

# Optimizing Vaccine Delivery by Drinking Water

## 完善的疫苗飲水投與法



# Vaccination Does Not Guarantee Immunization

疫苗接種並不保證免疫力

- Vaccines must survive many risks to provide full immunity

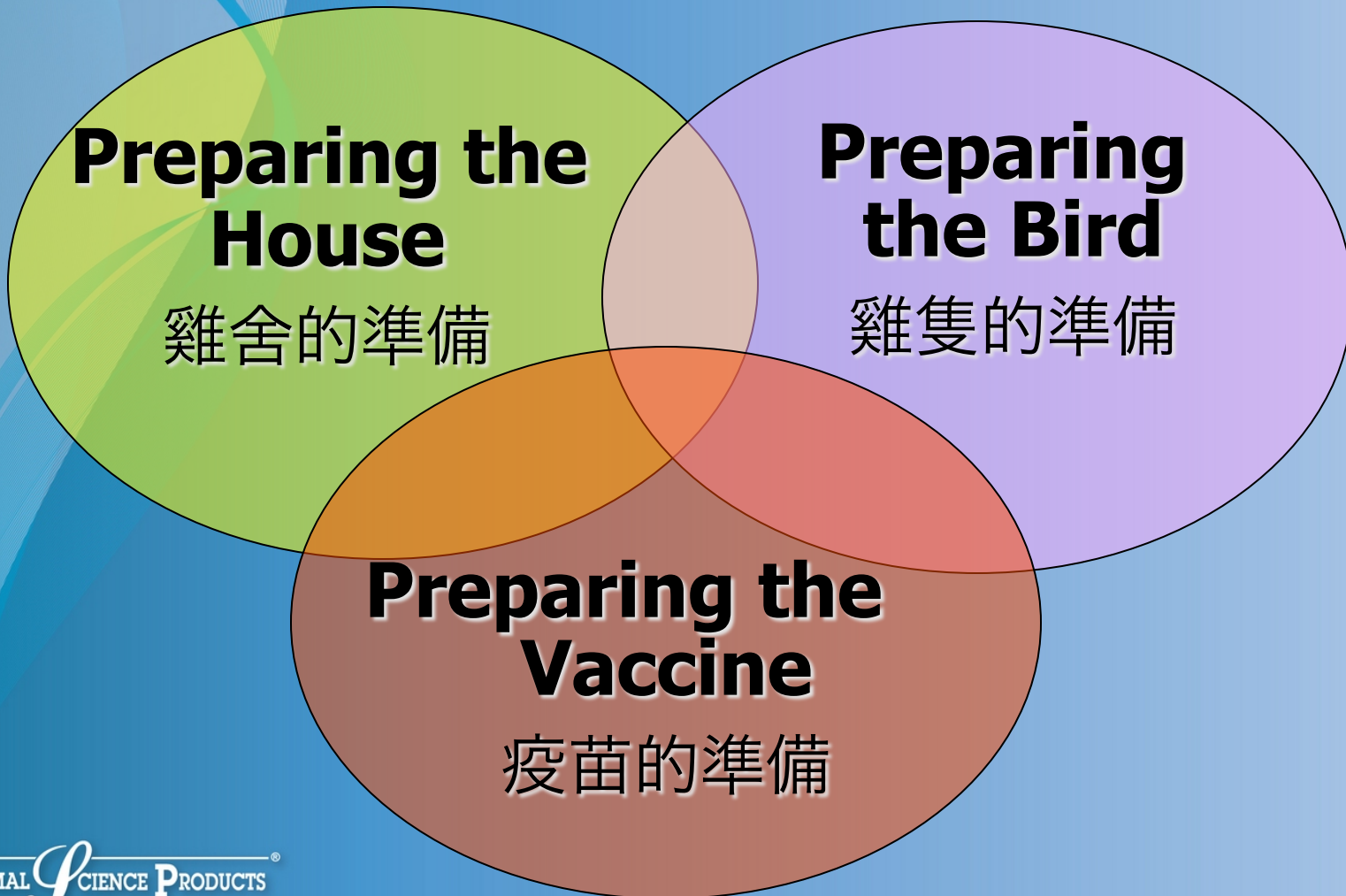
疫苗需經許多風險存活下來,以提供完整的免疫力

- Threat to vaccine titer increases during mass vaccination with drinking water

當使用大量疫苗飲水投與方法時,也增加對疫苗力價的威脅

# Management Factors Impact Vaccination Success

管理的因素衝擊防疫接種的成功



# Preparing the House

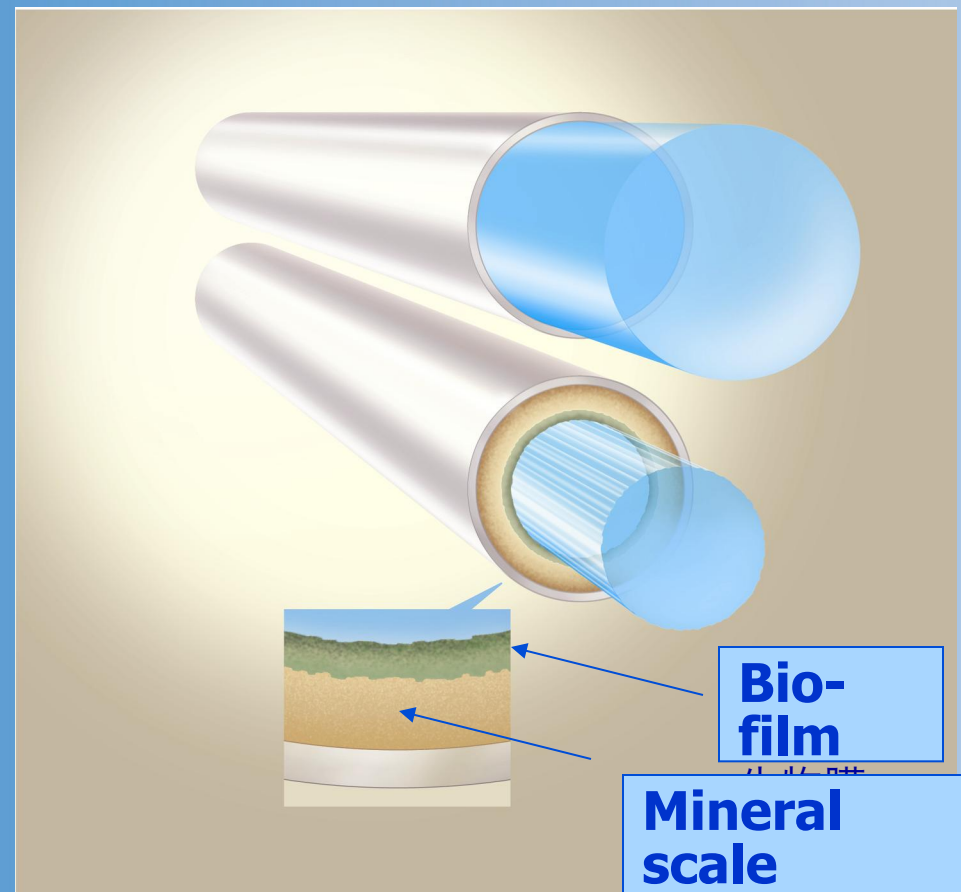
## 雞舍的準備

- Vaccination success starts with routine water sanitation

預防接種的成功,始於定期的飲水消毒

- Organic and mineral buildup reduces vaccine titers

有機物及礦物質的沈積,會降低疫苗力價



礦物水垢

# Preparing the House 雞舍的準備

- Vaccine manufacturer case study of a field vaccination failure

疫苗製造廠針對田間免疫失敗的個案研究

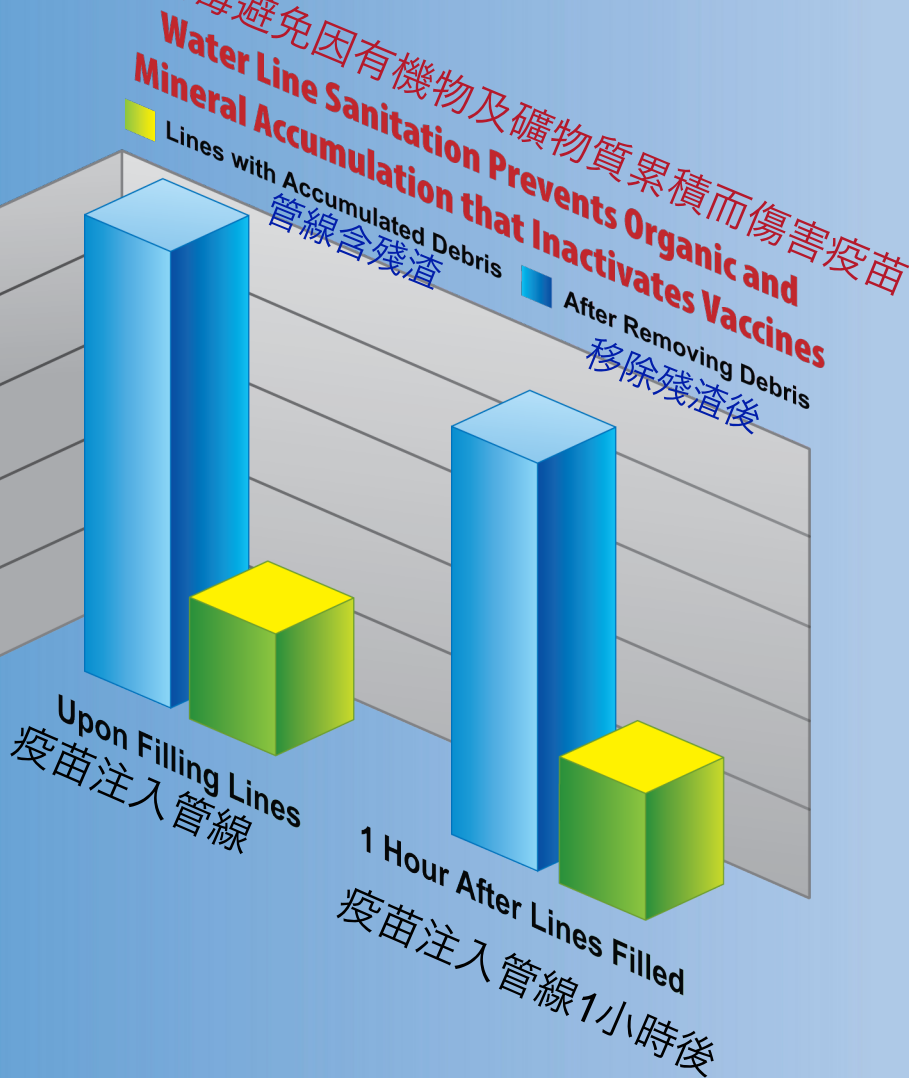
- Researchers confirm removing debris from water lines improves vaccine stability

研究人員確定移走水線中之殘渣,可改善疫苗的安定性

IB  
疫苗  
的  
相  
關  
活  
性

Bronchitis Vaccine,  
Relative Survival %

100  
80  
60  
40  
20  
0



# Preparing the House 雞舍的準備

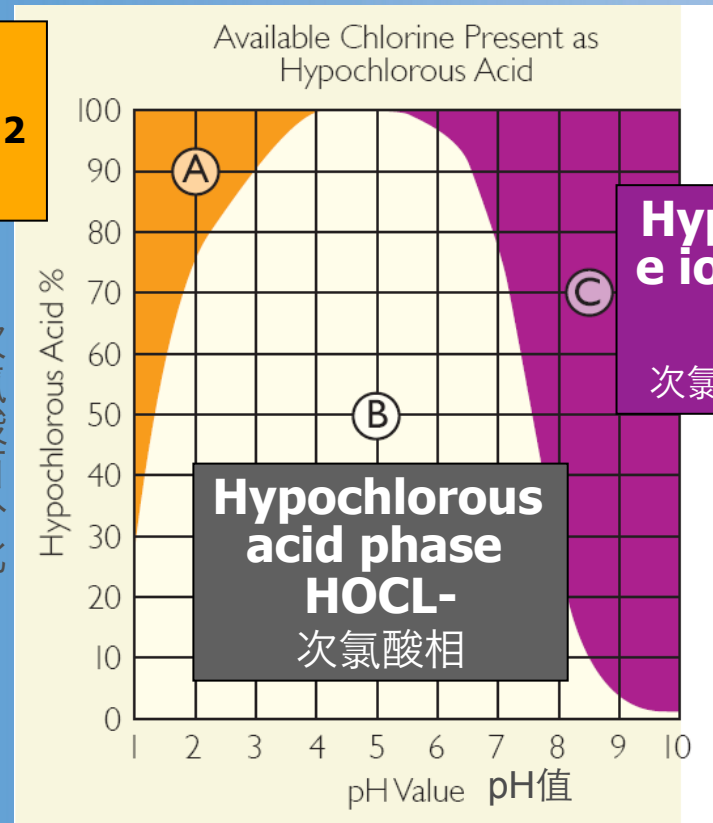
以次氯酸表現的有效氯

**Gas phase  $\text{Cl}_2$**   
氯氣相

- Constant chlorination prevents mold/algae accumulation and kills incidental pathogens

經常的用氯消毒,可防止黴菌/藻類的累積並可殺死偶見微生物

次氯酸百分比



- Chlorine is most effective when acidified to pH 4-5  
當酸化至pH值4~5時氯的功效最好

# Preparing the House

## 雞舍的準備

- PKA pH water treatment is stronger than citric acid and dissolves mineral scale with no bitter taste

PKA pH水質處理劑比檸檬酸更強並可溶解礦物質水垢,而不會產生苦味

- By-pass or remove filters that may inactivate vaccine or expose it to trapped organic matter.

管路避開或移除過濾器,因其可能不活化疫苗,或使疫苗接觸到其濾到的有機物

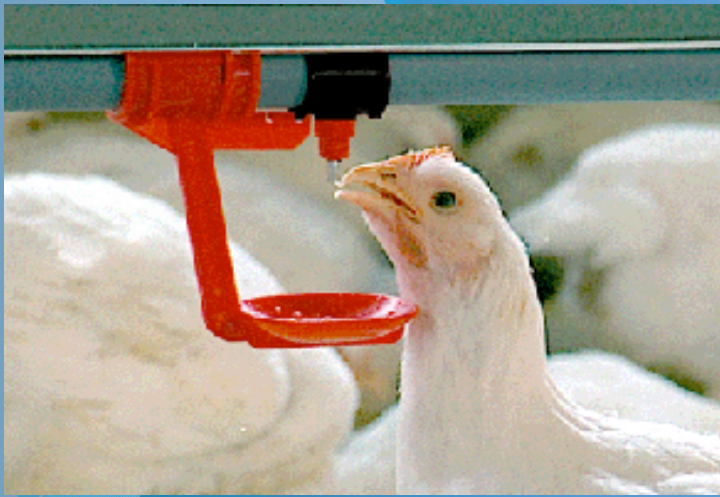


# Preparing the House

## 雞舍的準備

- Discontinue water medications  
停止飲水投藥
- Neutralize residual sanitizer and acid with a “new generation” stabilizer before vaccination

在預防接種前以新一代的水質穩定劑中和殘留的消毒劑及酸





# Preparing the Birds

## 雞隻的準備

- Determine the birds' water intake over a typical vaccination period (2 hours) on the day before vaccinating

在接種前一天要決定雞隻飲水投與量,要超過標準2小時的供應量

- Directly measure stabilized stock solution disappearance from a medicator pail or tank

直接量測穩定劑預溶液自投藥桶消失



# Preparing the Birds

## 雞隻的準備

- Do not vaccinate sick or stressed birds with weak immune systems

不要免疫因病或緊迫而免疫系統衰弱的雞隻

- Induce thirst before vaccinating by turning off the water several hours

在免疫前藉由停止供水數小時,讓雞隻有口渴感

- In hot weather as little as 1 hour may be enough, and in cool weather as many as 4 hours may be required

在夏天可能停水1小時即足夠,而冬天可能要4小時



# Preparing the Vaccine

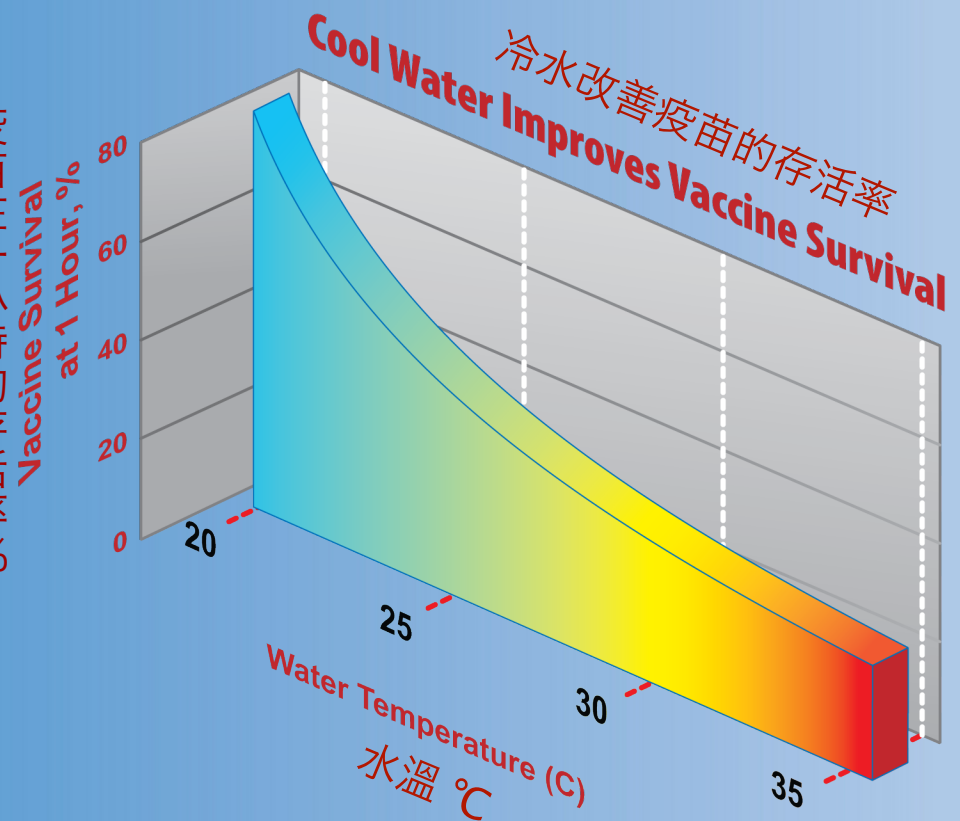
## 疫苗的準備

- Always use the coolest water available for vaccine solutions  
對疫苗泡飲之水永遠要用最冷的水



- Do not use warm water to dissolve insoluble stabilizers  
不要使用溫水去溶解不溶的穩定劑

疫苗在一小時的存活率%



# Preparing the Vaccine

## 疫苗的準備

- Add a New Generation vaccine stabilizer such as Vac-Pac Plus to the water via concentrate or directly to the water tank

加入新一代的疫苗穩定劑如「安穩飲」至預溶水中,或直接加入水桶

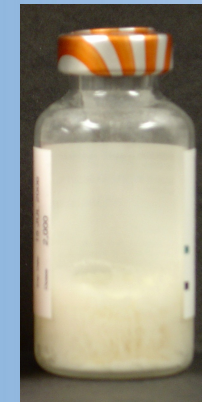
- Rehydrate dried vaccines with stabilized water only

只用加穩定劑後的水來溶解乾燥的疫苗



- Rinsing the vial recovers up to 14% residual doses

沖洗疫苗瓶可回收14%的殘存疫苗



# Preparing the Vaccine

## 疫苗的準備

- Mix enough vaccine and water to last the birds about 2 hours

混入足夠的疫苗和水,最少要供應雞隻2小時

- Shorter times limit the dose received by timid birds

時間太短會限制膽小雞隻疫苗攝取不足

- Longer times risk potency decay

過長的投與時會導致疫苗力價降低



# Preparing the Vaccine

## 疫苗的準備

- Charge the water lines with vaccine and allow the birds to drink

將水線充滿疫苗水,以讓雞隻飲用

- Walk the birds to encourage all of them to consume vaccine

走動趨趕雞隻,以鼓勵其接觸飲水



- Achieving a uniform, high dosage is key to full immunity

取得平均且高劑量疫苗是達到完全免疫之關鍵

# Preparing the Vaccine

## 疫苗的準備

- Occasionally stir the vaccine to keep uniform

偶而攪動疫苗水以保持均勻

- Rinse behind the vaccine solution with stabilized fresh water to avoid injuring the remaining vaccine

在疫苗溶液之後繼續以加穩定液之清來清水線,以避免傷害殘存的疫苗



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# New Generation Vaccine Stabilizers

新一代的疫苗穩定劑

## From the Global Leader in Vaccine Stabilizing Technology

來自全球疫苗穩定技術的領導者

**Overcomes the limitations  
of obsolete milk-based  
products and effervescent  
tablets or powders**

克服老式牛乳基質產品及發泡錠或粉劑之限制



# New Generation Vaccine Stabilizers

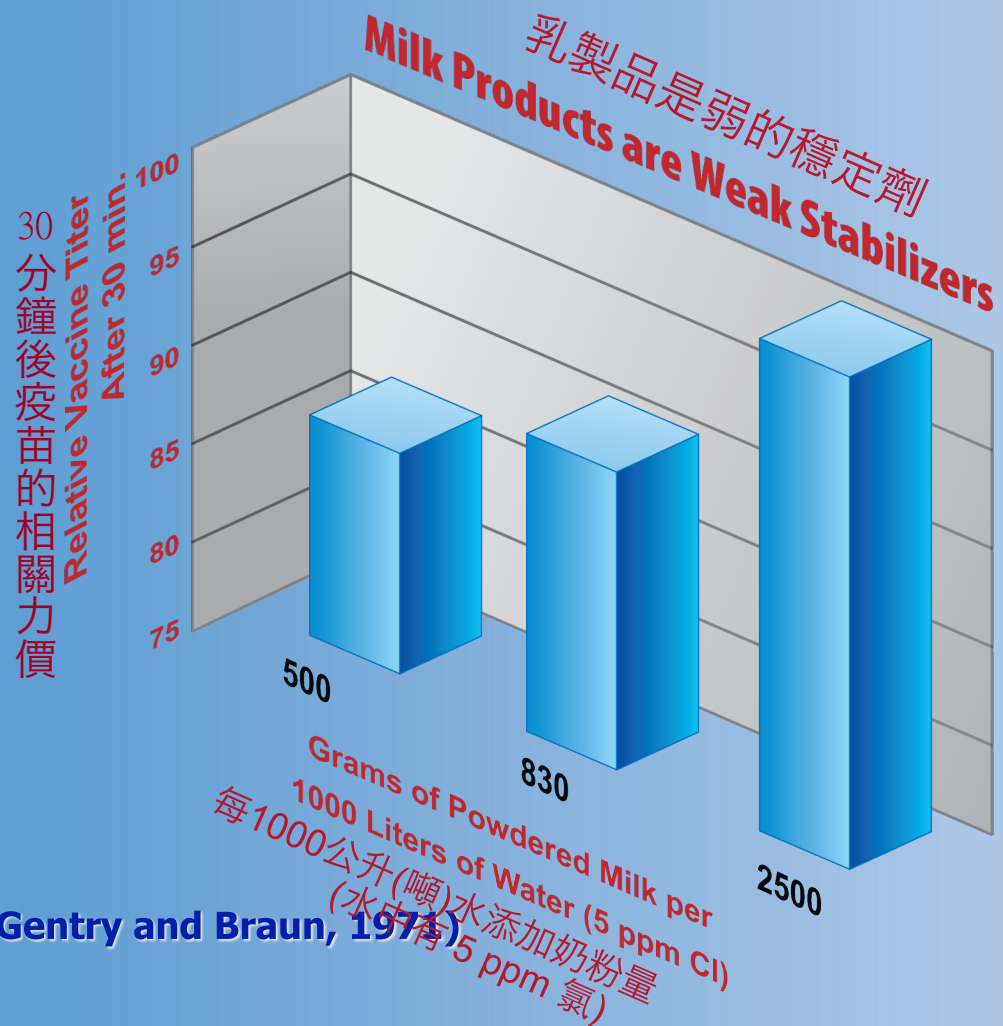
新一代的疫苗穩定劑

- Old-style milk-based stabilizers were commonly used at 500 grams/1000 liters

舊式的乳品類穩定劑通常1000公升水只添加500公克

- With chlorine at 5 ppm, up to 2500 g are required to stabilize 1000 liters

含氯5ppm之水中,每1000公升之水需添加2500公克以穩定水質



# New Generation Vaccine Stabilizers

新一代的疫苗穩定劑

- Poor solubility of milk products requires 10-15 minutes to fully dissolve

乳製品不良的溶解度需耗時15分鐘才完全溶解

- Warm water used to dissolve milk powder harms vaccines

習於用溫水去溶解乳製品將傷害疫苗

- Products of animal origin increasingly viewed as a health risk

動物來源的產品越來越多觀點視為健康的風險

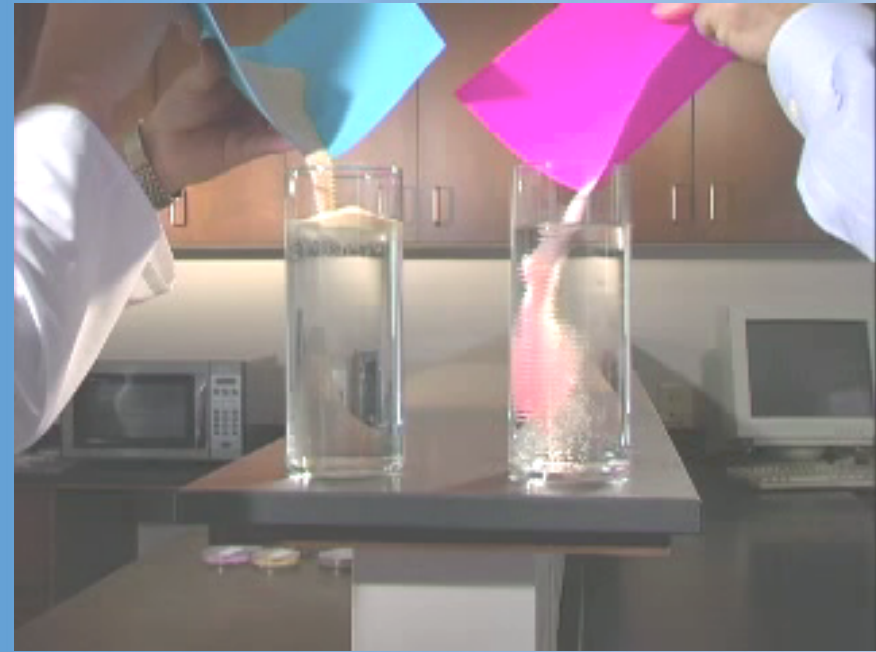




# Vac-Pac and Vac-Pac Plus 安穩飲

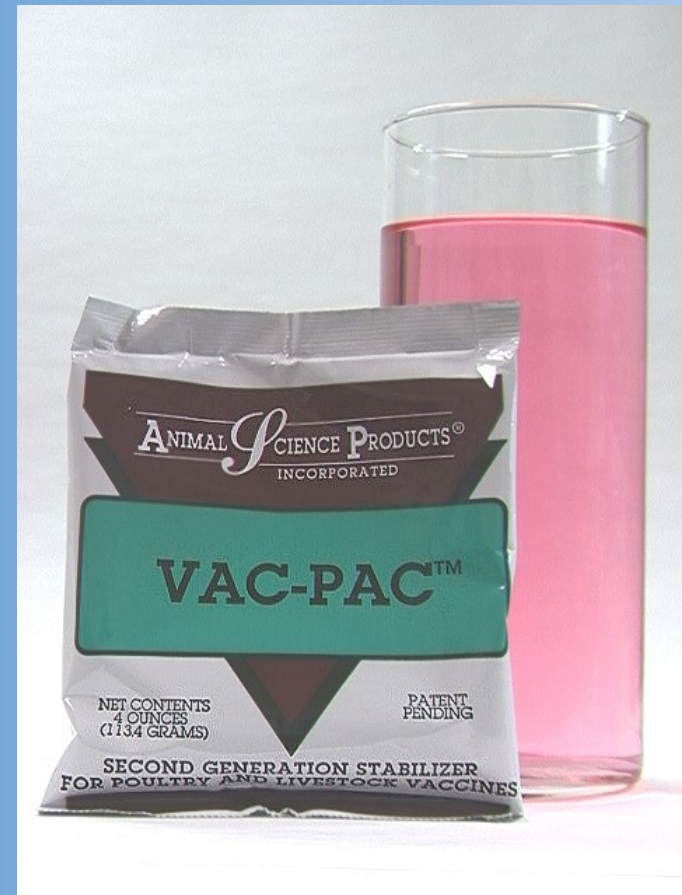
- 100% soluble  
100%溶解
- Instantly mixes with  
water  
即刻與水混合
- Greatly concentrated  
濃度高
- Require only 120 grams  
to stabilize 1000 liters.

每1000公升水只需120公克即可穩定水質



# Vac-Pac

- Vac-Pac is light red  
Vac-Pac是淡紅色
- Visually assures vaccinators that it is present in a stock solution or vaccine concentrate  
疫苗投與者可由外觀確認其為預溶液或疫苗液
- Uniform red color in concentrated solution indicates water is safe and ready to receive vaccine  
濃縮液為均勻的紅色,指示水是安全且備妥稀釋疫苗



# Vac-Pac Plus 安穩飲



- Vac-Pac Plus is dark blue  
安穩飲是深藍色
- Visible at the drinker  
在飲水器中可辨識



# Vac-Pac and Vac-Pac Plus 安穩飲

- No undissolved residue to trap vaccine or plug drinkers

沒有不溶之殘留物去妨礙疫苗或堵塞飲水器

- No products of animal origin

非動物來源產品



# Vac-Pac and Vac-Pac Plus 安穩飲

- Broadest spectrum  
廣泛的應用
- Stabilizes both viral and bacterial  
vaccines  
穩定病毒及細菌性疫苗
- Protects vaccines from the  
widest array of threats
  - Oxidizers
  - Low Tonicity
  - Stray pH能夠保護疫苗面對最廣泛的威脅
  - 氧化劑
  - 低張狀態
  - 緩衝pH值



# Vac-Pac Plus Protects Vaccine from Oxidizing Sanitizers

安穩飲保護疫苗免受氧化性消毒劑之傷害

Research conducted under Title 9, Code  
of Federal Regulations, section 113.327  
依據USDA 9 CFR 之研究報告

V. S. Davis, D.V.M., Ph.D. and H. N.  
Lasher, D.V.M.

Lasher Associates, Inc., Millsboro, DE





# Research Methodology

## 研究方法

- Prepare water with 4 ppm and 8 ppm available free chlorine as potent oxidizer  
準備含 4ppm及 8ppm游離氯的水作有效的氧化劑
- Add vaccine to unstabilized water and water stabilized with Vac-Pac Plus  
加入疫苗到未加以穩定的水中及以安穩飲穩定的水中
- Determine vaccine titers after 30 and 120 minutes  
經過30~120分鐘,測定疫苗的力價

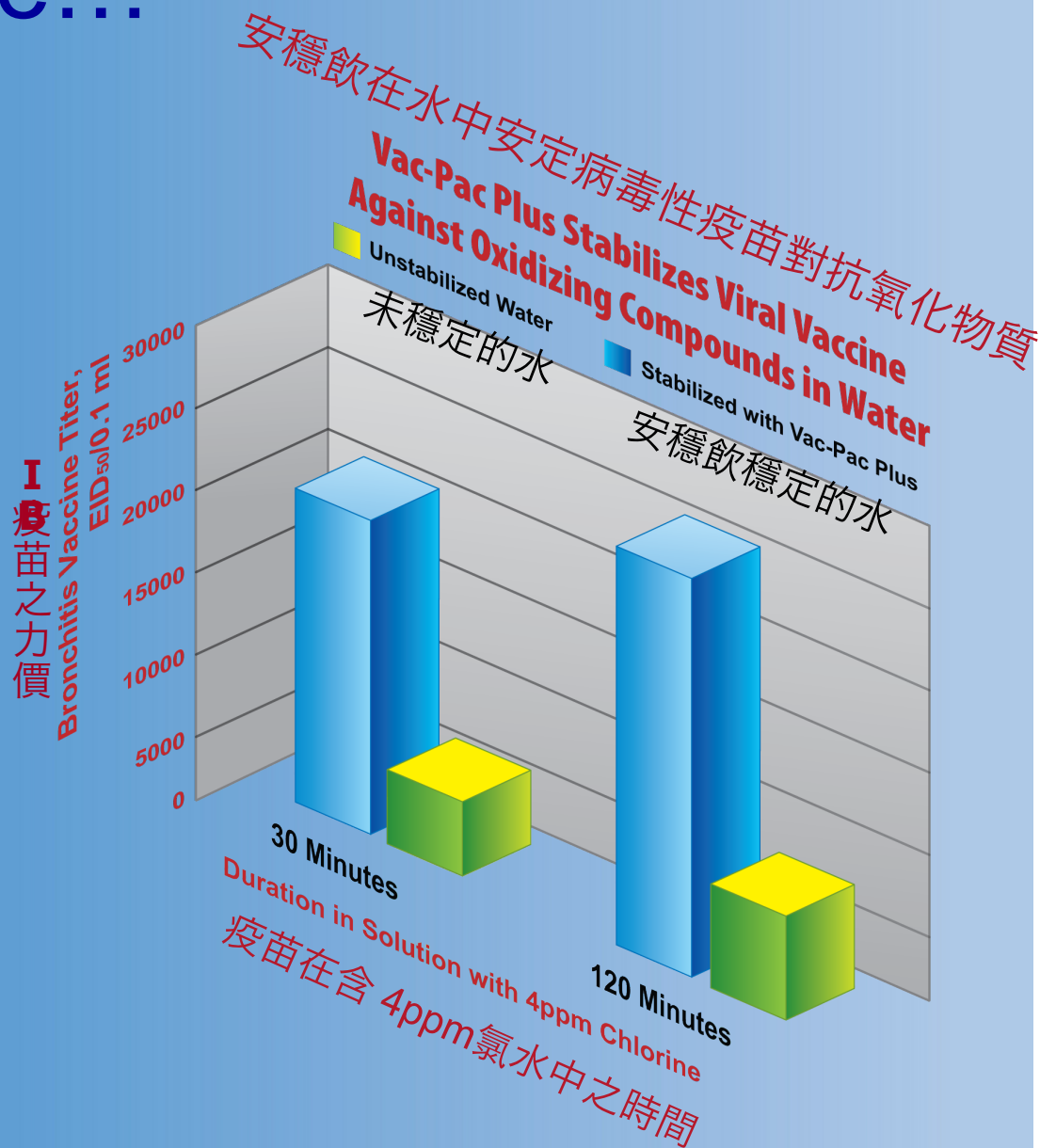
# Proven Effective... 證明有效...

- At 4 ppm Chlorine, the vaccine lost 75-80% titer

在含 4ppm 氯的水中, 疫苗失去 75~80% 力價

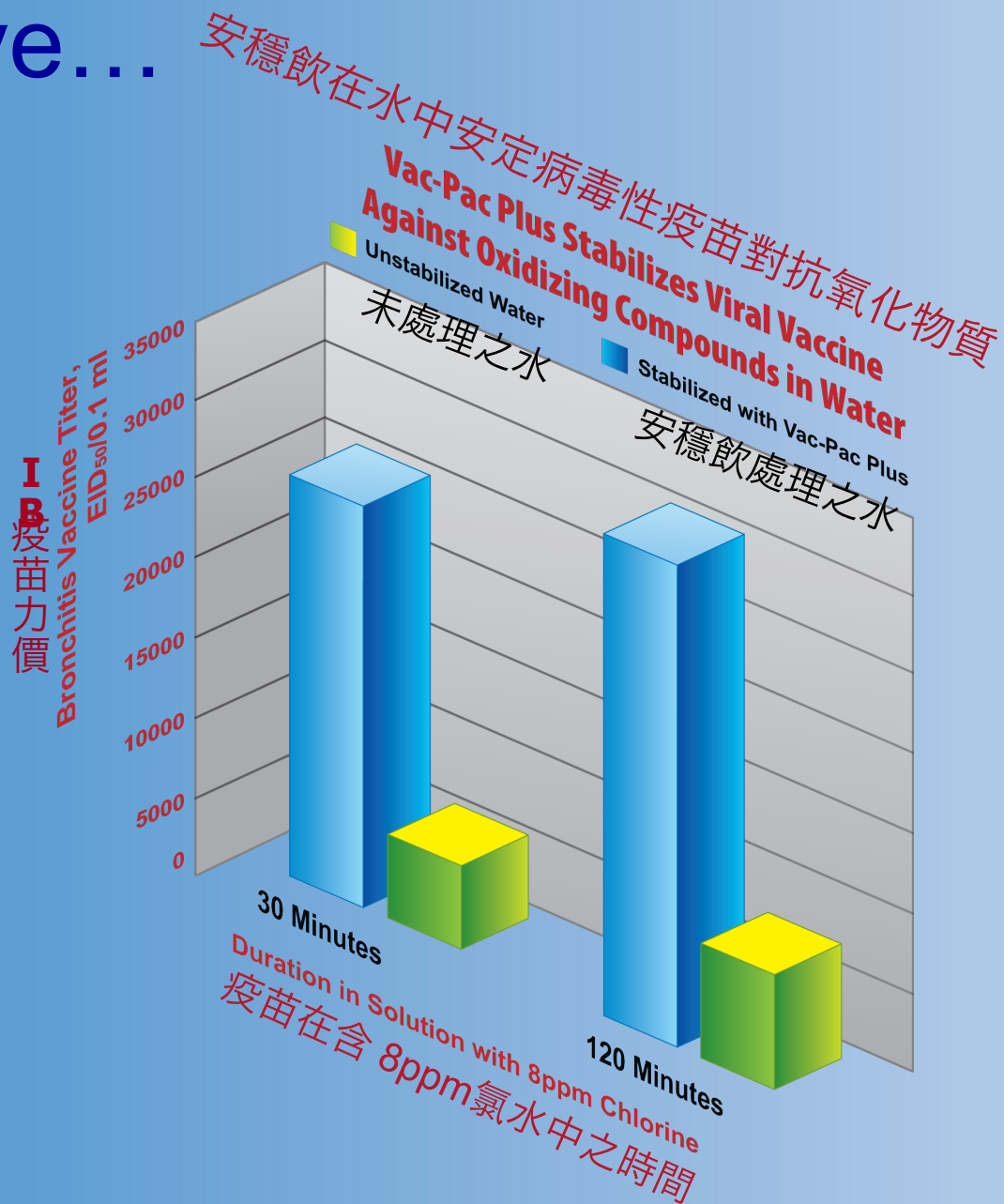
- Vac-Pac Plus rescued the vaccine from decay  
安穩飲避免疫苗力價衰退

- Stability ensured for over two hours  
穩定度超過 2 小時



# Proven Effective... 證明有效...

- At 8 ppm Chlorine, the vaccine lost 75-80% titer  
含 8ppm 氯之水,使疫苗失去75~80%力價
- Vac-Pac Plus rescued the vaccine from decay  
安穩飲避免疫苗力價衰退
- Stability ensured for over two hours  
穩定度超過2小時



# U.S. Department of Agriculture 美國農業部



## Mycoplasma Vaccination Improvement Project MG預防接種改進計劃

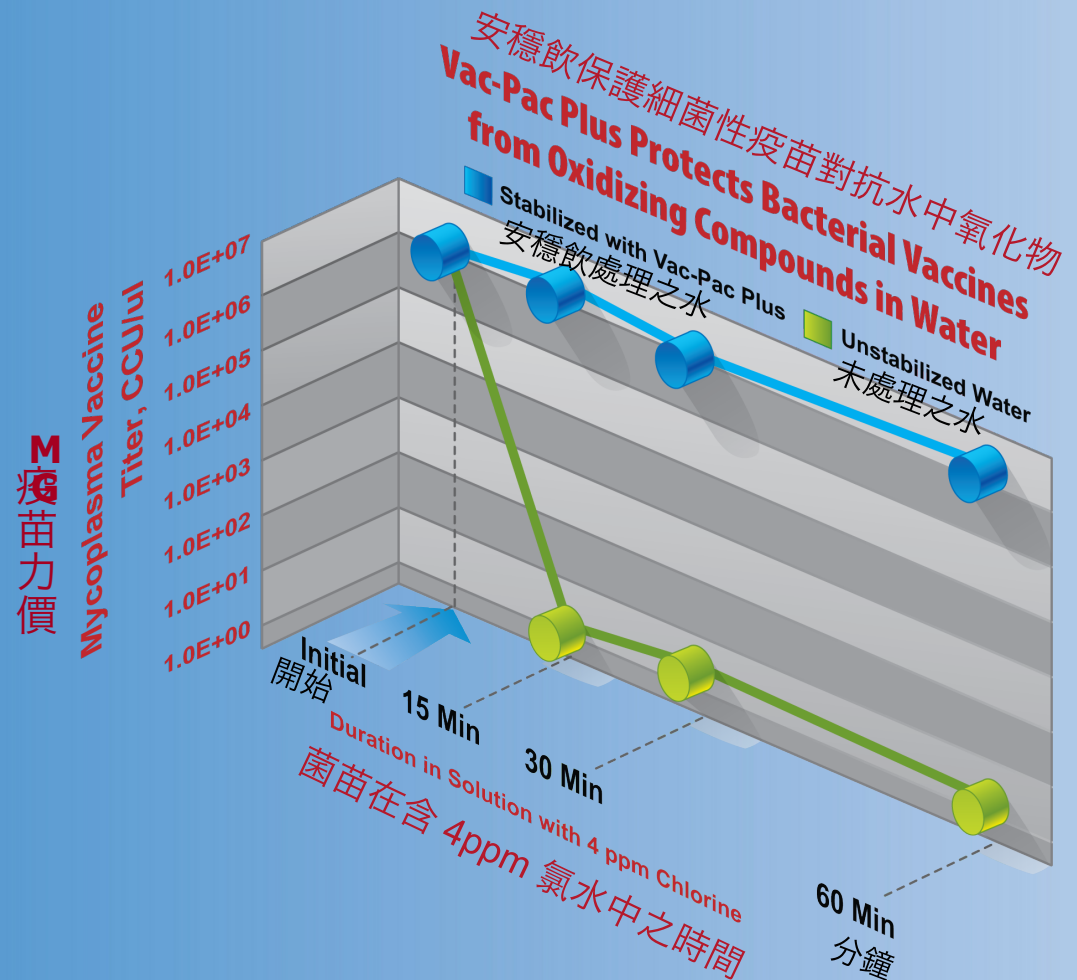
S.L. Branton, S.A. Leigh, J.D. Evans  
and S.D. Collier

USDA Poultry Research Lab  
Mississippi State University, Starkville, MS  
美國農業部家禽研究實驗室

# Bacterial Antigen Oxidation Study

## 細菌性抗原氧化作用研究

- USDA confirms Vac-Pac Plus is safe for bacterial vaccine  
美國農業部確認安穩飲對細菌性疫苗的安全性
- Vac-Pac Plus protects live Mycoplasma vaccine from oxidizers  
安穩飲保護MG活苗免於氧化劑之傷害



# Vac-Pac Plus Shields Bacterial Vaccine from Low Tonicity

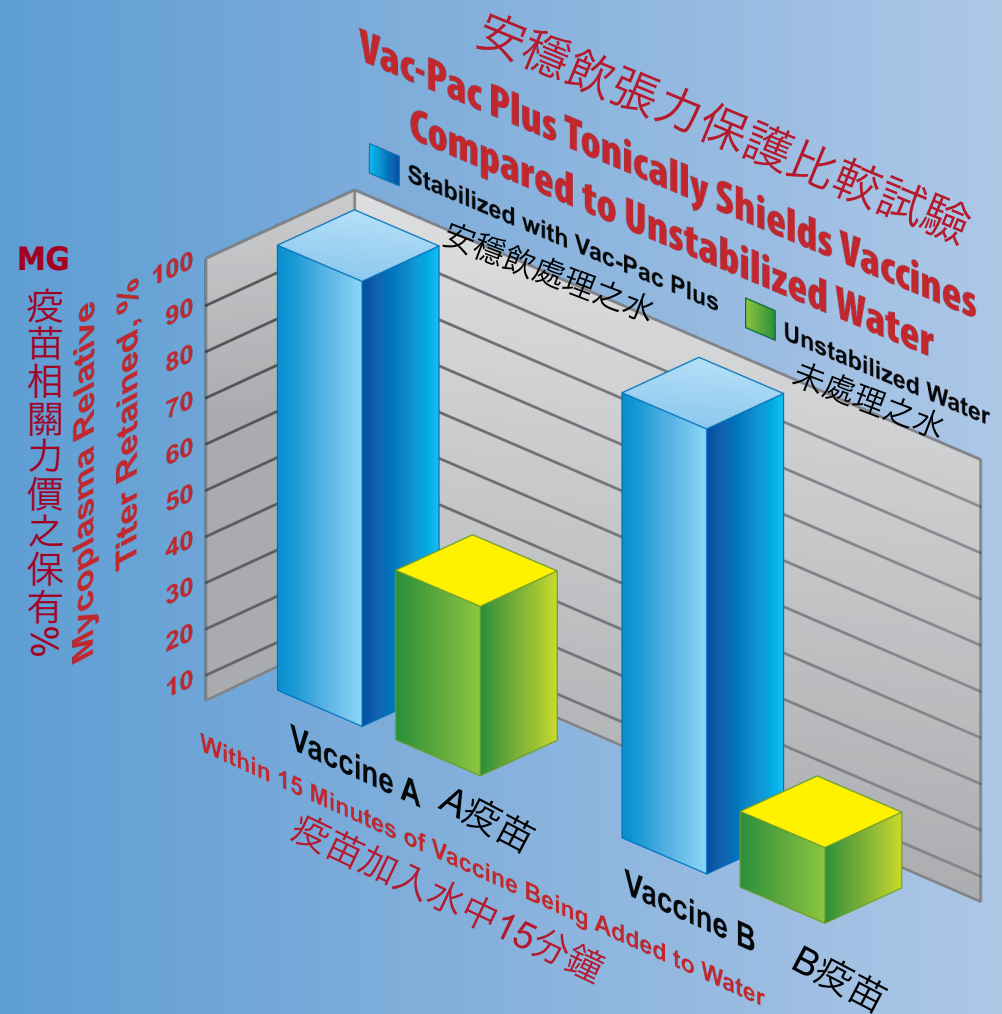
安穩飲保護細菌性菌苗免於低張狀態



# Vac-Pac Plus Tonically Shields Vaccine

安穩飲張力保護疫苗

- USDA tested relative Mycoplasma vaccine survival  
美國農業部測試MG疫苗相關活性
- 60-80% of the titer was killed within 15 minutes in unstabilized water  
未穩定之水在15分鐘內其力價約60~80%被消滅
- Titers were preserved in water stabilized with Vac-Pac Plus  
以安穩飲處理過之水力價仍然

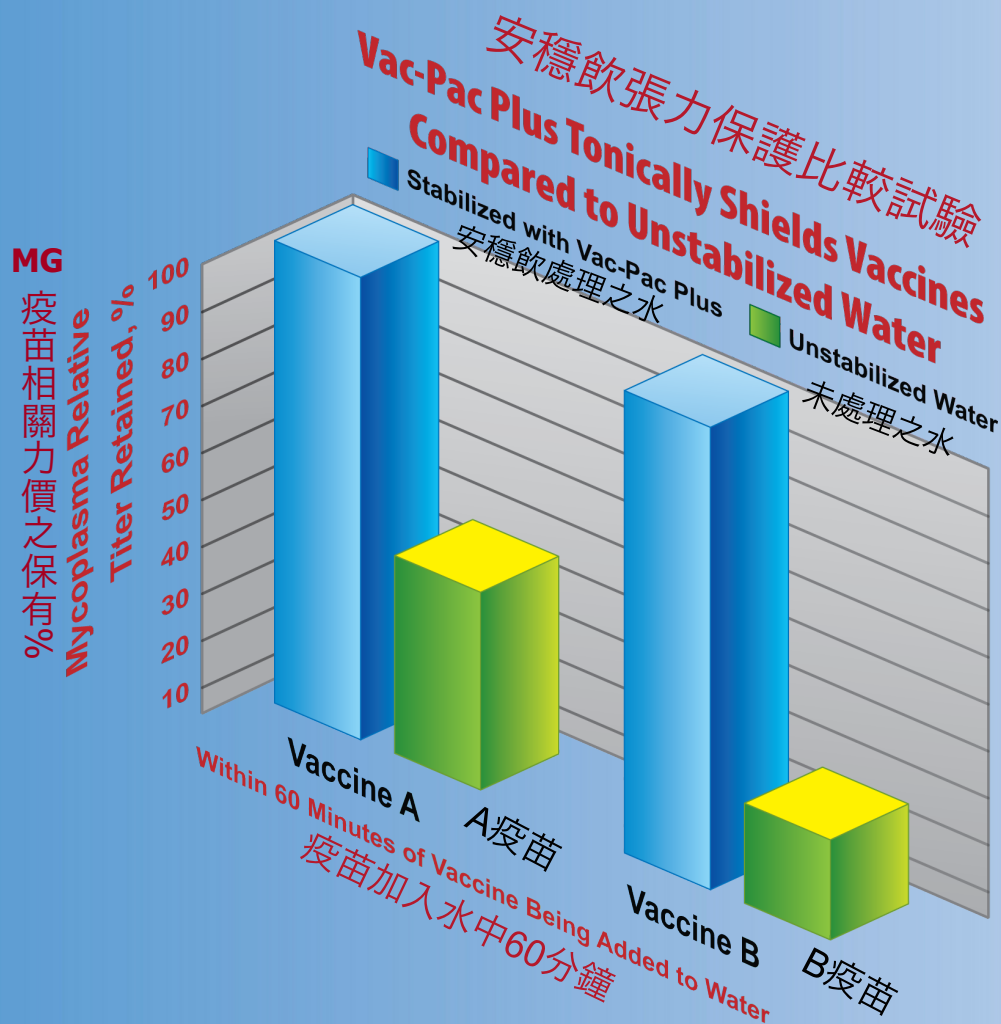


# Vac-Pac Plus Tonically Shields Vaccine

## 安穩飲張力保護疫苗

- Even after 1 hour, Vac-Pac Plus maintained the relative potency of the vaccines

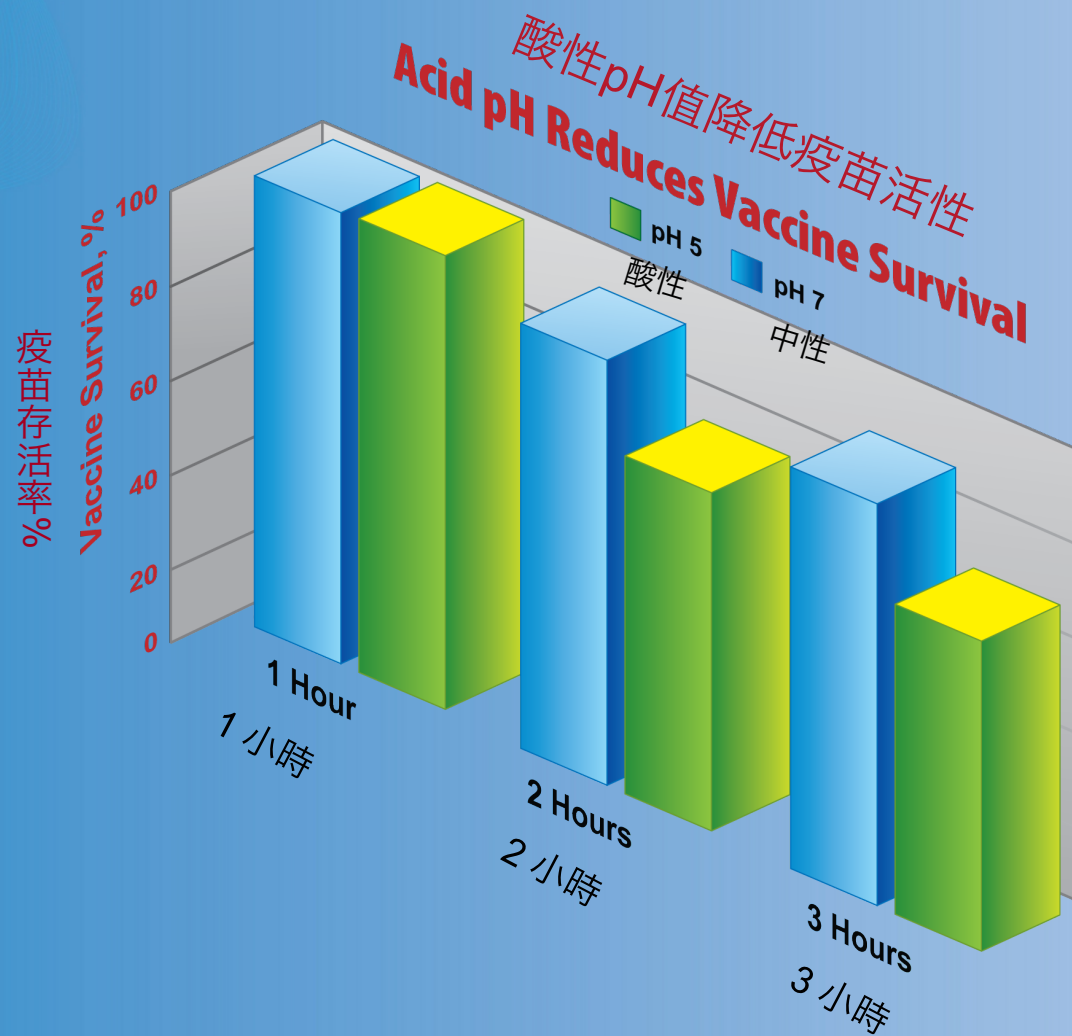
長達1小時後,安穩飲仍能維持疫苗的相關效價





# Acid pH Threatens Vaccines

酸性的pH值威脅疫苗

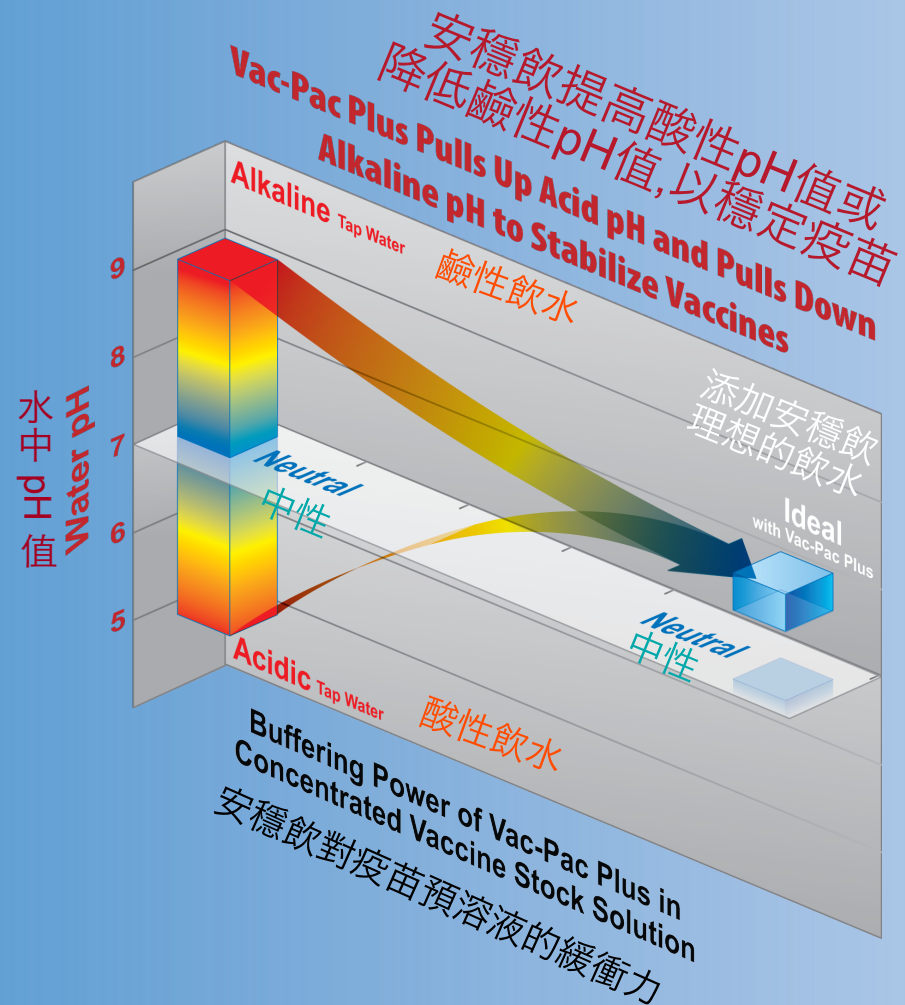


# Vac-Pac Plus Rescues Vaccines from Stray pH

安穩飲緩衝pH值以安定疫苗

- Buffers operate in multiple ranges to optimize the pH of the vaccine concentrate  
在不同範圍上藉由緩衝作用改善疫苗溶液pH值
- Pulls alkaline water down and acid water up, locking the vaccine at an ideal pH

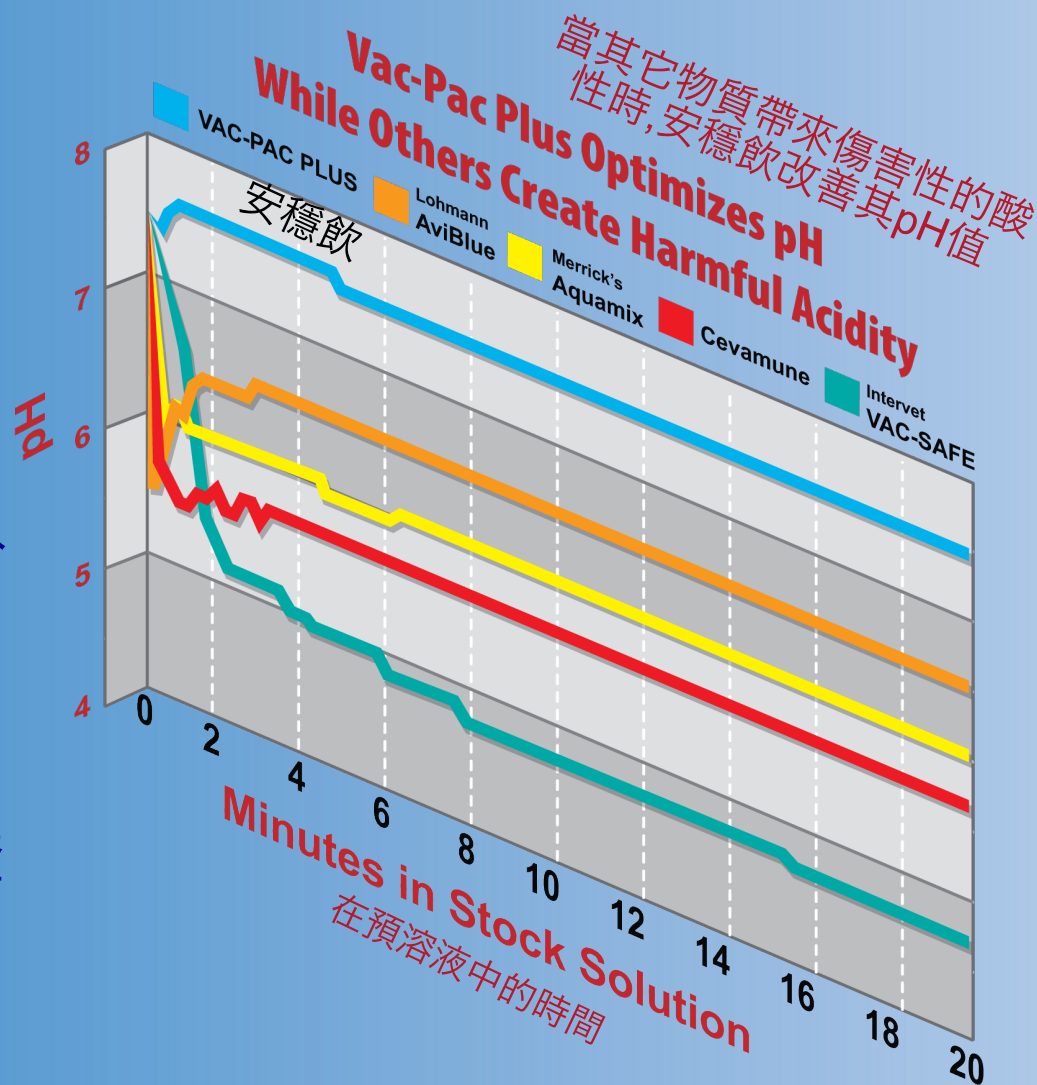
降低鹼性飲水pH值,提高酸性飲水pH值,而將疫苗穩定在理想的pH值



# Effervescent Products Contain Harmful Acidity

發泡產品含有傷害的酸性

- Effervescence produces excess acid  
冒泡產生過量的酸
- Dissolves slowly, require up to 20 minute wait before adding vaccine  
溶解慢,加入疫苗前需等20分鐘
- Leaves undissolved tablet binder residue  
留下來溶解的片劑粘著殘渣



# Vac-Pac and Vac-Pac Plus Offer More...

安穩飲提供更多的利益...

- More vaccine stability...preserves vaccine titer for stronger immunity and better bird performance  
更多的疫苗穩定性...保存疫苗力價產生較強免疫力及較佳雞隻性能
- More vaccine types...viral and bacterial antigens  
適用更多疫苗種類...病毒性及細菌性抗原(疫苗)
- More effective...shields against multiple risk factors  
更有效...對抗多種的危險因子
- More concentrated...less handling, less mixing  
更濃縮...操作方便,混合方便
- More immediately active...less waiting, less lost time  
更直接的操作...少等待,不浪費時間
- More soluble...no inactive residue **WE GUARANTEE IT!**  
更易溶解...沒有不作用之殘渣,“我們保證!”

# The Leader in Vaccine Stabilizers

## 疫苗穩定劑的領導者

