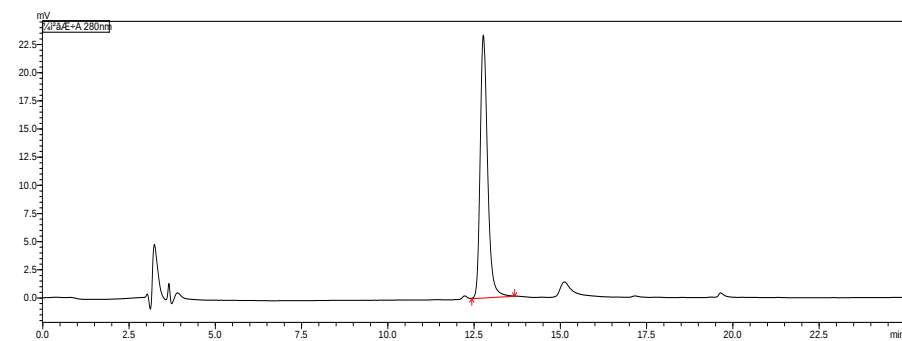


Figure 2. Chromatogram of the sample

High Precision: CV < 10%

High Accuracy: Recovery Rate within 90%-110%

Matrix	Background Value (mg/kg)	Spiking Value (mg/kg)	Testing Result (mg/kg)	Recovery Rate
Pasteurized milk A	34	40	73	98%
Infant Formula milk A	564	650	1165	92%
Infant Formula milk B	267	400	647	95%
Modified milk	0	200	196	98%
Yogurt A	0	100	106	106%
MPC powder	4796.2	5000	9917.9	102%
Whey powder	1497.8	1700	3356.4	109%

Obtained Dutch Invention Patents

- Innovated Buffer A achieved Dutch Invention Patent
- High extraction efficiency with unique extraction method
- Great performance on complex matrix



Competitive Analysis

<1> Flow Rate

Brand	Flow Rate (10mL distilled/deionized water)			Remark
MZ (12mL)	7min30s	7mi45s	8min30s	< 10min
MZ (3mL)	10min20s	10min30s	10min20s	< 10min
GE	N/A	N/A	N/A	> 10min
Zhongjian Weikang	7min	7min10s	7min15s	< 10min
Biopanda	11min	11min30s	11min20s	> 10min
Napu	12min30s	12min40s	16min	> 10min
Yuxu	29min58s	32min	31min10s	> 30min

<2> Accuracy

Matrix	Brand	MZ 12mL	MZ 3mL	GE	Anpu	Napu	Zhongjian Weikang	Biopanda	Yuxu
Infant Formula milk		94%	88%	91%	66%	75%	54%	86%	71%
Pasteurized milk		92%	94%	N/A	54%	87%	70%	89%	72%
Milk beverage		93%	92%	N/A	N/A	93%	81%	92%	89%
Modified milk		96%	92%	N/A	N/A	85%	50%	94%	76%



- **MZ: Great efficiency with higher flow rate to pass the column; Great performance with better accuracy.**
- GE: Applicable to the matrices that GB National Standard claims, **pre-packed columns** can block the HPLC's pipeline;
 - Anpu: **Not applicable to the matrices that GB National Standard claims**, testing results present much lower;
 - Napu: Milk beverage meets the GB National Standard, pasteurized milk & modified milk show the lower result. **Not applicable to infant formula powder**;
 - ZJWK: Only milk beverage shows the lower result. **Not applicable to the rest of matrices**;
 - Fudi (Biopanda): Applicable to the matrices that GB National Standard claims, **but all showing the lower results**;
 - Yuxu: Only milk beverage meets the GB National Standard. **Not applicable to the rest of matrices**.

04

Potential Customer

Potential Customers

Dairy Enterprises

Global Dairy T20, like FrieslandCampina, Danone, Nestle, etc.

- Achieved the business with Nestle and FrieslandCampina in China.

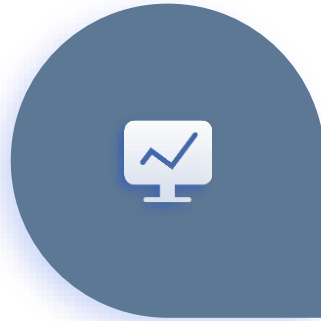
China Dairy D20, like Yili, Mengniu, Feihe, etc.

Pharmaceutical or FSMP Enterprises

Danone, Biostime, By-health, etc.

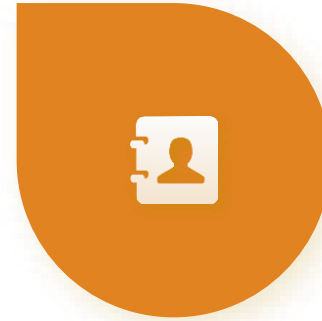
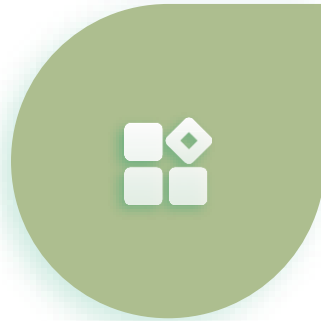
Functional beverage or powder

Diagnosis/ Health



Third Party Lab

SGS, Pony, CTI, ALS, Eurofins, etc.



Research Lab & Government

Customs, University, Research Institute, Research lab (disease control and prevention center, food, diagnosis...)

Competitive Strategy



Dairy Enterprises

➤ **Scope of product line:**

pasteurized milk, infant formula powder, modified milk, fermented milk, milk beverage, etc.



Healthcare Enterprises



Food for Special Medical Purpose Enterprises



Government, Research Institute, etc.



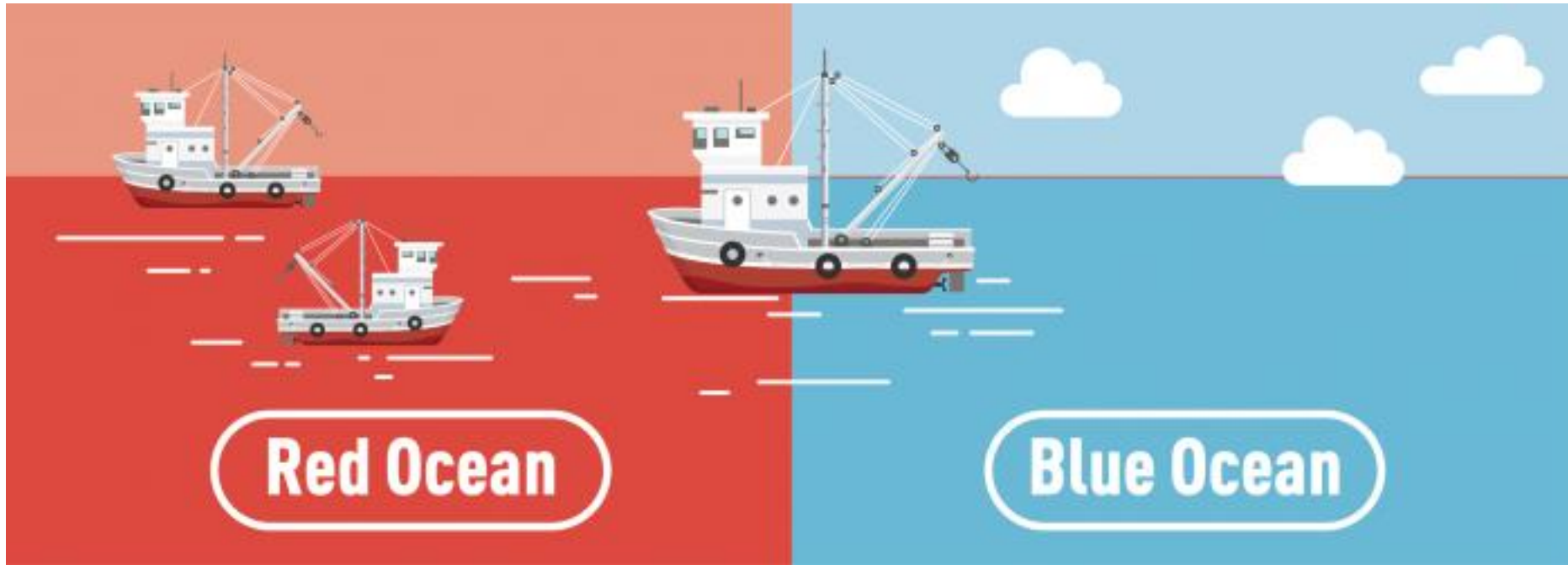
3rd Party Lab

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High-price
Harvesting

Low-price seize
high-volume sales



- Strip/Cassette Test
- ELISA Test
- Normal IAC products
-

- IAC for Heparin
 - Currently, there' re many competitors in the market.
 - ex-China brand: GE, R-bioherm, negative performance feedback from customers; not applicable to complex matrix; high price.
 - in-China brand: bad performance; haven' t started ex-China business yet.

Thank You

For Your Time

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