



View of industry on FCS-free solutions

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PAN Biotech – Your expert in cell culture

Company Profile



01

Based in Aidenbach, Germany

02

Founded in 1988, 60 employees, >10 million € annual sales

03

Product: Media and supplements for cell culture

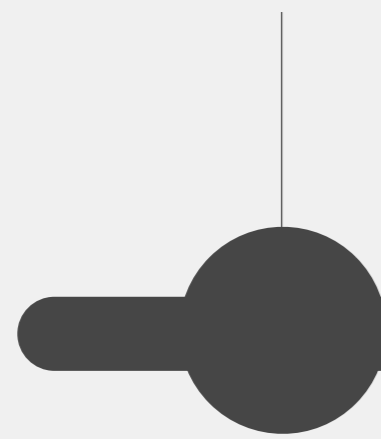
04

Deliver to industry and academia

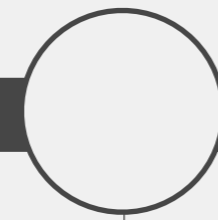
Company Profile

Foundation in
Aidenbach

1988

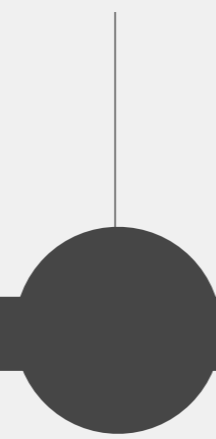


1998
In-house R&D
and Production

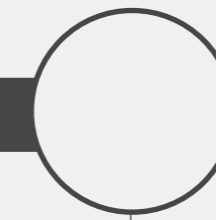


Serum-free
Products

2002

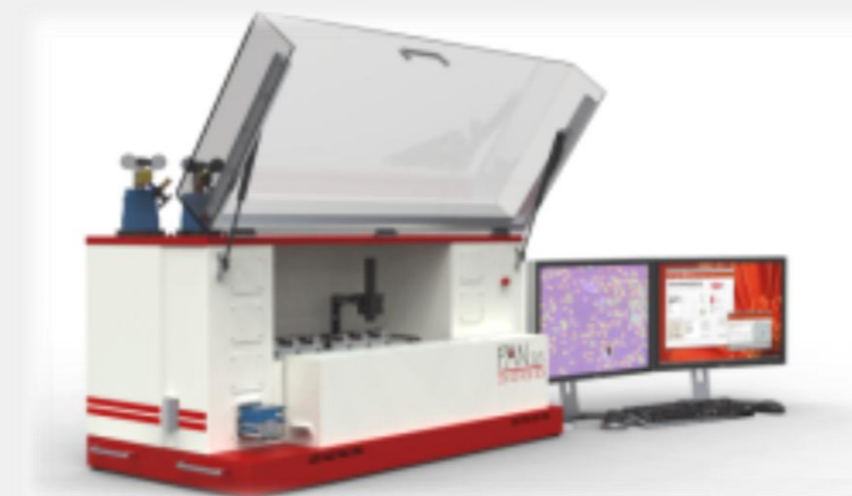
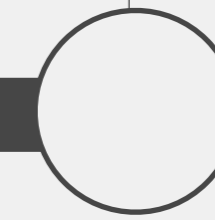


2008
Cell culture
device
PANSys3000

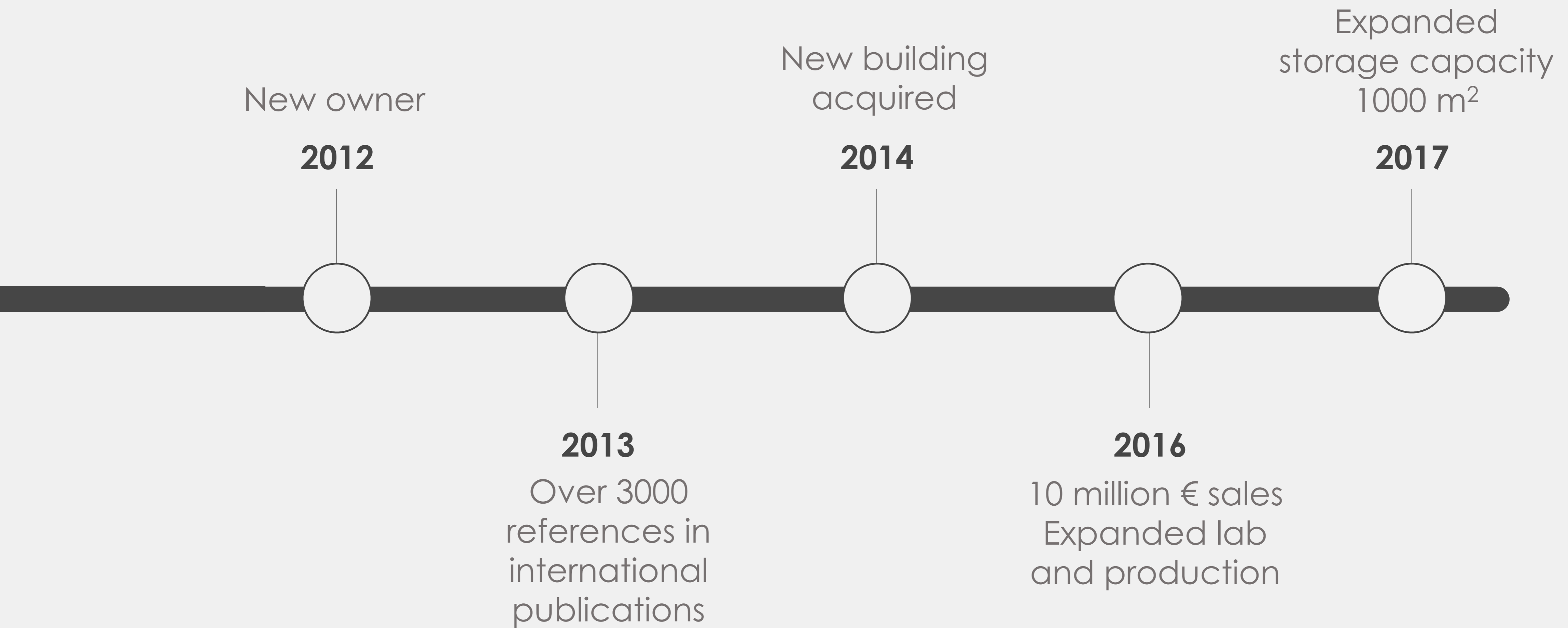


ISO 9001
ISO 13485

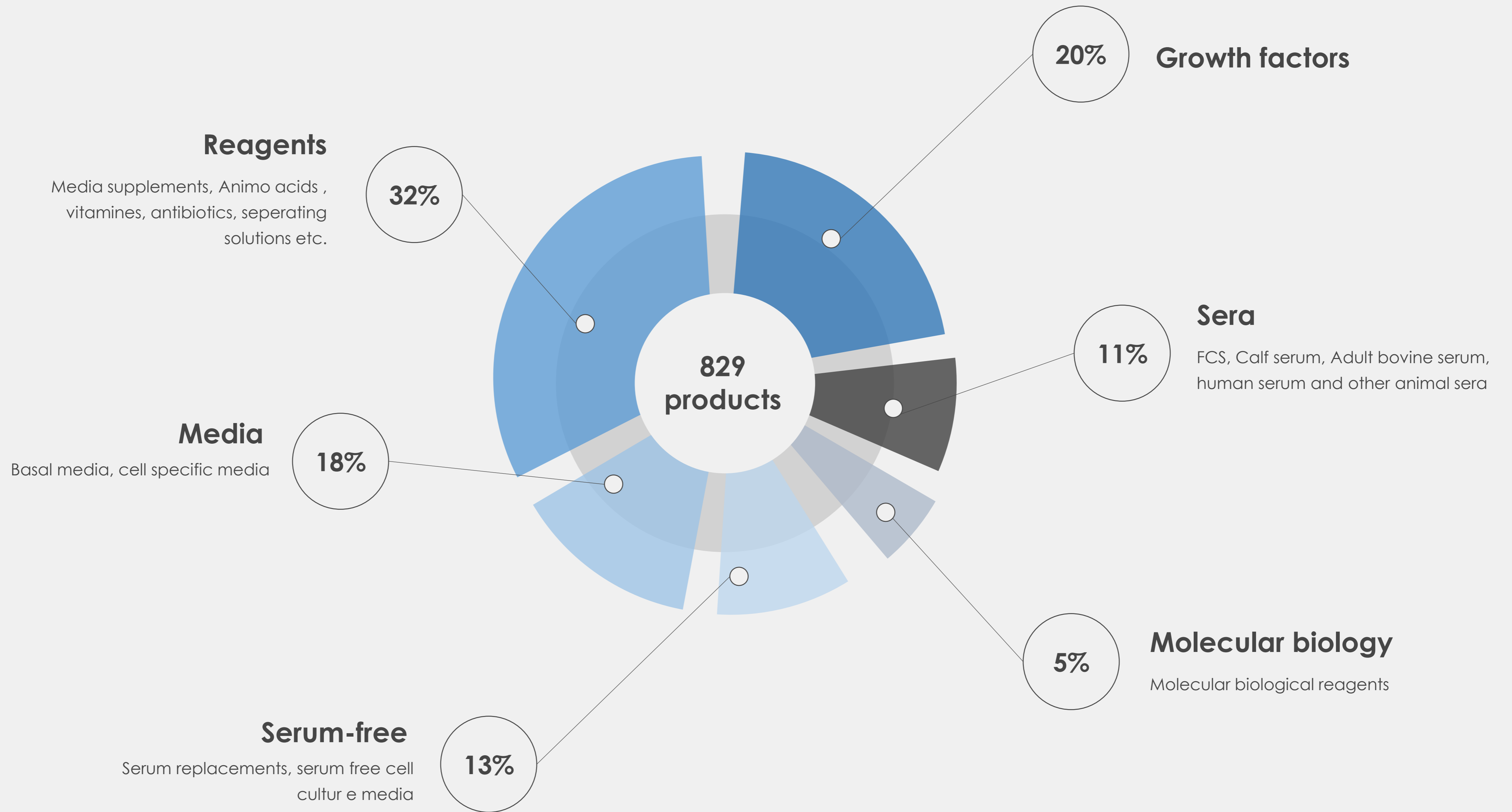
2011



Company Profile



Portfolio

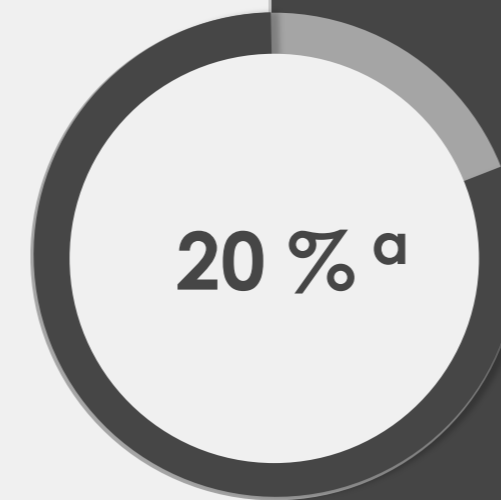


Serum in cell culture market

Global media market value in 2014: 3.7
bn US\$

39% Reagents
41% Media

Expected total annual growth rate:
13%



20% Sera



Expected annual growth rate sera:
3.7%^a -13%^b

^a Data from "Cell Culture Media, Sera, and Reagents Market - Global Industry Analysis", published 2017.09.18

^b Data from "Global Animal Blood Plasma Products and Derivatives Market", published 2017.05

Serum in cell culture market

Increasing demand

Serum becomes a limitation factor for the dynamic biopharma industry

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Limited supply



Complex supply chain:
Slaughterhouse -> Agent -> Producer



Seasonal:
Raw material acquired twice a year



Increasing price:
Affected by the beef industry and climate change



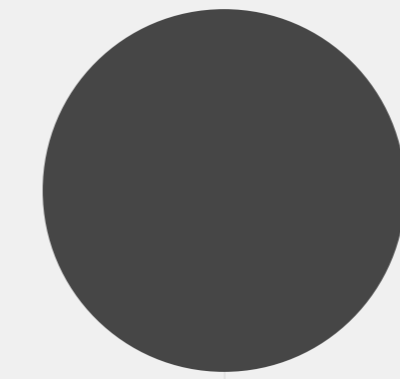
Turbulent pricing policy:
Monopolization in certain regions/countries



**Bio-pharma
industry needs
alternative(s)
to FCS.**

View of industry on FCS-free solutions

The market is being transformed



Monopolization

2011

PAA -> GE Health care

2014

Life technologies -> Thermo Fischer
Hyclone -> GE Health care

Outsourcing



Since 2009

Strategic outsourcing of media design and cell culture media manufacturing

Approx. 50 FCS producers

Monopolized raw serum market -
Stronger competition -



2017

View of industry on FCS-free solutions

Less independent professional media producers on the market

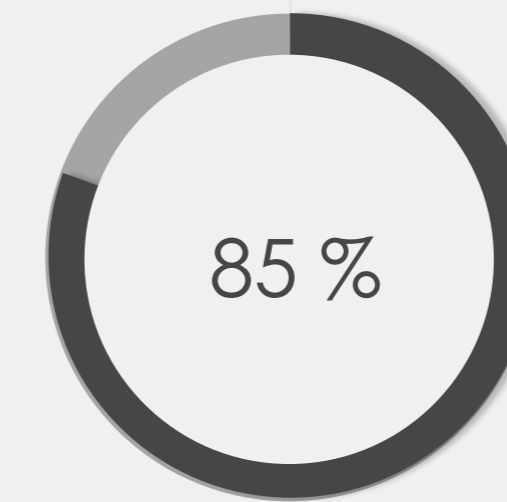
FCS



Higher costs

- Extensive costs by sourcing, storage
- Decreased market share

2017



Growth in sales of FCS-free products

Good Opportunity



Culture Media

- More customized contract manufacture -
- Benefit from stable biochemicals market -

View of industry on FCS-free solutions

Cell specific SFM and serum replacements

SFM: Serum-free media

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Research customers



Problems & Challenges

- Specific formulation
- Short of established SFMs
- 1000 ~ 2000 new cell lines per year

Industry customers



Problems & Challenges

- Time and cost intensive media development
- Customized formulation
- New quality standards
- Minimization of the costs

Defined serum replacement



FCS replacement

Panexin basic

Fully defined Serum Replacement

- No more serum testing!
- Easy handling!
- Full reproducibility!
- Cost – effective!

FREE TEST KIT



Fully defined FCS replacement.

01

Fully defined -> High reproducibility

02

Flexibility -> Design your own FCS-free Media!

03

Stable pricing (lower or comparable to FCS)

04

Functionality

FCS replacement

- *Human pancreatic adenocarcinoma COLO357*
- *Human prostate cancer cell line (PC3)*
- *rMSC & hMSC*
- *RASF (rheumatoid arthritis synovial fibroblasts)*
- *Human liposarcoma SW872*
- *TAF (tumor-associated fibroblasts)*
- *SZ95 sebocytes*
- *Bone marrow derived macrophages (BMDMs)*
- *Human corneal epithelial cells (HCE-T, HCK)*
- *Human hepatoblastoma cell line Hep G2*
- *The human breast cancer cell lines MCF-7*
- *HeLa, MDCK, HEK*
- *Most tumor cells*

And more ...

- *J Immunol.*
- *Prostate*
- *Int J Mol Med.*
- *Exp Dermatol.*
- *Am J Respir Cell Mol Biol.*
- *BRAIN*
- *Infect Immun.*
- *Anticancer Res.*
- *Vaccine.*
- *Int J Pharm.*
- *Free Radic Biol Med.*
- *Microbiology*
- *BMC Immunol.*

And more ...

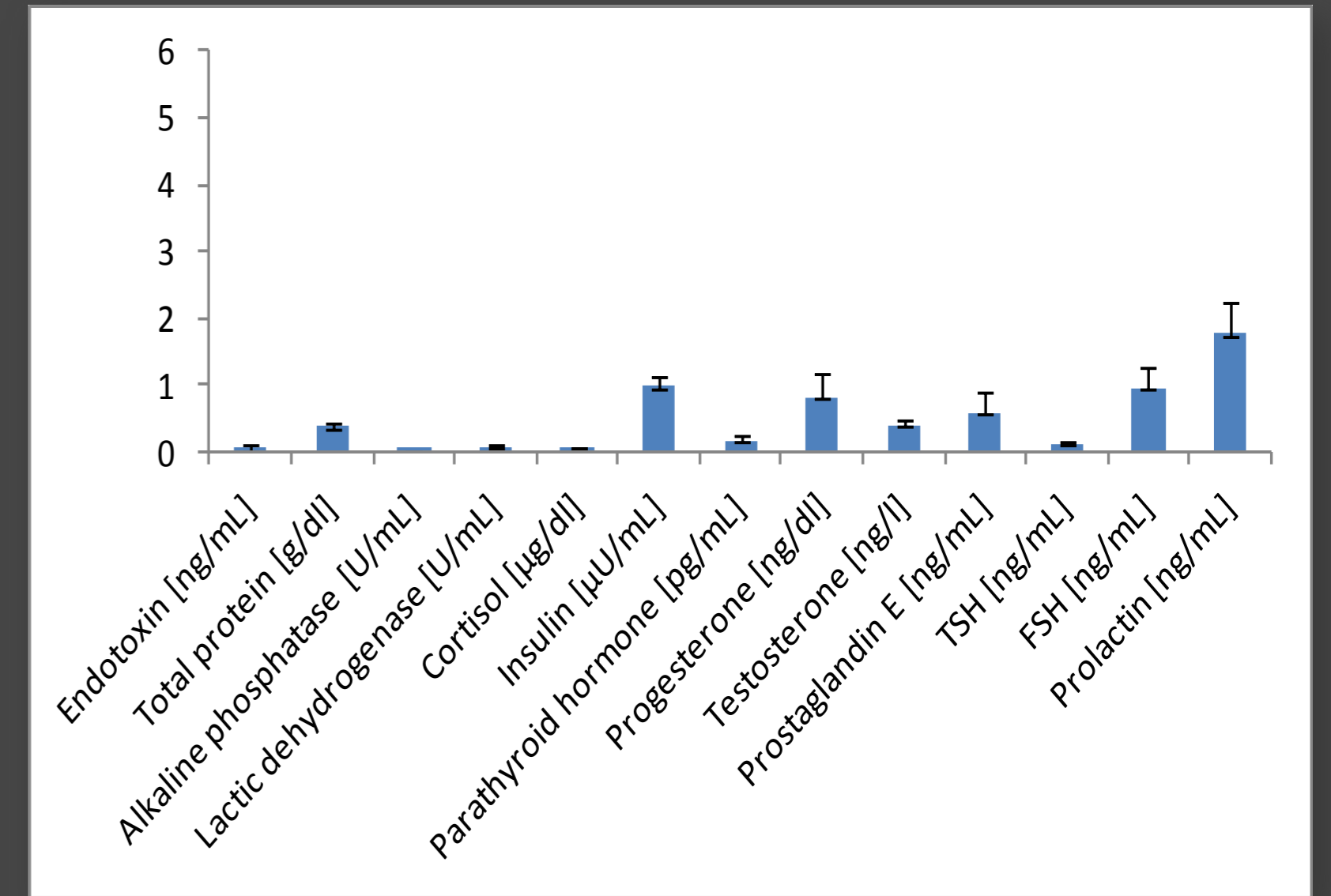
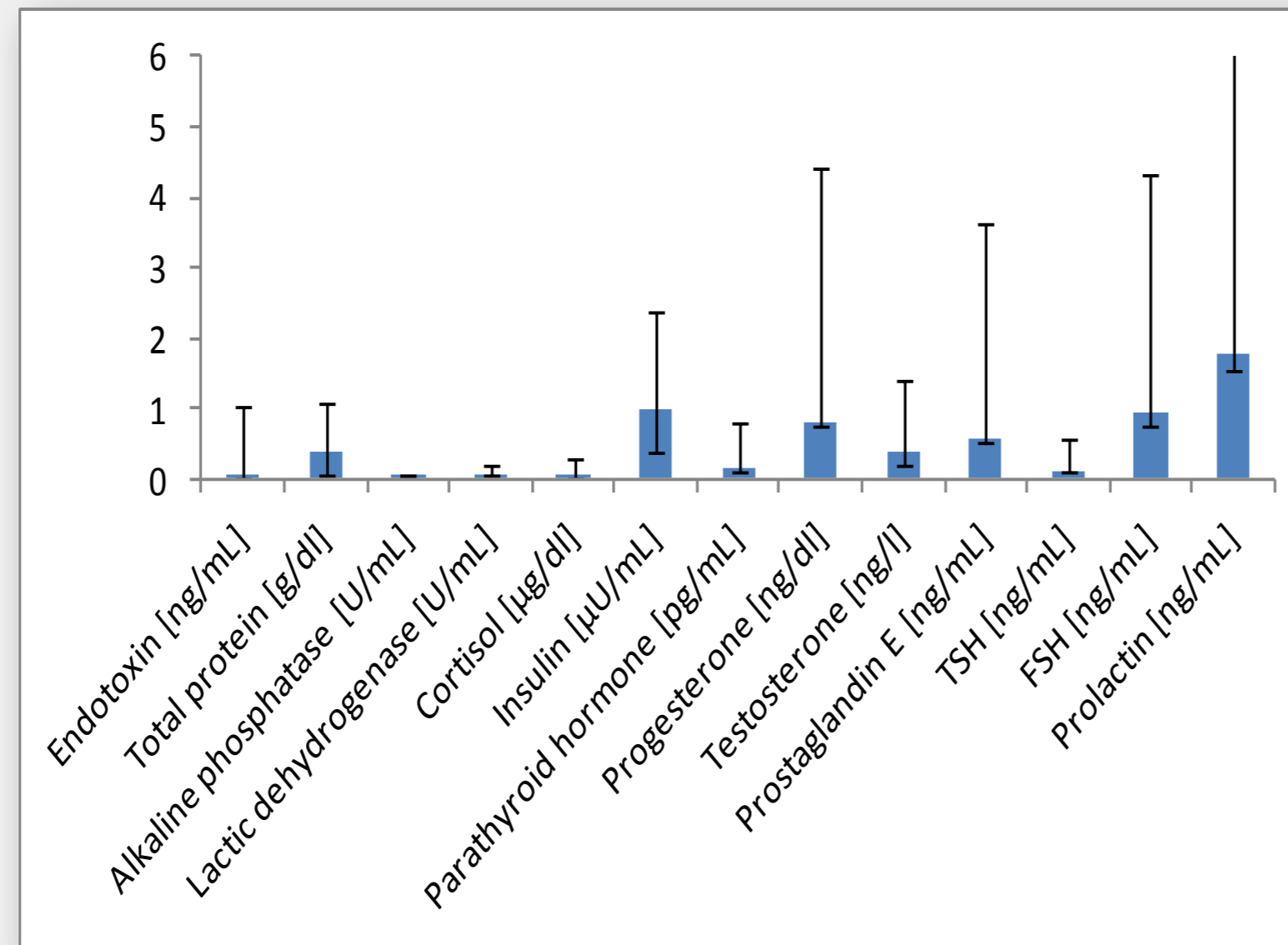
Improved reproducibility

BOVINE SERUM'S WIDE RANGE

The bioactive compounds in fetal bovine serum can vary dramatically from lot to lot. Selected components are shown below.

| Components | Average (range) |
|----------------------|--------------------------------------|
| Endotoxin | 0.356ngml ⁻¹ (0.008-10.0) |
| Total protein | 3.8gd ⁻¹ (3.2-7.0) |
| Alkaline phosphatase | 255mUml ⁻¹ (111-352) |
| Lactic dehydrogenase | 864mUml ⁻¹ (260-1,215) |
| Cortisol | 0.5µgd ⁻¹ (<0.1-2.3) |
| Insulin | 10µUml ⁻¹ (6-14) |
| Parathyroid hormone | 1,718pgml ⁻¹ (85-6,180) |
| Progesterone | 8ngd ⁻¹ (<0.3-36) |
| Testosterone | 40ngd ⁻¹ (21-99) |
| Prostaglandin E | 5.91ngml ⁻¹ (0.5-30.5) |
| TSH | 1.22ngml ⁻¹ (<0.2-4.5) |
| FSH | 9.5ngml ⁻¹ (<2-33.8) |
| Growth hormone | 39.0ngml ⁻¹ (18.7-51.6) |
| Prolactin | 17.6ngml ⁻¹ (2.00-49.55) |

TSH, thyroid stimulating hormone; FSH, follicle stimulating hormone



M. Baker, Nature 537 2016 433-435

Replace 90% of FCS with Panexin

Panexin: FCS replacement



150 L per year for one pharmaceutical customer



Panexin basic

Fully defined. No undefined ingredients such as serum, platelet lysate, tissue extracts or hydrolysates. All components with purity higher than 98%



Panexin NTA

Modified for adherent cells. Fully defined.



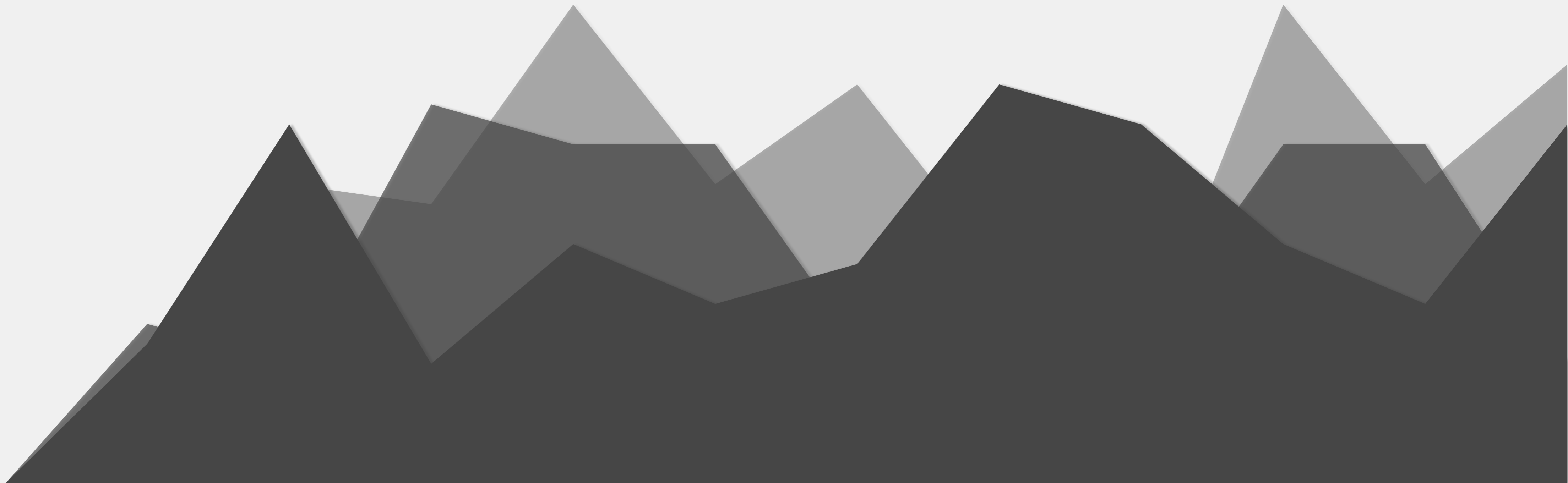
Panexin pharma

Chemically defined

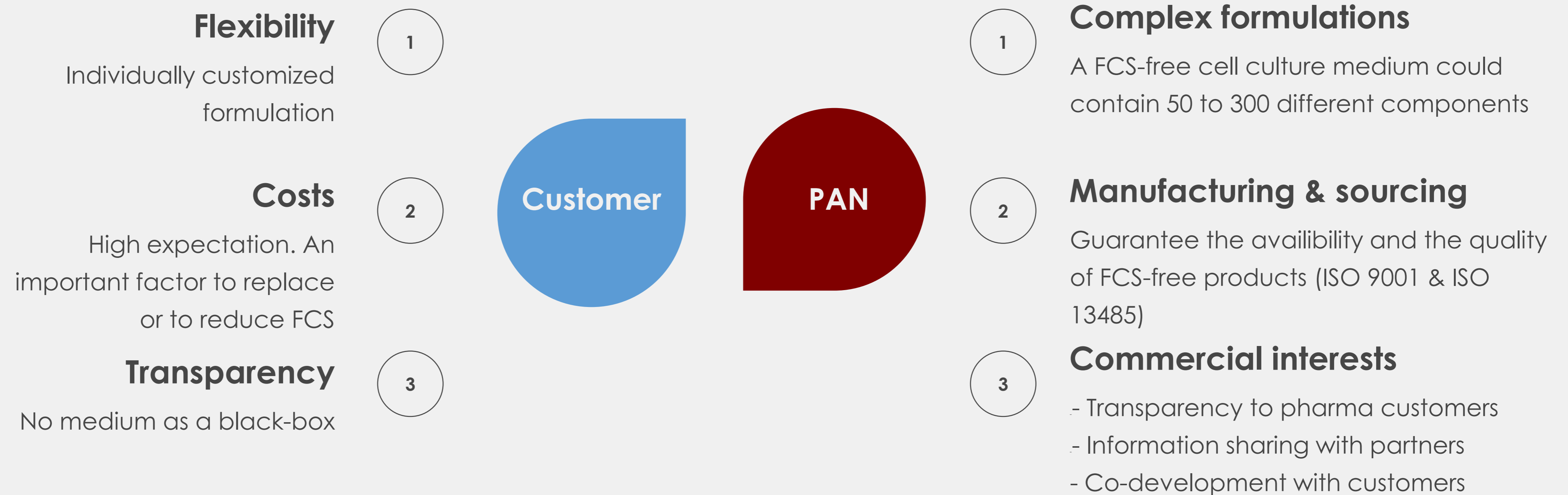
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View of industry on FCS-free
solutions –

Challenges and outlook



FCS-free media: Challenges and Opportunities



FCS-free media: Outlook

Good commercial concepts/products are important to replace FCS.

Contract manufacturing

- Minimal individual order 10 L
- Media configurator

Ethical concerns

- Serum as byproduct of meat industry
- Xeno-free Vs. fully defined
- Chemically defined

GMP Media

- Cell culture media are NOT pharmaceuticals
- Misleading definition
- Extensive price level

FCS-free media: Outlook

