



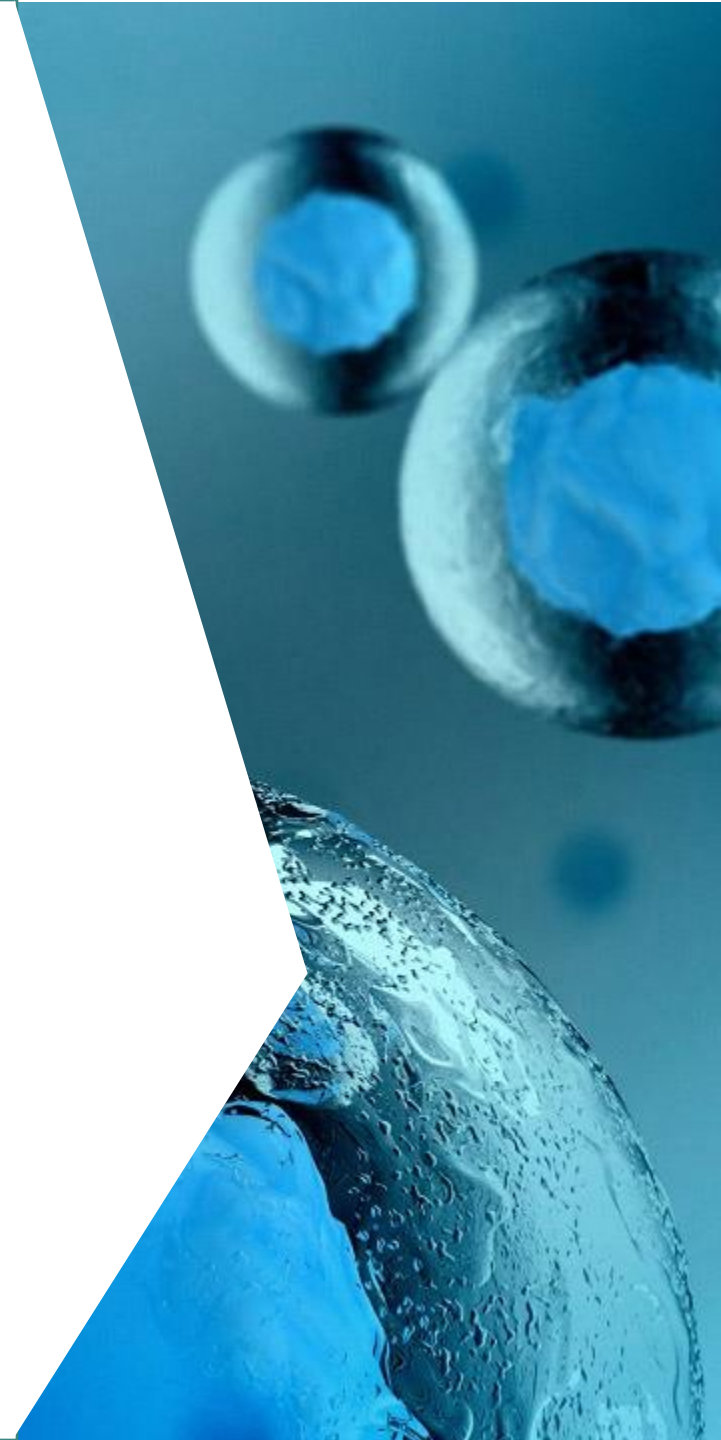
Cell Culture Medium Product Sheet
FUJIFILM Wako Pure Chemical Corporation

27 Aug 2021

Product Line-up

~Culture media for vaccine production~

- WakoVAC MDCK
- WakoVAC PSFM-J1
- WakoVAC Vero



What is WakoVAC MDCK?

FFWK Proprietary Media

Products developed under **WakoVAC** brand is taking a comprehensive approach to meet the key requirements for cell culture products in the field of life science.

➤ **Raw Materials**

- Components supply chain documented, scalable
- Animal component-free
- Non-animal hydrolysate contained

➤ **Industrial Applications**

- For bioproduction, scalable to commercial volumes
- Available in both liquid and powder form

➤ **Performances**

- Best in class performance
- Easy to use

What is WakoVAC MDCK?

Overview

- Custom-modifications are available
- Designed to maximize MDCK cell growth, viability and productivity
- Animal component-free formulation
- Non-animal hydrolysate contained
- GMP-compliant manufactured (non-GMP grade available for testing)

Target Markets and Customers

- Bioprocessing companies developing biologics, especially vaccines
- Research, process development, large-scale manufacturing/commercialization

Positioning

- Formulations built for large-scale manufacturing and industrial vaccine applications
- Achieve consistent, superior growth and sustained high-production capabilities
- FFWK provides complete workflow support: Media Optimization Service to regulatory support at the time of IND/NDA

What is WakoVAC MDCK?

Product Specification

	PN TBD	
Form	Powder	Liquid
Packaging	Flexible	
Shelf-life	12 months+ (powder, ongoing)	
Storage	2-10°C*, protect from light	

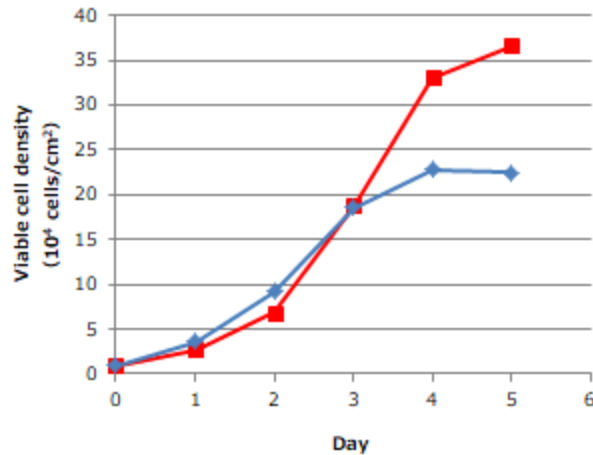
*Attached supplement (vial) for powder medium; under -20°C

Intended Use: Research and further manufacturing

Product Features

- Animal component-free
- The latest prototype shows an improved virus yield approximately 1.5 times higher than Medium B, commercially available serum-free medium from a competitor
- Designed and optimized for small to large-scale vaccine production
- Compatible with microcarrier
- Adaptation not typically required
- Scalable, adaptable system to support commercialization
- GMP-compliant manufactured

Outperforms commercially available serum-containing option

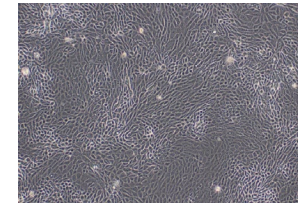


■ WakoVAC MDCK
Serum-free Medium, Prototype A

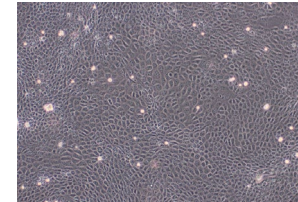
◆ EMEM/NEAA/10%FBS

- Cumulated cell number over 4 passages was assessed
- Static
- T flask
- Number of cells plated : 1 × 10⁴ cells/cm²
- 37°C, 5% CO₂

WakoVAC MDCK
Serum-free Medium,
Prototype A (Day4)

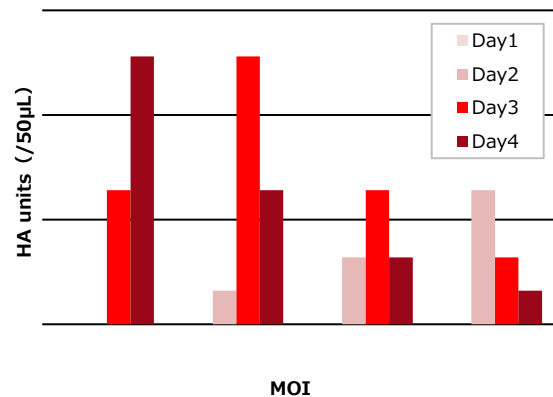


**EMEM/NEAA/
10%FBS (Day4)**

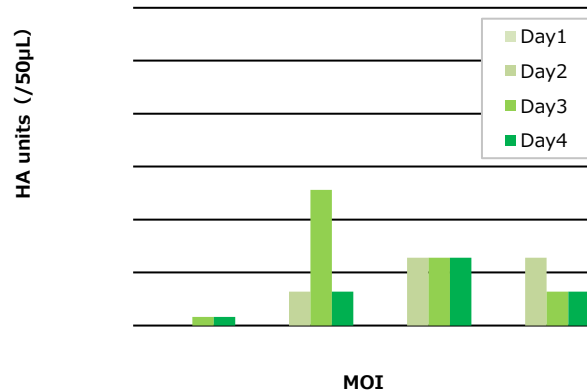


Equal to or higher yields of influenza virus than commercially available serum-containing option

WakoVAC MDCK
Serum-free Medium, Prototype A



Medium B, Competitor's

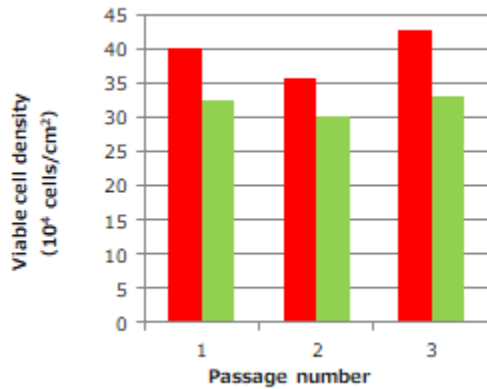


Influenza A virus (H1N1)

- Static
- T flask
- 37°C, 5%CO₂
- Number of viral inoculated cells
Wako : 25.8 × 10⁴ cells/cm²
Medium B : 21.2 × 10⁴ cells/cm²

Adaptation not necessarily required

Switch from a commercially available serum-free medium

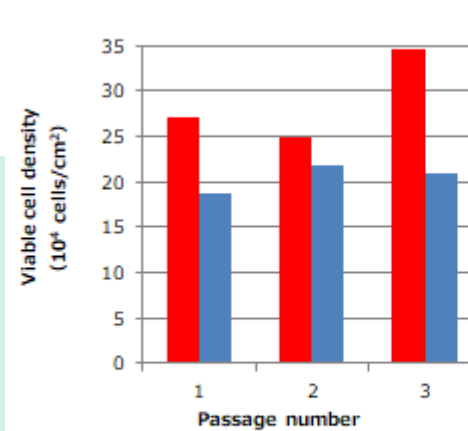


- WakoVAC MDCK Serum-free Medium, Prototype A
- Medium C

MDCK cell

- Serum-free medium
- Static
- T flask
- 37°C, 5% CO₂
- Number of cells plated: 1×10⁴ cells/cm²
- Culturing duration: 4 days

Switch from a serum-containing medium

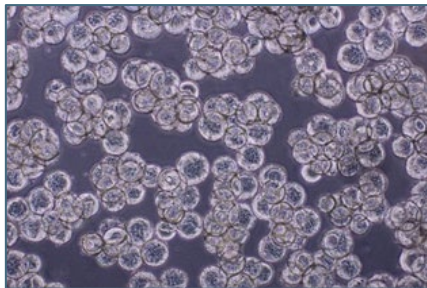


- WakoVAC MDCK Serum-free Medium, Prototype A
- EMEM/NEAA/10%FBS

MDCK cell

- Serum-free medium
- Static
- T flask
- 37°C, 5% CO₂
- Number of cells plated: 1×10⁴ cells/cm²
- Culturing duration: 4 days

Compatible with microcarrier



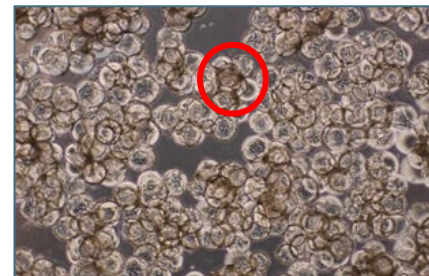
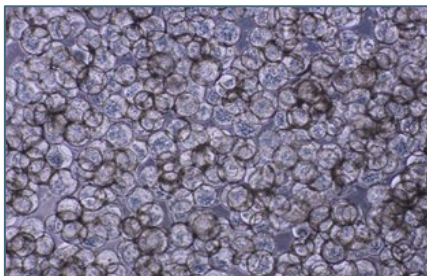
MDCK cell with **WakoVAC MDCK Prototype A**

- Microcarrier
- @day3 and day4
- Cell detachment↓
- Cell aggregation↓



MDCK cell with **Medium D, Competitor's**

- Microcarrier
- @day3 and day4
- Cell detachment↑
- Cell aggregation↑



What is WakoVAC PSFM-J1?

In-licensed media

Formulated for insect cell expansion. Even being made with the same formulation, WakoVAC PSFM-J1 manufactured in FFWK outperforms the same media manufactured by a competitor due to quality and strictly-controlled raw materials.

➤ Raw Materials

- Components supply chain documented, scalable
- Fish-oil (cGMP, virus-inactivated) and hydrolysate (yeast-derived) contained

➤ Industrial Applications

- For vaccine production, scalable to commercial volumes
- Available in both liquid and powder form

➤ Performances

- Best in class performance
- Easy to use

What is WakoVAC PSFM-J1?



Overview

- Supports a wide range of **insect cells**: Hi5, Sf9, Sf21
- Designed to maximize insect cell growth, viability and productivity
- GMP-compliant manufactured
- FFWK provides regulatory support to ensure the compliance required by each country's pharmaceutical authority

Target Markets and Customers

- Bioprocessing companies developing biologics, especially vaccines
- Research, process development, large-scale manufacturing/commercialization

Positioning

- Formulations built for large-scale manufacturing and industrial vaccine applications
- Achieve consistent, superior growth and sustained high-production capabilities

Product Specification

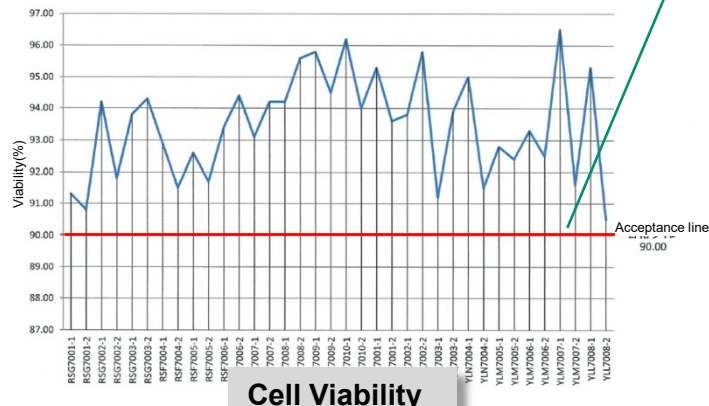
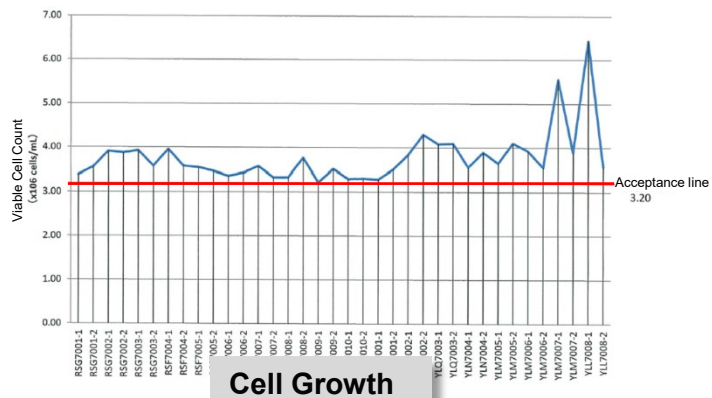
Intended Use: Research and further manufacturing

	PN 160-25851	PN TBD
Form	Liquid	Powder
Packaging	1L	8kg (customize upon requests)
Shelf-life	1 year from the date of MFG	2 years from the date of MFG
Storage	2-10°C, protect from light	

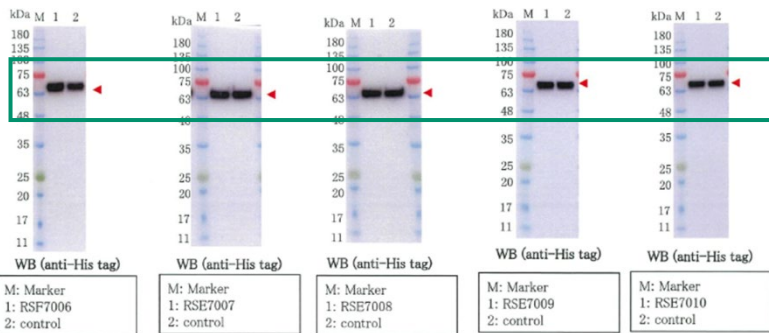
What is WakoVAC PSFM-J1?

Product Features

- Supports wide range of insect cells



Wako Internal Specification



- Flexible packaging
- Fish-oil (cGMP) and yeast-derived hydrolysate contained
- CoA available. Cell growth, cell viability and protein expression data can be included upon request



Other information

- Assure lot-to-lot consistency
- Fine protein expression also in Sf9, Sf21 and Hi5
- L-Glutamine does not need to be supplemented
- Comparative landscape

Product Description	Supplier	SF	ACF	PF	CD	GMP	Yeast Extract	Cell Type	Shelf-life	Storage	Size	Packaging
Medium X	Competitor	+	+	-	-	+	Low	Sf9, Sf21	12 mo	2-8°C	1L	5L (Customize upon request)
WakoVAC PSFM-J1	FFWK	+	Fish-oil	+	-	+	Medium	Hi5, Sf9,Sf21	12 mo	2-10°C	1L	10L and 20L Powder available

Retains target expression with Sf21

Sf21 Cells

Protein Expression Testing

M : Molecular weight size marker

→ : Target protein

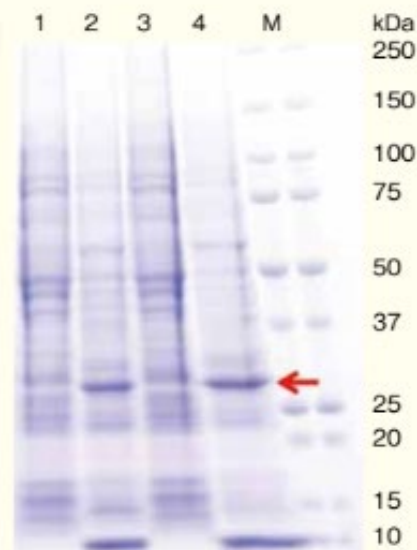
Lane 1 : Medium A (Pre-viral inoculation)

Lane 2 : Medium A (Post-viral inoculation)

Lane 3 : PSFM-J1 (Pre-viral inoculation)

Lane 4 : PSFM-J1 (Post-viral inoculation)

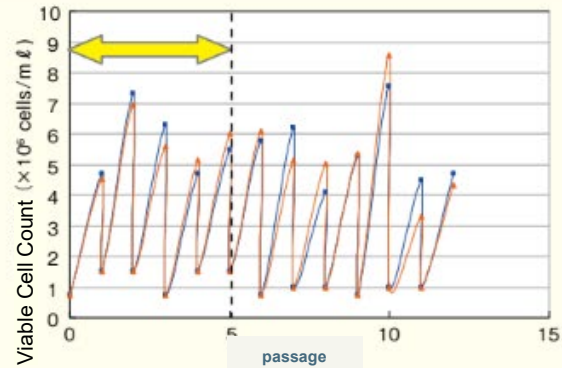
- The amount of samples being used: 15 μ L/Lane
- SDS-PAGE: 5-20% gradient gel, 200v constant
- Voltage for 50 minutes



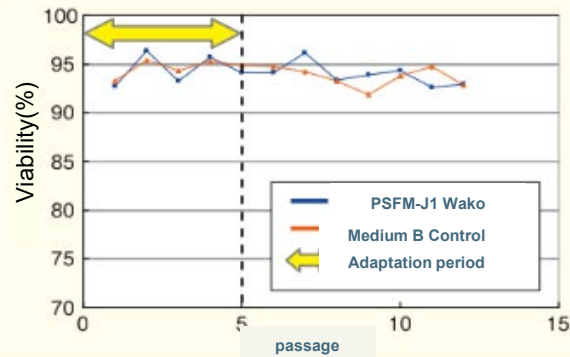
Retains robust cell growth, viability and target expression with Sf9

Sf9 Cells

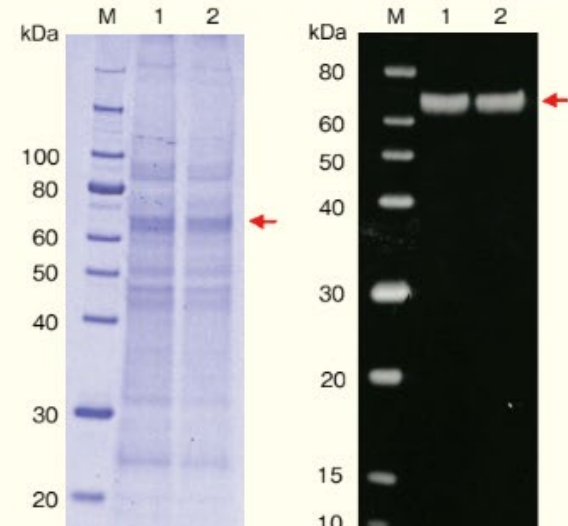
Cell Growth



Cell Viability



Protein Expression Testing



M : Molecular weight size marker

Lane 1: WakoVAC PSFM-J1

→ : Target protein

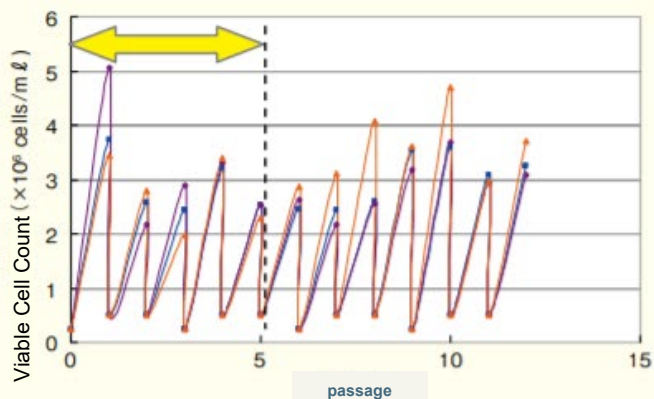
Lane 2: Medium B Control

- The volume of samples being used: 20 μ L/Lane
- SDS-PAGE: SuperSep (TM) Ace 10-20% (Product code: 191-15031), 200v constant voltage for 60 minutes
- Western blotting: PVDF membrane
- Antibody: Anti-his tag antibody

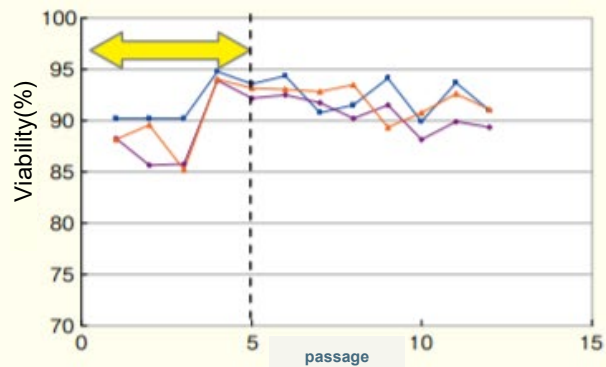
※Data provided by Goshima Lab from Nagoya University

High Five (H5) Cells

Cell Growth

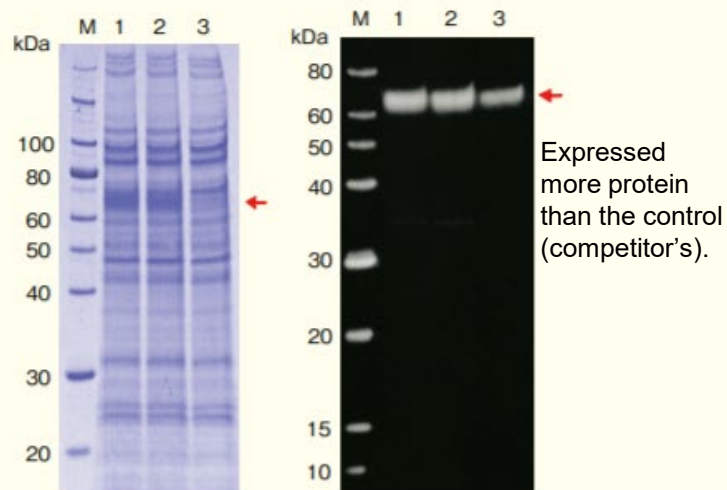


Cell Viability



— PSFM-J1 Wako — PSFM-J1 Wako +L-glutamine
— Medium C Control +L-glutamine — ↔ Adaptation

Protein Expression Testing



M : Molecular weight size marker

→ : Target protein

Lane 1: WakoVAC PSFM-J1

Lane 2: WakoVAC PSFM-J1 + L-Glutamine

- The volume of samples being used: 20 μ L/Lane
- SDS-PAGE: SuperSep (TM) Ace 10-20% (Product code: 191-15031), 200v constant voltage for 60 minutes
- Western blotting: PVDF membrane
- Antibody: Anti-his tag antibody

* Data provided by Mirai-Kougaku

What is WakoVAC Vero?

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Products developed under **WakoVAC** brand is taking a comprehensive approach to meet the key requirements for cell culture products in the field of life science.

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- Components supply chain documented, scalable
- Animal component-free
- Non-animal hydrolysate contained

➤ **Industrial Applications**

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- Available in both liquid and powder form

➤ **Performances**

- Best in class performance
- Easy to use

What is WakoVAC Vero?

Overview

- Custom-modifications are available
- Designed to maximize Vero cell growth, viability and productivity
- Animal component-free formulation
- Non-animal hydrolysate contained
- GMP-compliant manufactured (non-GMP grade available for testing)

Target Markets and Customers

- Bioprocessing groups developing vaccine biologics
- Research, process development, large-scale manufacturing/commercialization

Positioning

- Formulations built for large-scale manufacturing and industrial vaccine applications
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What is WakoVAC Vero?

Product Specification

	PN TBD	
Form	Powder	Liquid
Packaging	Flexible	
Shelf-life	TBD	
Storage	2-10°C, protect from light	

*WakoVAC Vero is under commercialization.

*Attached supplement (vial) for powder medium; under -20°C

Intended Use: Research and further manufacturing

Product Features

- Animal component-free
- Designed and optimized for small to large-scale vaccine production
- Compatible with microcarrier
- Adaptation not typically required
- Scalable, adaptable system to support for commercialization
- GMP-compliant manufactured
- Formulation will be established for the best performance with your cells

Shows better cell proliferation

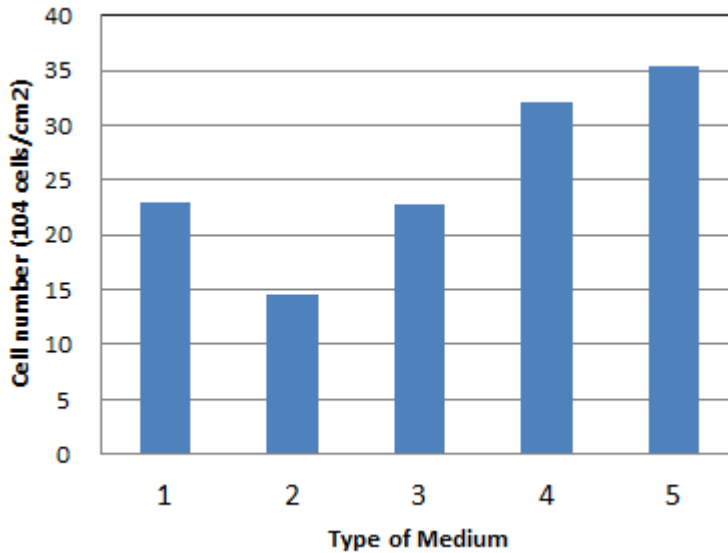


Plate : Corning 12 well Plate (Corning, #3513)

Cell type : Vero cell

Number of seeded cells : 30,000 cells/well

Condition : 37°C, 5%CO₂

Culture period : 5 days

Medium: 2.0mL

1: EMEM/5%FBS

2: DMEM/5%FBS

3: SFM from a competitor

4: WakoVAC Vero prototype A; Chemically Defined

5: WakoVAC Vero prototype B; Includes hydrolysate

FUJIFILM
Value from Innovation