

# Selected Swine Diseases

## 重要的猪病

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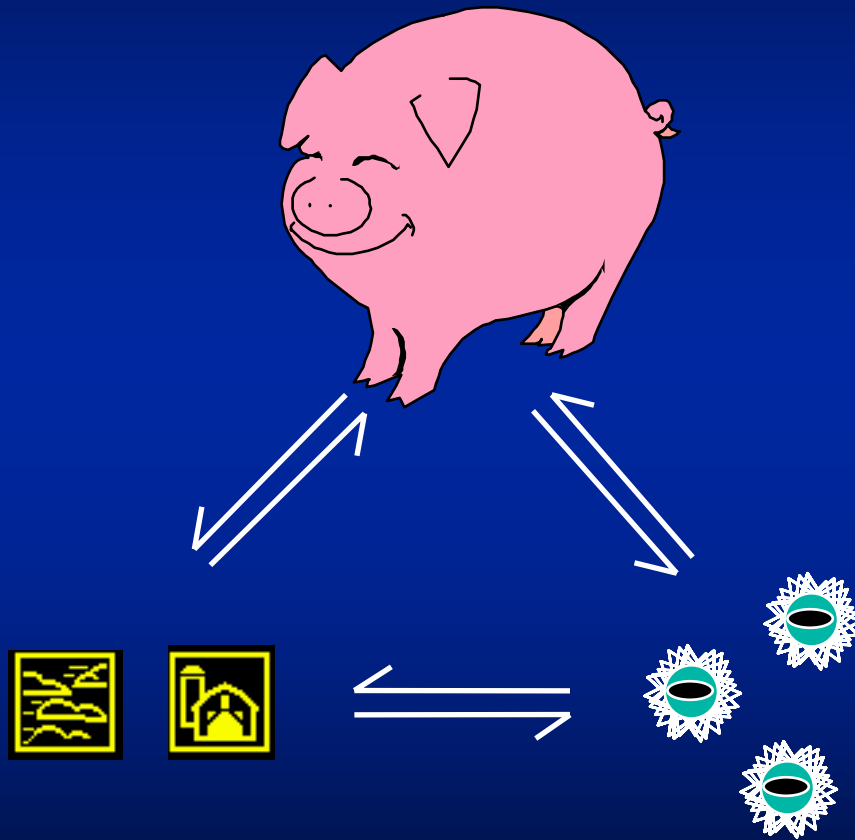


# DISEASE CONCEPTS

## 疾病的概念



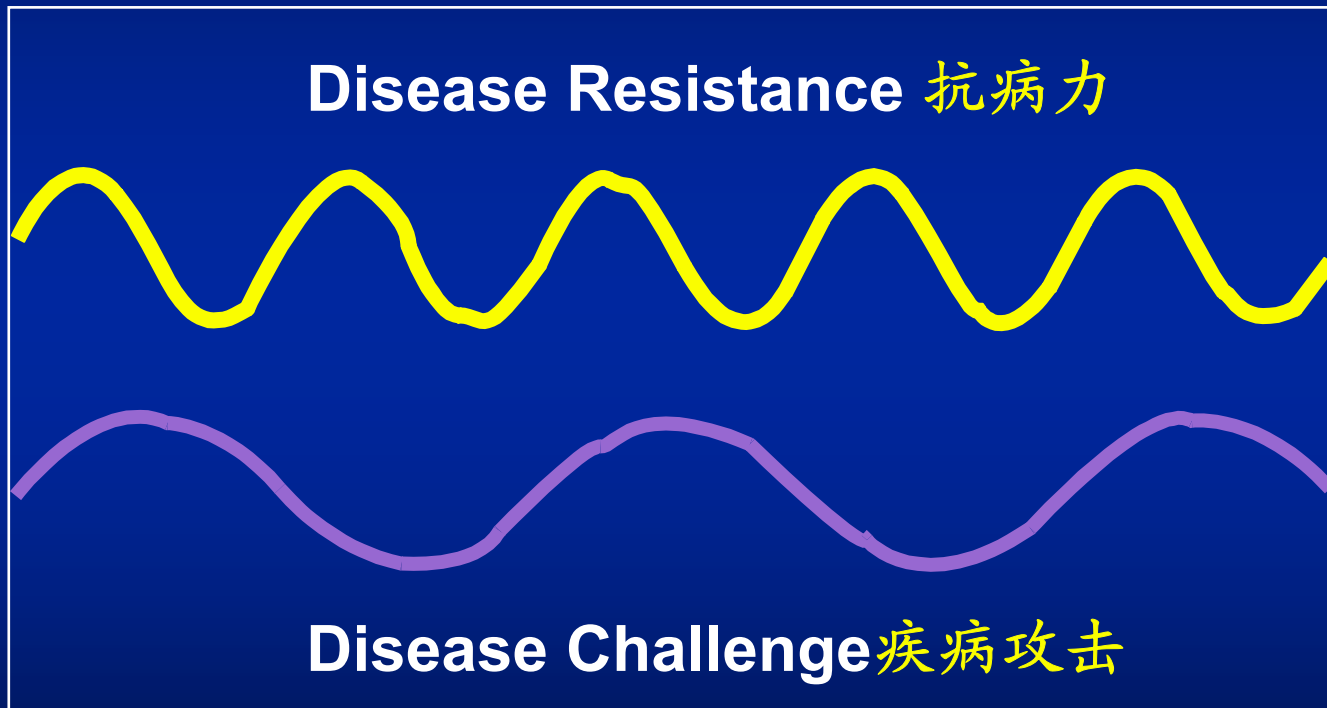
# Disease Triangle 疾病的三角关系



# DISEASE AND RESISTANCE

## 疾病和抗病力

LEVEL水平

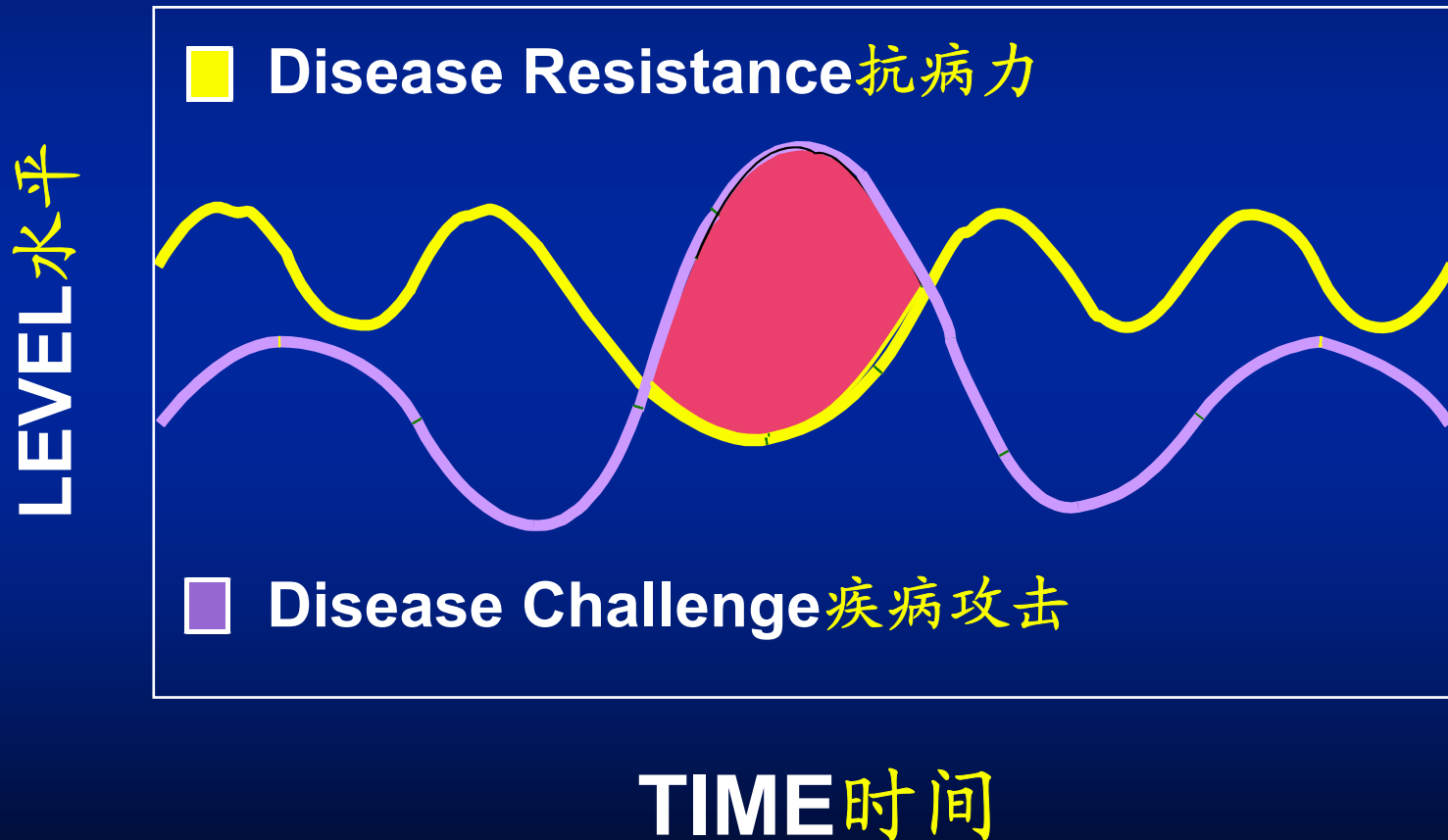


TIME时间



# DISEASE AND RESISTANCE

## 疾病和抗病力



# Porcine Circovirus type 2 (PCV2)

II 型猪圆环病毒



# PCV2 II型猪圆环病毒

- Nursery-Grower pigs 保育期-生长期的猪
- Clinical Syndromes 临床症状
  - Pneumonia 肺炎
  - Porcine Multisystemic Wasting Syndrome 猪多系统消耗性综合征
  - Porcine Dermatitis and Nephropathy Syndrome 猪皮炎和肾病综合征
  - Variety of others (enteritis, abortion) 各种其它疾患(肠炎, 流产)



# PCV2 II型猪圆环病毒

- Porcine Multisystemic Wasting Syndrome (PMWS)猪多系统消耗性综合征
  - Waste away消瘦
  - Lymph node enlargement淋巴结肿大
  - Jaundice黄疸
  - Diarrhea腹泻
  - Gastric Ulcers胃溃疡



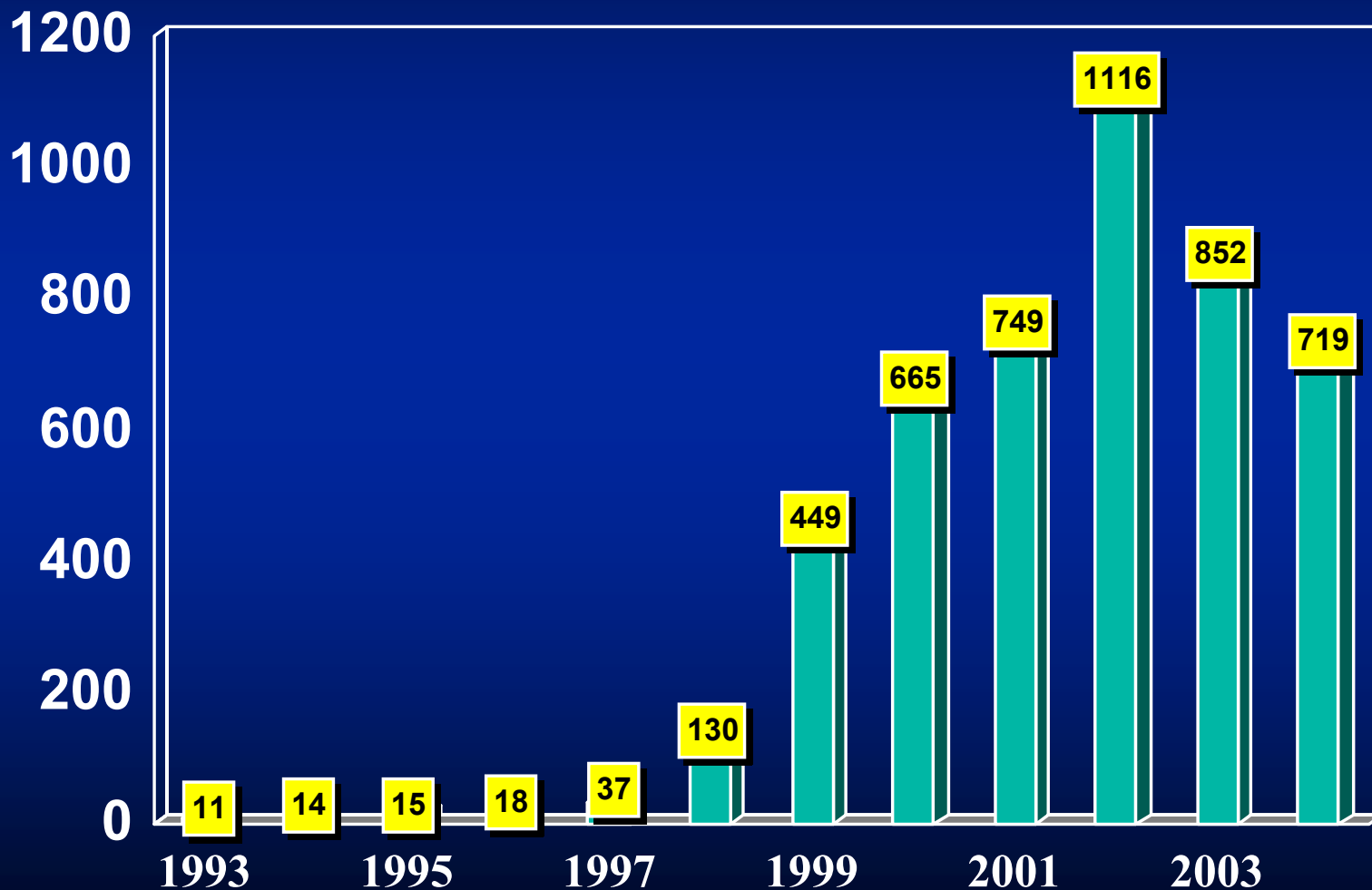
# Trends in PCV2-associated diseases

## 与 II 型猪圆环病毒有关的疾病趋势

	2000	2001	2002	2003	2004
<b>Pneumonia</b> 肺炎	404	379	557	407	343
<b>PMWS</b> 猪多系统消耗性综合征	209	255	346	283	224
<b>Systemic Infection</b> 全身感染	49	94	179	129	113
<b>Enteritis</b> 肠炎	2	11	25	23	21
<b>Abortion</b> 流产	1	10	9	3	2
<b>PDNS</b> 皮炎和肾病综合征	7	8	12	7	16

# Trend in total cases of PCV2-associated diseases at Iowa State

## 依阿华州猪II型圆环病毒病病例趋势



# Circovirus 2-PCR ADRDL

## II 型猪圆环病毒-聚合酶链式反应 动物疾病研究诊断实验室

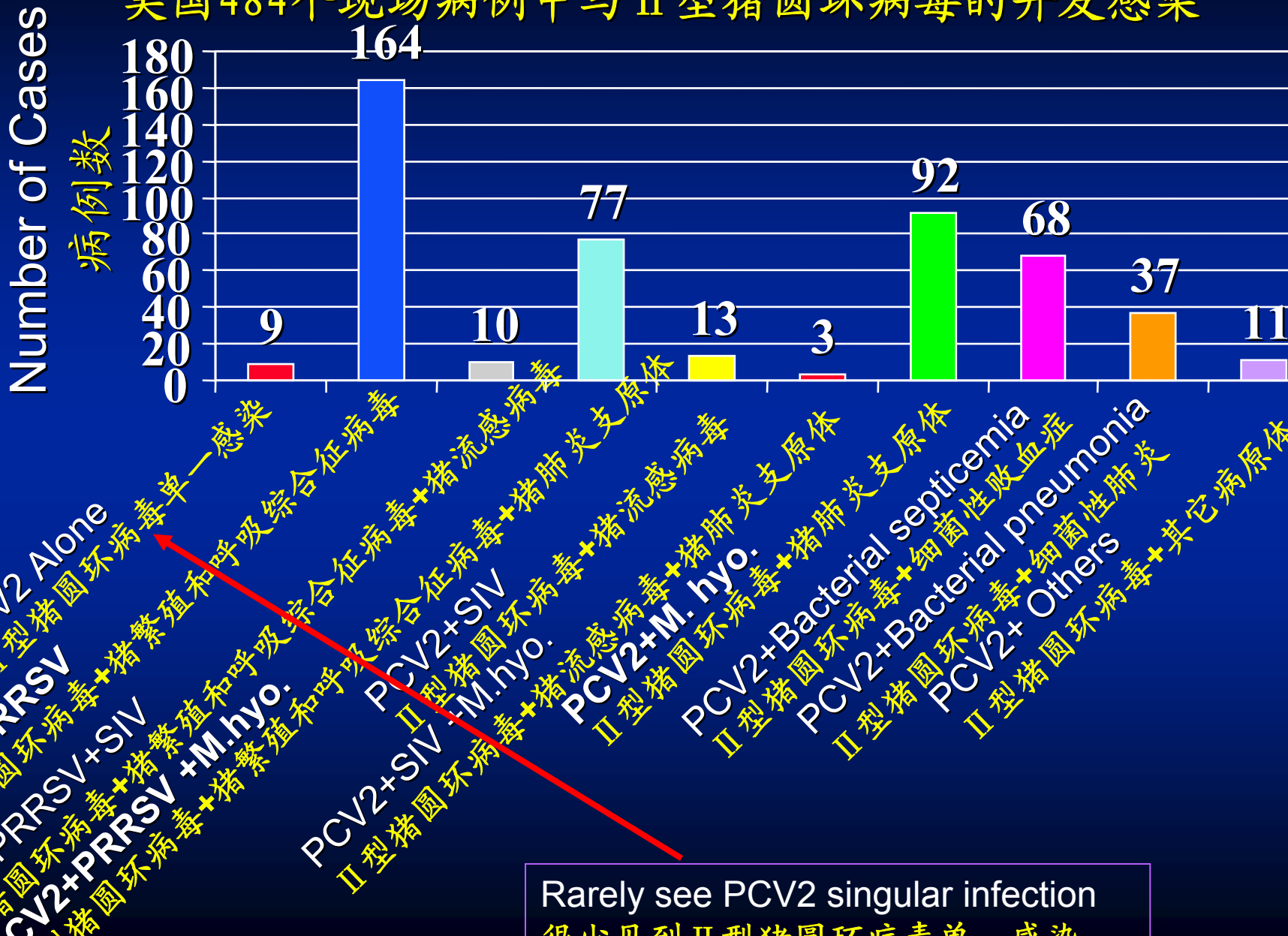
	#positive 阳性
2004	65
2003	67
2002	74
2001	71
2000	2*

\*Test added June



# PCV2 coinfections in 484 U.S. field cases: ISU-VDL

美国484个现场病例中与II型猪圆环病毒的并发感染



Rarely see PCV2 singular infection  
 很少见到II型猪圆环病毒单一感染

# Effect of Host Genetics on Susceptibility to

## PCV2-Associated Disease and Lesions

### 动物的种质对于II型猪圆环病毒病和病变易感性的影响

- **3/19 (15.8%) Landrace pigs developed PMWS** whereas none of the Duroc or Large White pigs developed PMWS
- **3/19(15.8%)长白猪发生猪多系统消耗性综合征**，而杜洛克和大白猪则无一发生此症
  - **Wasting, severe lymphoid depletion, PCV2 antigen associated with the lymphoid depletion**消瘦、淋巴细胞严重减少，II型猪圆环病毒抗原与淋巴细胞减少有关
- **Significantly more severe lymphoid depletion in tonsils and lymph nodes of Landrace pigs**长白猪扁桃体和淋巴结中淋巴细胞显著较少
- **Data analysis indicates no influence of dam or sire on the results**数据分析表明副本和母本对结果均无影响
- **Landrace pigs appear to be predisposed to PCV2-associated lymphoid depletion and PMWS**长白猪看来容易发生与II型猪圆环病毒有关的淋巴细胞减少和猪多系统消耗性综合征



# The effect of adjuvants on PCV2 associated disease

## 佐剂对 II 型猪圆环病毒有关疾病的影响

- **Oil-in-water products appear to be more likely to enhance PCV2-associated lesions** 水包油疫苗看来很可能会增强 II 型猪圆环病毒所致病变
  - **Differences likely exist among oil-in-water products** 各种水包油制品之间很可能存在差异
- **Practitioners must weigh the effect of not controlling coinfections vs the negative effect of vaccination** 兽医必须在不控制并发感染以及在免疫接种所致副作用之间进行权衡
  - **M. hyo. infection significantly enhances PCV2 replication, severity of PCV2-associated lesions, and incidence of PMWS in PCV2-infected pigs** 猪肺炎支原体感染可显著促进 II 型猪圆环病毒的复制、增强该病毒所致的病变、提高 II 型猪圆环病毒感染猪中猪多系统消耗性综合征的发生率
  - **Vaccines may also vary in efficacy of control of M. hyo.** 疫苗对于控制猪肺炎支原体感染的效力不一。



# Effect of timing of vaccination on enhancement of PCV2 associated disease

## 免疫接种时间对促进II型猪圆环病毒病的影响

- Significant differences between groups in
- 不同组之间在下列方面有显著差异:
  - ✓ Severity of lymphoid depletion 淋巴细胞减少的严重程度
  - ✓ Severity of hepatitis 肝炎的严重程度
  - ✓ Severity of myocarditis 心肌炎的严重程度
  - ✓ Severity of interstitial pneumonia 间质性肺炎的程度
  - ✓ PCV2 genomic copy numbers in serum 血清中PCV2基因组拷贝数
- **Summary:** No or minimal vaccine-induced enhancement of PCV2-associated lesions when vaccines are administered **2-4 weeks prior to PCV2 exposure** at 8 weeks of age 在8周龄感染PCV2前2~4周进行免疫接种，几乎不会增强PCV2有关的病变。



# Control of PCV2-Associated Diseases

## II 型猪圆环病毒有关疾病的防制

- Aggressive treatment of other bacterial coinfections  
• 对其它细菌性并发感染进行积极治疗
- Determine if there is an association of increased PCV2-induced disease with the use of certain vaccines or timing of vaccination  
• 必须确定：PCV2有关疾病的增加是否与某些疫苗的使用或者免疫接种的时间有关。
  - Use vaccines judiciously  
• 要正确地使用疫苗
  - Change products and/or timing of vaccination  
• 改换疫苗或者改变接种时间
    - Oil-in-water vaccines appear to be more problematic
      - Not all oil-based vaccines are alike  
• 水包油疫苗看来比较有问题
    - Place vaccines 2-4 weeks prior to PCV2 infection  
• 在感染PCV2之前使用疫苗
- Use of anti-inflammatory drugs is reported to be beneficial  
• 据报告，应用抗炎药有好处



# Control of PCV2-Associated Diseases

## II 型猪圆环病毒有关疾病的防制

**Pull sick pigs** 取走病猪

- Long term shedding in essentially all body fluids 几乎在所有体液中长期排毒
- Back up 1-2 stages on diet in sick pen (病猪栏的饲料前移一到二个阶段)

**Focus on decreasing stress and improving pig comfort!** 重点在减轻应激和提高猪的舒适程度

- Appropriate pig density and AIAO flow 饲养密度要适度, 实行全进全出
- Minimize mixing and regrouping 减少混群和重新组群
- Good air quality and appropriate temp 改善空气质量, 环境温度适当
- Solid pen dividers, mats for sleeping, etc... 采用实体隔墙, 睡眠区用垫子, 等等。。。

**Use effective disinfectants (Virkon-S) between groups** 每批猪出圈后用高效消毒剂消毒(维康S)

**Consider a change in genetics?** 考虑饲养其它猪种

**PCV2 vaccines are on the horizon!** PCV2疫苗已经研制成功



# Porcine Respiratory and Reproductive Syndrome Virus (PRRSV)

猪繁殖和呼吸综合征(PRRS)病毒

Two Syndromes 二种综合征

Respiratory 呼吸

Reproductive 繁殖



# PRRS猪繁殖和呼吸综合征

## ■ Reproductive Syndrome繁殖综合征

- Premature, weak, stillborn & mummified pigs  
早产、弱仔、死产、木乃伊胎儿
- Abortion流产
- Poor conception rates受胎率低下



# PRRS猪繁殖和呼吸综合征

## ■ Respiratory Syndrome 呼吸综合征

- Mild pneumonia if uncomplicated 轻度肺炎(如无并发症时)
- Severe pneumonia if complicated by Mycoplasma hyopneumoniae & secondary pathogens 若并发猪肺炎支原体或其它继发性病原体时发生严重肺炎
- Lethargic, off feed, fever, coughing, “thumping”, and death 抑郁, 厌食, 发热, 咳嗽, 死亡
- High preweaning mortality 断奶前死亡率高
- High nursery disease and mortality 保育期发病率高、死亡率高
- Finisher pig pneumonia 肥育猪肺炎
  - M hyopneumoniae central role 主要是支原体肺炎
  - PRDC 慢性呼吸道复症



# PRRSV-Diagnosis ADRDL

## PRRS病毒诊断

### 动物疾病研究诊断实验室

	Respiratory 呼吸	Reproductive 繁殖	Abortion 流产
2004	173	55	6
2003	184	28	4
2002	176	51	13
2001	192	304	11
2000	178	284	19



# PRRSV Impact on Disease

## PRRS病毒对疾病的影响

- PRRS disease and mortality often from secondary bacterial diseases
- **PRRS**的病和死亡常常是因为继发性细菌感染所致



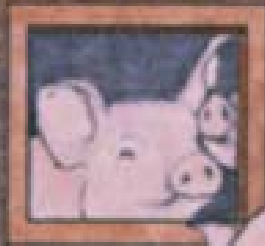
# PRRSV Impact on Disease

## PRRS病毒对疾病的影响

- In utero PRRSV infection impact
- **PRRS病毒子宫内感染造成的影响**
  - Immunosuppressed免疫抑制
    - VERY susceptible 2° bacterial infection
    - 对细菌感染非常敏感
  - Long-term viremia长时间病毒血症
  - Typhoid Marys “PRRSV Porky’s” 带病毒猪
  - **MUST CONTROL SOW PRRSV infection to control finisher PRRS** 必须控制母猪的PRRS感染，才能以便控制肥育猪的PRRS



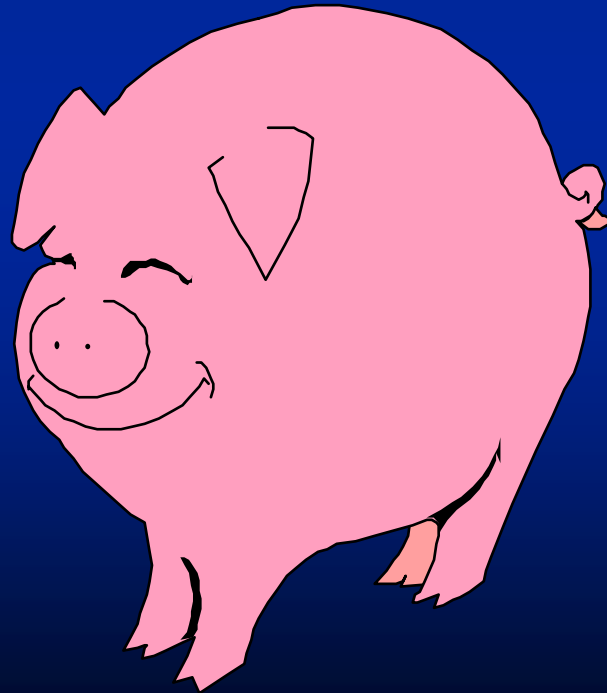
NURSERY



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# Boar Persistence

## 公猪感染的顽固性



# PRRSV -PCR ADRDL

## PRRS病毒-聚合酶链式反应

### 动物疾病研究诊断实验室

	2004	2003	2002	2001	2000
<b>Semen-1</b> 精液-1 US美国	487(4.1%) 11,674	157(0.8%) 20,397	115(1%) 8,091	319(12%) 2,749	313(10%) 3,274
<b>Semen-2</b> 精液-2 European 欧洲	3(0.7%) 420	3(0.7%) 415	3(0.9%) 323	0 26	---
<b>Serum-1</b> 血清-1 US美国	4148(17.6%) 23,552	3265(8.6%) 37,933	1398(11.4%) 12,166	1092(12.4%) 8,802	557(10.3%) 5,370
<b>Serum-2</b> 血清-2 European 欧洲	88(1.1%) 8,238	45(0.6%) 7,304	32(2.1%) 1,503	0 277	----

# Vaccines 疫苗

## ■ PRRSPRRS

- **Live-Autogenous-Serum Therapy**
- 活的自家疫苗免疫-血清治疗
- **MLV-BI**弱毒活苗-BI
- **Inactivated- Intervet**灭活苗-英特威公司
- **Inactivated-Autogenous**灭活苗-自家疫苗



# Management Practices

## 管理方法

- All in All Out 全进全出
- Feed-Limit Off Site Sources 限制  
饲料来源
- Cleaning & Disinfection-  
Facilities, Trailers, Trucks and  
Equipment 清洗消毒-猪舍、拖车、  
卡车和设备



# Swine Industry Changes

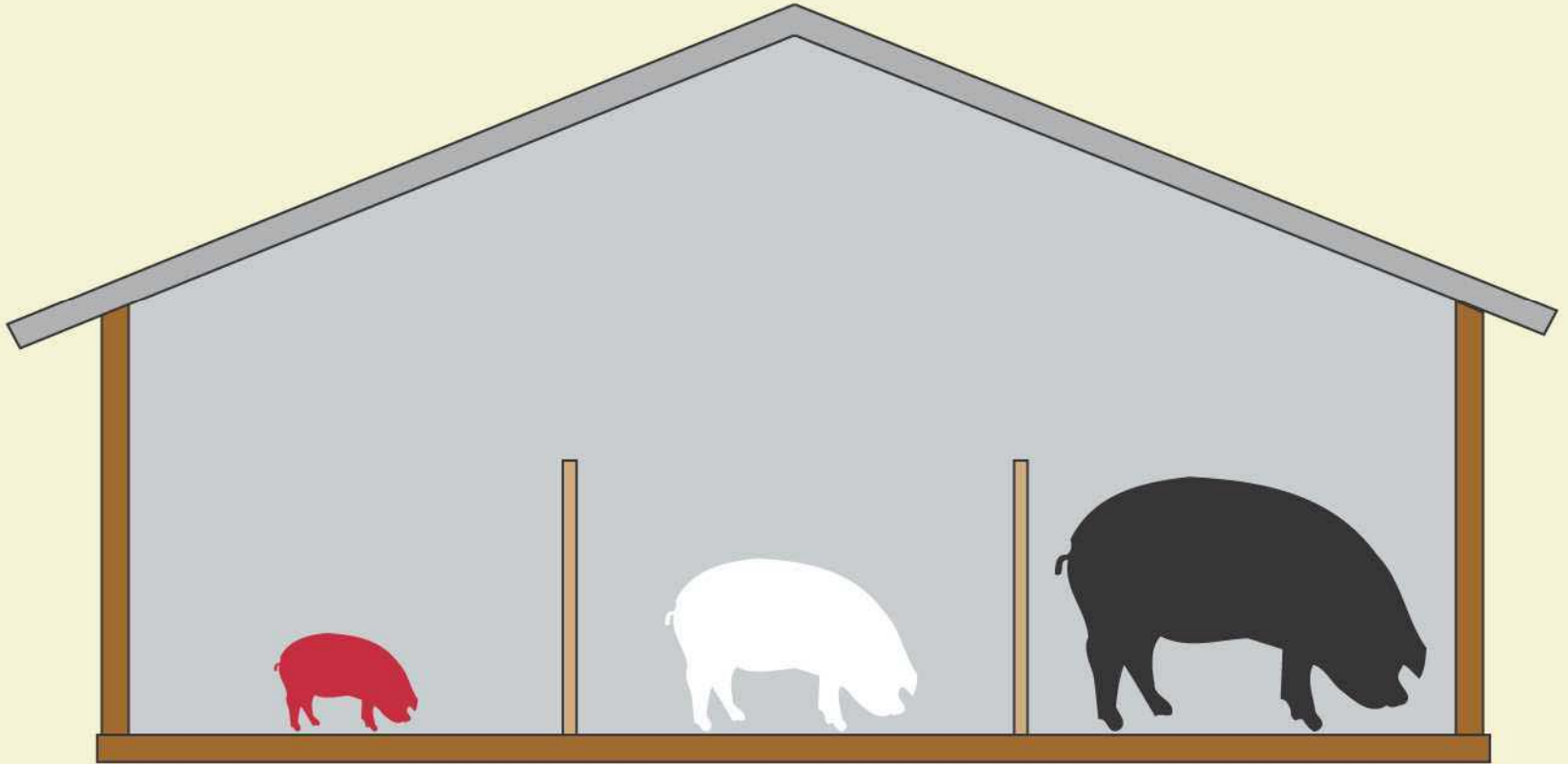
## 养猪业的变化

- **Continuous Pig-Flow Rearing** 连续饲养作业
  - **Multiple age groups** 多年龄猪群饲养
    - **Building or site** 同一猪舍或同一地点
  - **Never cleaned / disinfected** 从不清洗消毒
  - **Endemic disease model** 地方性疾病模型
    - **Day Care/School-kid model** 白天照料-对待学子的方式



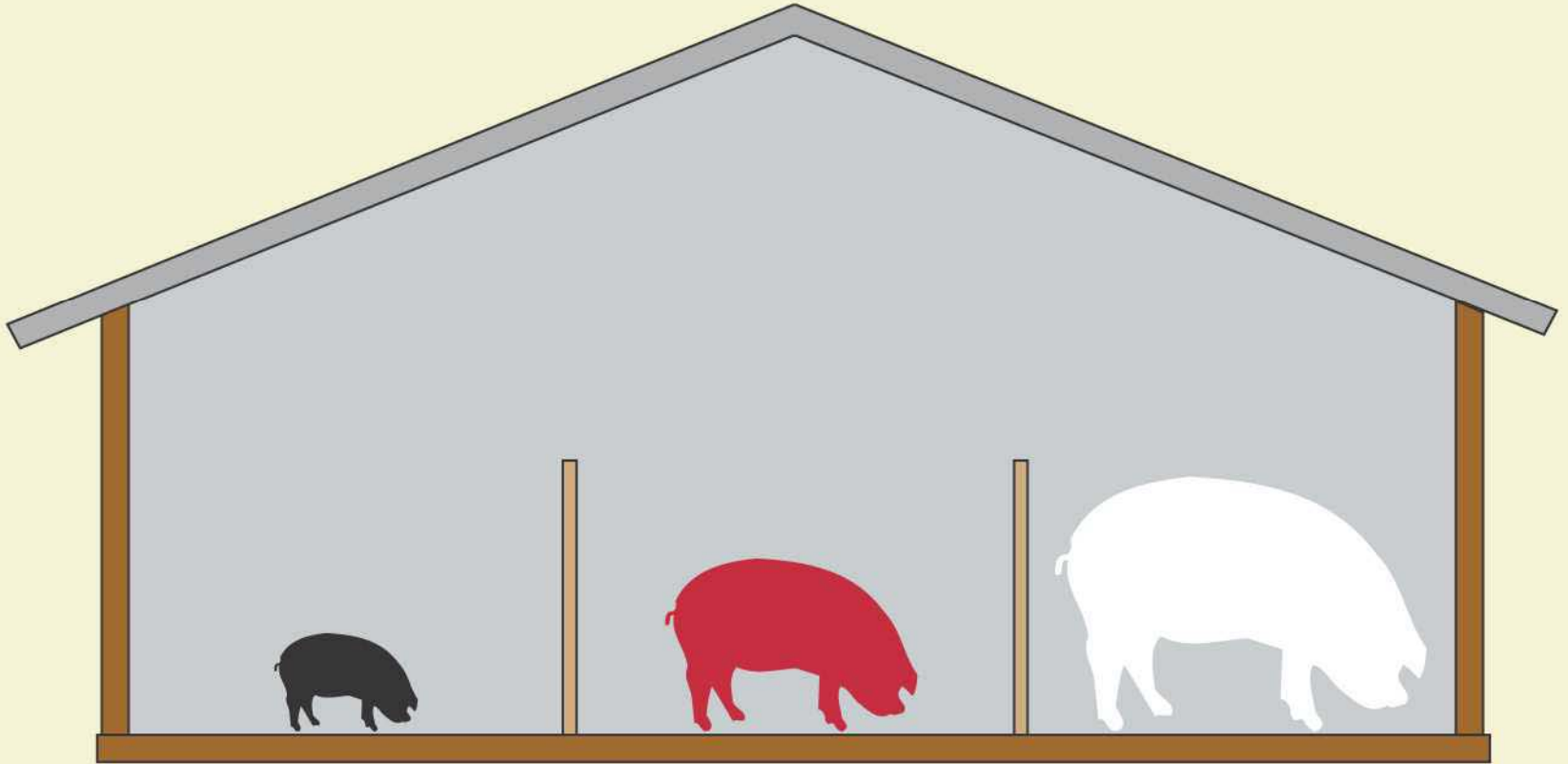
# 连续作业

## Continuous Flow



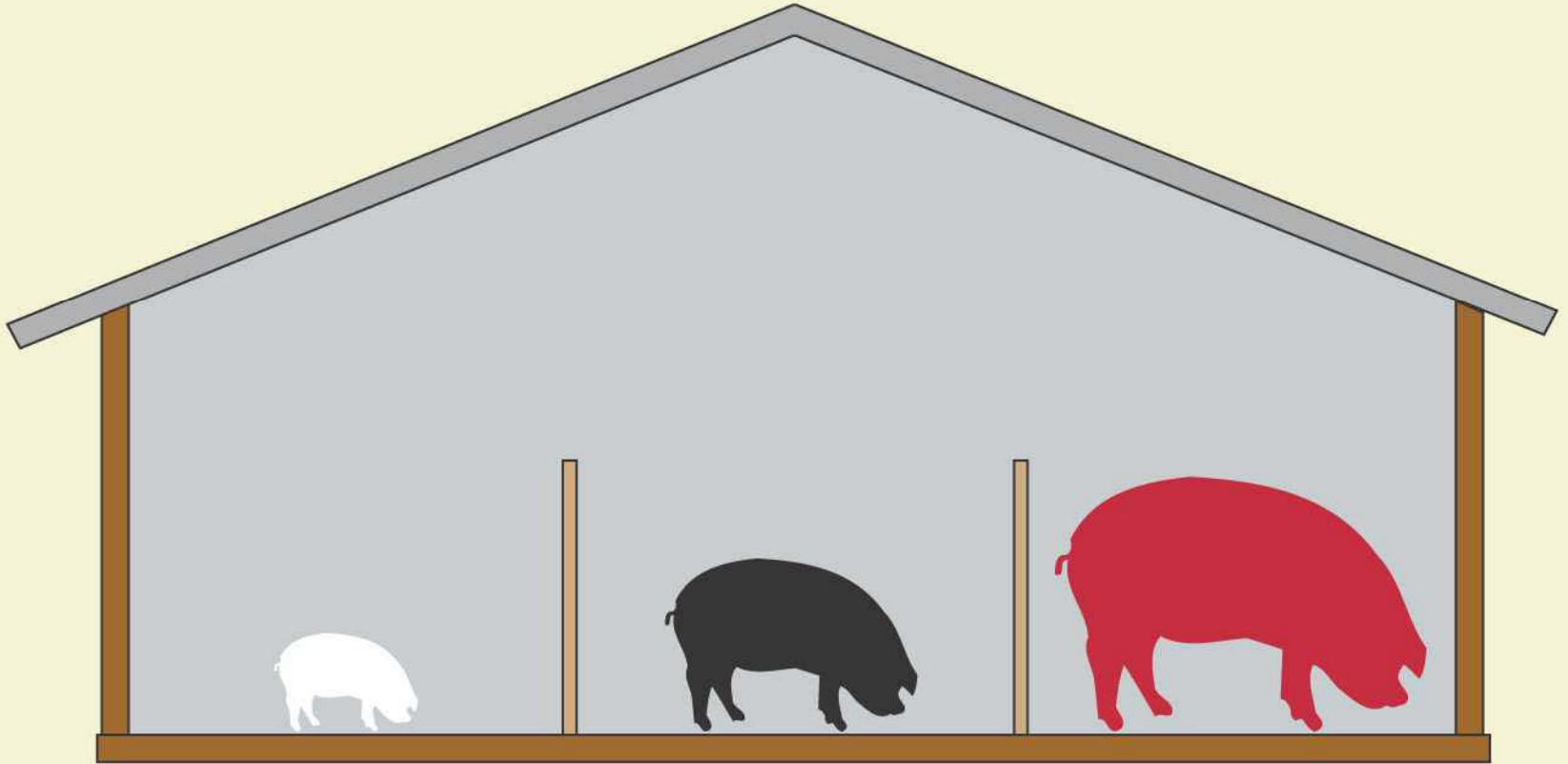
# 连续作业

## Continuous Flow



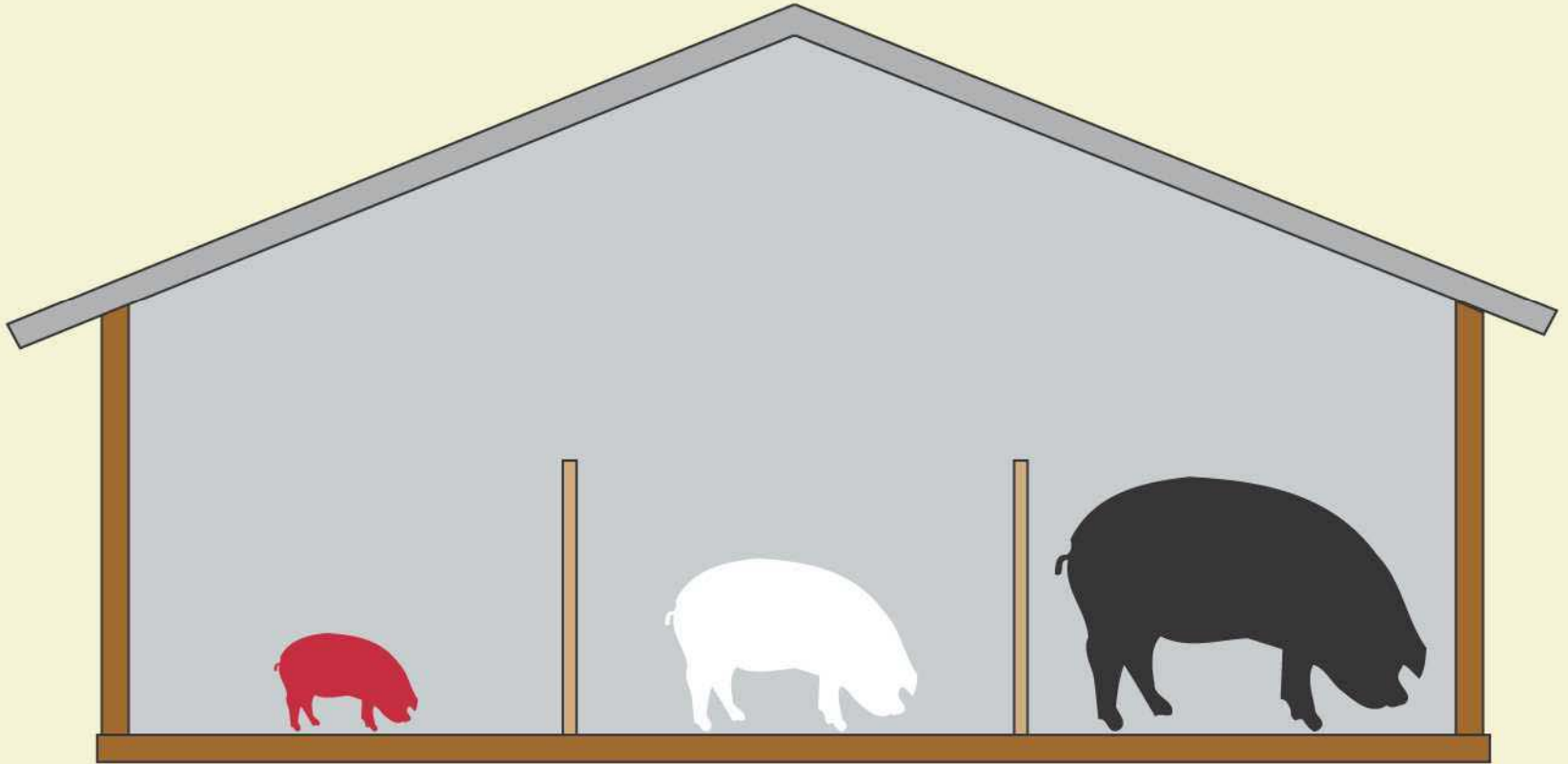
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## Continuous Flow



# 连续作业

## Continuous Flow



# Swine Industry Changes

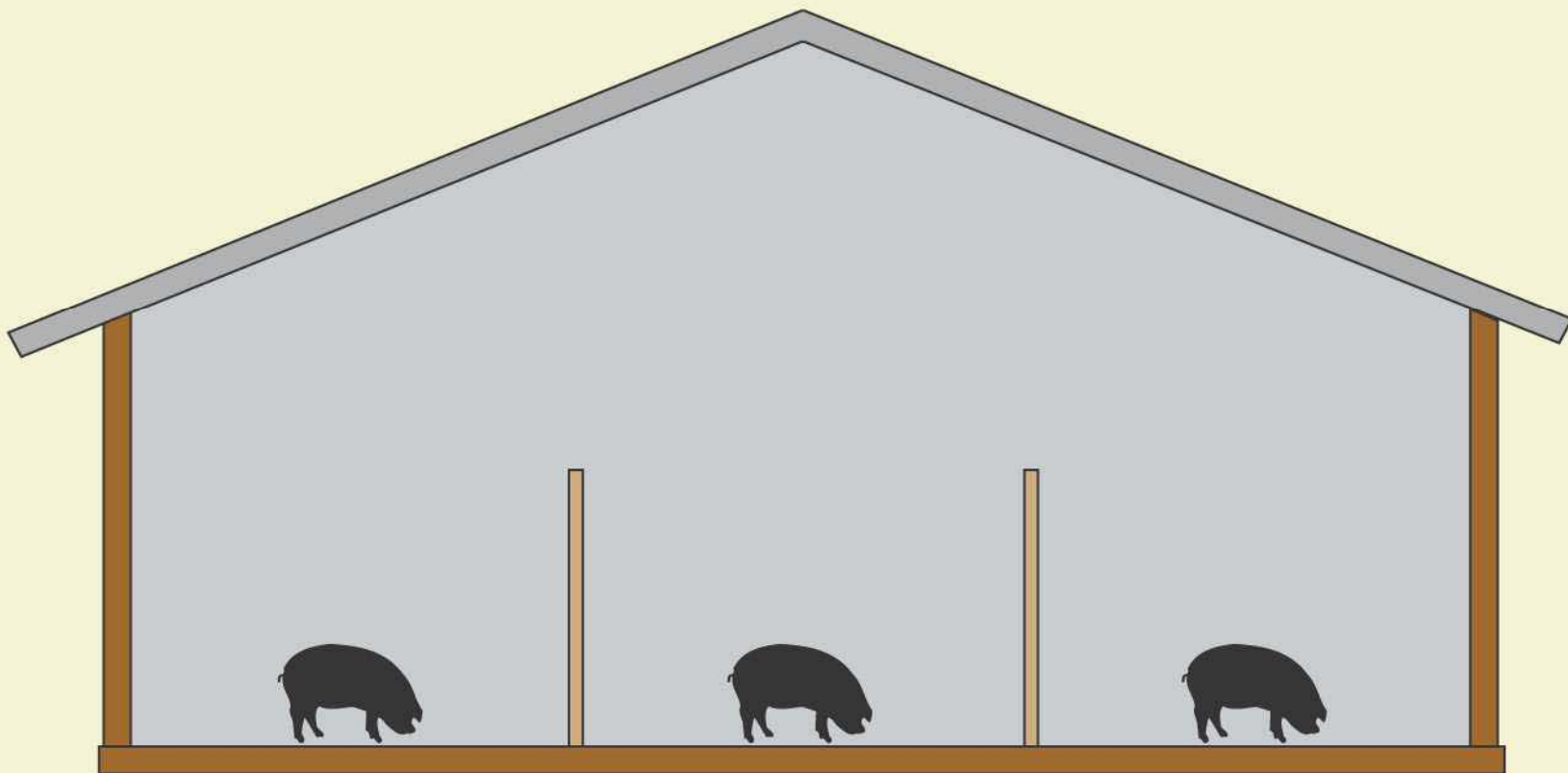
## 养猪业的变化

- All In-All Out (AIAO) Pig-flow Rearing
- 全进全出流程饲养
  - Single age group 单一年龄猪群
    - room / building / site 同一室/猪舍/地点
  - Placed at same time 同时入舍
  - Emptied completely 同时完全出舍
  - Cleaned and disinfected 清洗和消毒



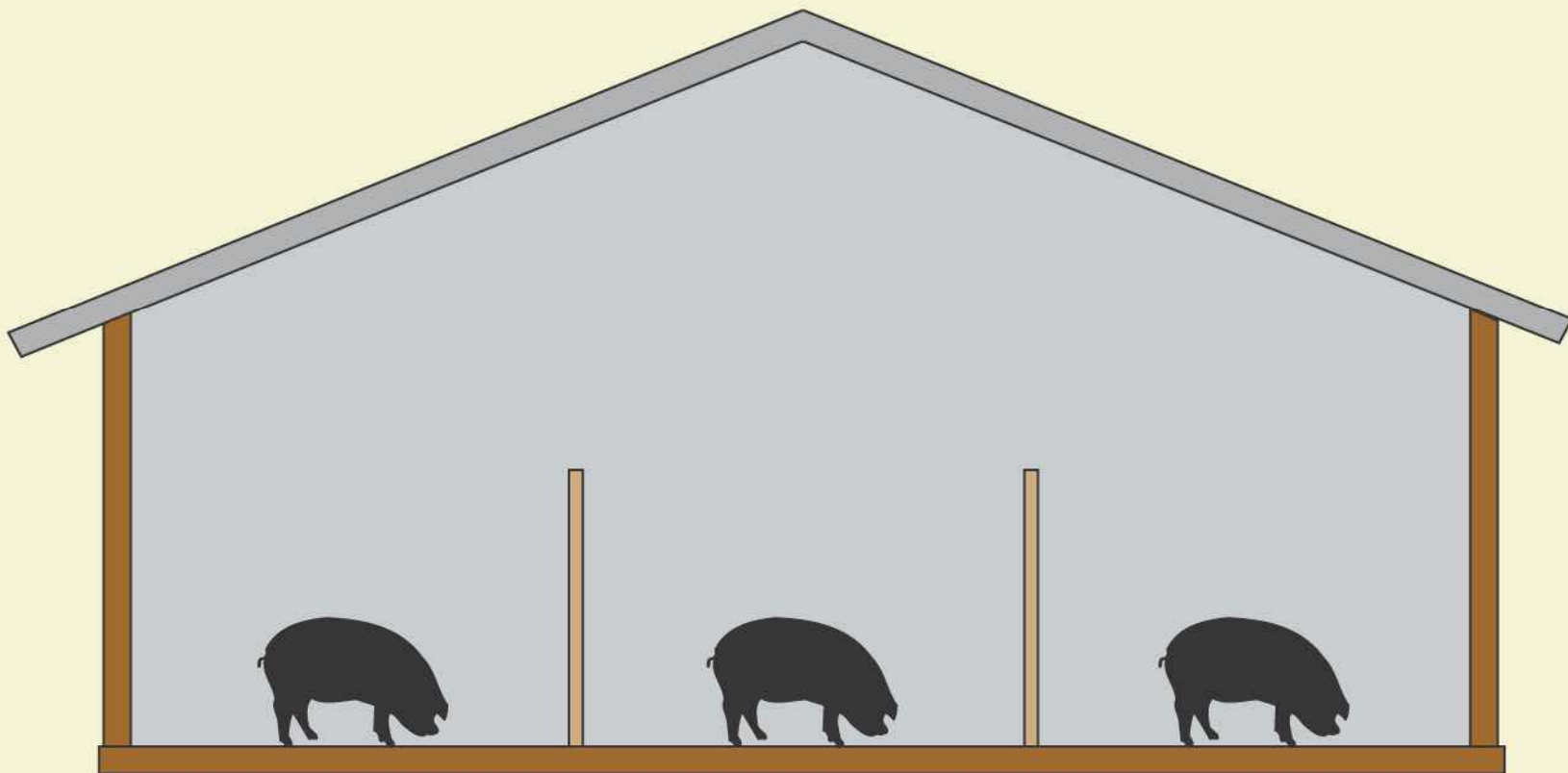
全进全出

All in - All Out



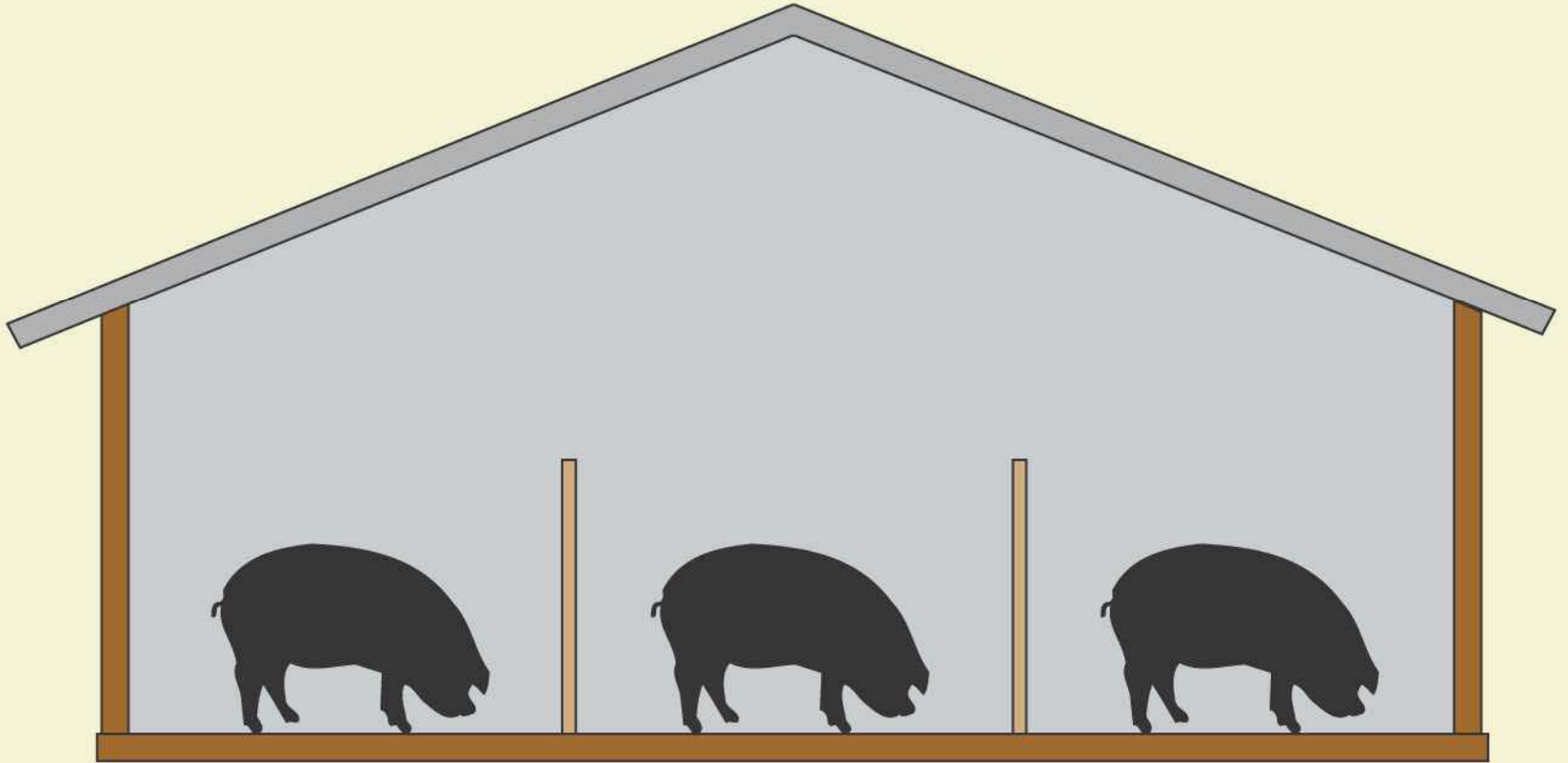
全进全出

All in - All Out



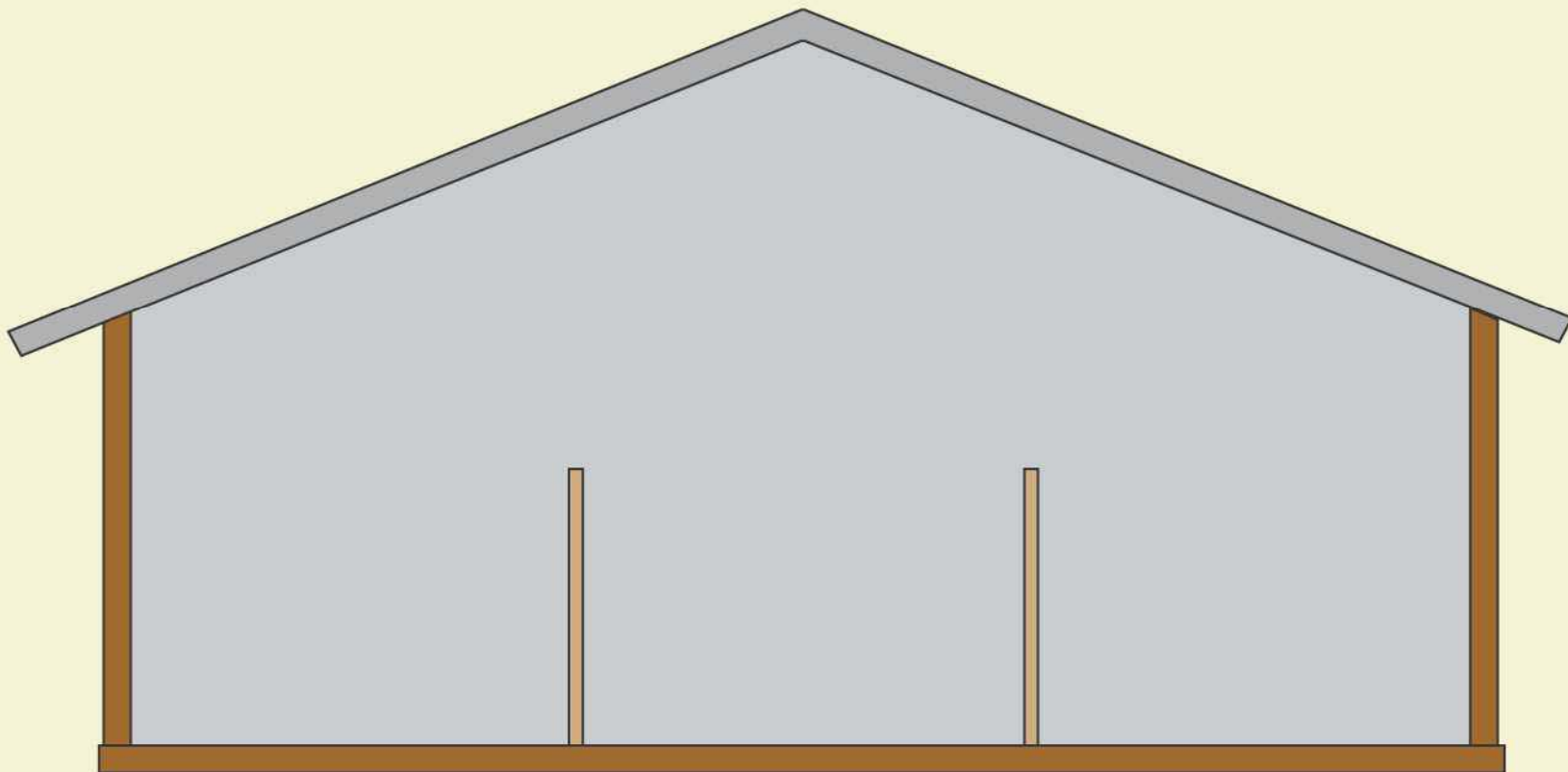
全进全出

All in - All Out



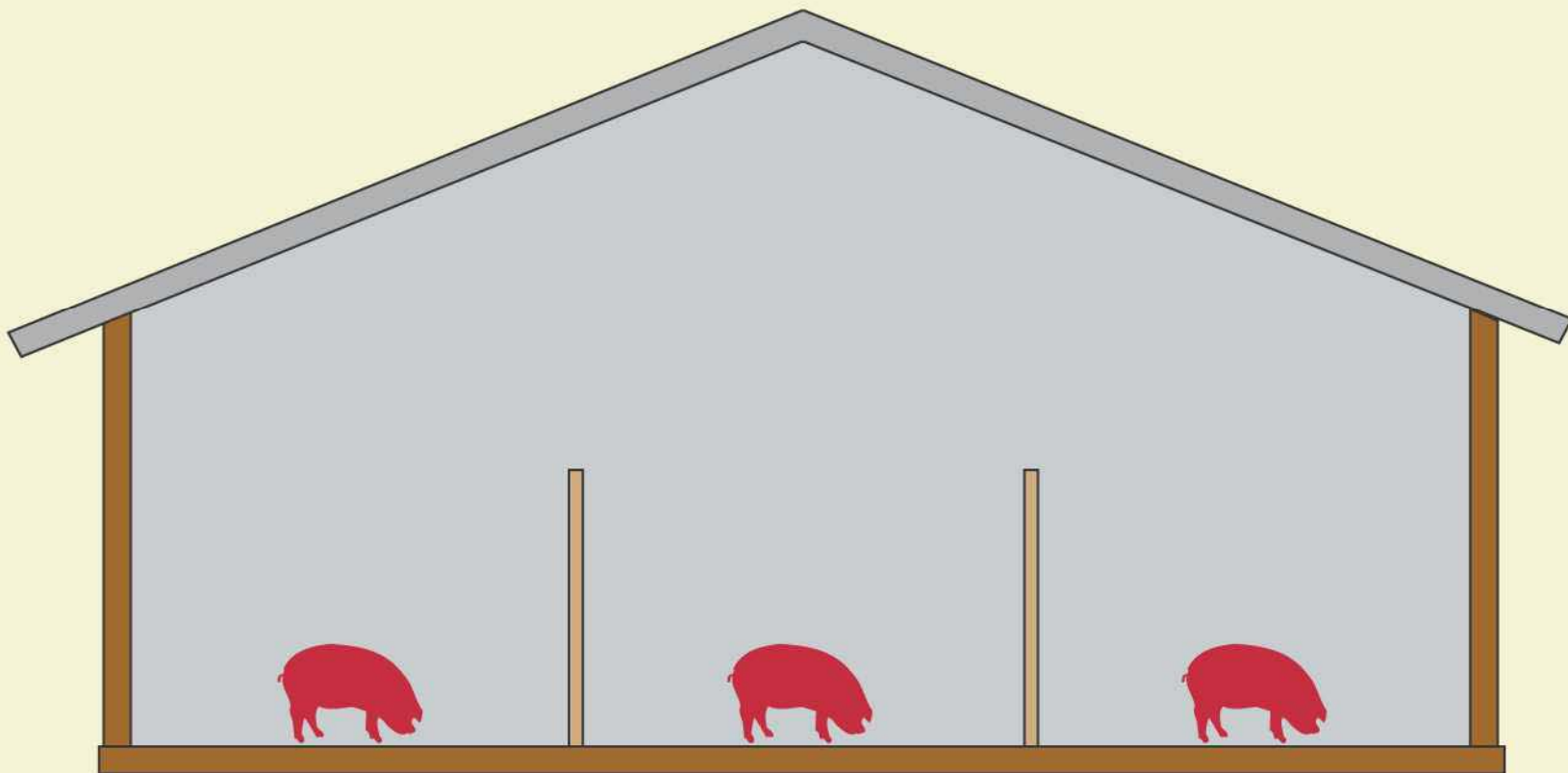
全进全出

All in - All Out



全进全出

All in - All Out



# Swine Industry Changes

## 养猪业的变化

- **AIAO Pig-flow Rearing** 全进全出
  - End old-to-young transmission
  - 长大后出舍-小猪入舍
    - Decreasing contact /exposure 减少接触-感染
  - **Must be perfect to be successful!!??**
  - **必须做得完美无缺才能成功!!??**
    - Naïve population if successful 如果成功，猪群从无感染
  - **Epidemic Disease Model???** 流行病模型



# Swine Industry Changes

## 养猪业的变化

- Site level disease control 饲养点的疾病控制
  - 1 site production 单点生产
    - “farrow to finish” 分娩-肥育
- (Farrowing)(Nursery)(Grow-Finish)(分娩)(保育)(生长-肥育)



# PORCINE RESPIRATORY DISEASE COMPLEX

猪呼吸道疾病复症



# COMMON FACTORS CONTRIBUTING TO PRDC OUTBREAK

## 促进猪呼吸道疾病复症的常见因素

### ■ Porcine Reproductive & Respiratory Syndrome Virus (PRRSV)

#### ■ PRRS病毒

- Infection rate increases in grower-finisher (GF)- by 14 weeks of age 90% are infected
- 生长肥育猪中感染率增高-到14周龄时90%都已感染

### ■ Mycoplasma Hyopneumonia (MH)支原体肺炎

- Infection rate increases primarily in finisher- by 14 weeks of age 65% are infected
- 感染率主要增高在肥育猪, 到14周龄时65%已经感染

### ■ High Gilt Replacement Rate后备母猪感染率高

- Increases risk of MH infection in pigs prior to weaning 增加断奶前仔猪感染支原体肺炎的危险
- A result of low maternal antibody levels 母源抗体水平低的结果

### ■ Wide Weaning Age Range (14 to 22 Days)断奶日龄范围很广(14~22日龄)

- Results in MH infected and naive pigs at weaning 导致感染支原体肺炎以及断奶时敏感

Commingling of Pigs In GF With Varying Degrees of Immunity to PRRS & MH 将具有不同PRRS和支原体肺炎免疫力的生长肥育猪混群



# MH INFECTION POTENTIATES PNEUMONIA CAUSED BY PRRSV

感染支原体肺炎会加重PRRS病毒引起的肺炎

## ■ MH Attracts Inflammatory Cells

### ■ 支原体攻击炎性细胞

- Porcine Alveolar Macrophages (PAM's)
- 猪肺泡巨噬细胞
- Porcine Intravascular Macrophages (PIM's)猪血管内巨噬细胞

## ■ Which Produce An Ideal Environment for PRRSV To Persist 这些为PRRS病毒的长期存在提供了理想环境



# PRIMARY PATHOGENS CAUSING PRDC

引起猪慢性呼吸道复症的主要病原体

- Porcine Reproductive and Respiratory Syndrome Virus (PRRSV) 猪繁殖和呼吸综合征病毒(PRRS病毒)
- Mycoplasma Hyopneumonia (MH) 猪肺炎支原体



# PRDC-Diagnosis ADRDL

## 猪慢性呼吸道复症-诊断 动物疾病研究诊断实验室

	<b>PRRSV</b> <b>PRRS病毒</b>	<b>M.hyo</b> 猪肺炎支原体	<b>APP</b> 胸膜肺炎 放线杆菌
<b>2004</b>	<b>173</b>	<b>81</b>	<b>25</b>
<b>2003</b>	<b>184</b>	<b>132</b>	<b>41</b>
<b>2002</b>	<b>176</b>	<b>151</b>	<b>30</b>
<b>2001</b>	<b>192</b>	<b>150</b>	<b>32</b>
<b>2000</b>	<b>178</b>	<b>154</b>	<b>67</b>



# MYCOPLASMA HYOPNEUMONIA

## 猪肺炎支原体

- Transmitted By Contact And Aerosols  
■ 通过接触和空气传播
- Chronic Non-Productive Cough If Uncomplicated 若无并发症则表现慢性干咳
- Severe Pneumonia If Complicated by PRRSV & Secondary Pathogens 如果并发PRRS病毒感染或继发性病原体感染则表现严重肺炎
- Commercial Bacterins Available 现有商品菌苗出售



# SECONDARY PATHOGENS CONTRIBUTING TO THE SEVERITY OF PRDC

## 加重猪慢性呼吸道复症的继发性病原体

- Swine Influenza Virus 猪流感病毒
- Pasteurella Multocida (PM) 多杀性巴氏杆菌
- Streptococcus Suis 猪链球菌
- Actinobacillus Pleuropneumonia (APP) 胸膜肺炎放线杆菌
- Haemophilus Parasuis 副猪嗜血杆菌
- Salmonella Cholerasuis 猪霍乱沙门氏菌



# ACTINBACILLUS PLEUROPNEUMONIA (APP)

## 胸膜肺炎放线杆菌

- **Can Be Primary Or Secondary Infection** 可以是原发性感染，也可是继发性感染
- **Disease Is Usually Stress Related** 发病常与应激有关
- **Causes Severe Pneumonia Especially If Complicated By PRRSV & MH** 引起严重肺炎，尤其是并发**PRRS**病毒感染或猪肺炎支原体感染时
  - **Sudden Death** 突然死亡
- **Can Be Treated With Antibiotics** 可用抗生素进行治疗
- **Commercial & Autogenous Bacterins Available.** 有商品菌苗或自家菌苗可供应用



# PREVENTION & CONTROL OF PRDC

## 猪慢性呼吸道复症的预防和控制

- Use Improved Management Procedures & A Proper Vaccination Program 改进管理方法和免疫程序
- Isolate & Acclimate New Breeding Stock For At Least 60 Days 对新种猪至少进行为期60天的隔离和适应
  - Vaccinate against PRRSV, MH & other pathogens indicated by herd serum profile 根据猪群血清学检查结果进行PRRS、支原体肺炎和其它病原体的免疫接种
  - expose to cull sows and nursery pigs 用淘汰母猪和保育期仔猪接触



# PREVENTION & CONTROL OF PRDC

## 猪慢性呼吸道复症的预防和控制

### CONTINUED续

- **Use Segregated Early Weaning (SEW) 14 To 18 Days**应用早期隔离断奶(14~18日龄)
  - Helps to control *Mycoplasma Hyopneumonia*, *Pasteurella Multocida*, *APP*, *Salmonella Cholerasuis*有助于控制猪肺炎支原体、多杀性巴氏杆菌、胸膜肺炎放线杆菌、猪霍乱沙门氏菌
- **Use All In All Out (AIAO) Pig Flow**实行全进全出
  - Infections generally spread from older to younger pigs感染一般从年长猪传播给年轻猪
- **Clean & Disinfect Buildings Between Groups of Pigs**每批猪出圈后对猪舍进行清洗消毒
- **Use Proper Ventilation, Cooling, & Heating**进行正确地通风、降温和取暖



# PREVENTION & CONTROL OF PRDC

## 猪慢性呼吸道复症的预防和控制

- Proper Nutrition 适当的营养
- Keep Stress To A Minimum 减轻应激
  - Crowding, weaning, transport, change in diet or temperature  
拥挤、断奶、运输、日粮改变、温度改变
- Proper Vaccination Program
- 适当的免疫程序
  - Vaccinate breeding herd for PRRSV, MH, & Other Organisms indicated by herd serum profile
  - 根据血清学检查结果对种猪群进行针对以下疾病的免疫接种：猪繁殖和呼吸综合征(PRRS)、猪肺炎支原体等等。
  - Pre breeding & pre farrowing vaccination program
  - 配种前和分娩前免疫程序
  - Vaccinate nursery & grower pigs for diseases indicated by herd serum profile
  - 根据血清学检查结果对保育和生长猪进行免疫接种



# PRRSV Impact on Disease

## PRRS病毒对疾病的影响

- Horizontal nursery / finisher spread 保育期仔猪/肥育猪的横向传播
  - Possible field contributing factors
    - 促使传播的现场因素
      - Large populations 群体过大
      - Social interaction factors 群内个体间相互影响
      - Poor ventilation control 通风不良
      - Persistent bacterial / virus exposure 持续接触细菌/病毒
      - Compromised / stressed pigs on entry 新入舍猪遭受应激



# Antibiotic Therapy Challenges

## 抗生素治疗

- **PRRSV (nursery / finisher) PRRS 病毒感染**
  - Increased amount of finisher disease???
  - 增加肥育猪的发病???
  - Increased use of antibiotics 增加抗生素的使用
  - Complaint- “antibiotics aren’t working”
  - 抱怨-“抗生素不管用”
    - Must use much longer duration 必须延长使用时间
    - Withdraw antibiotics in frustration 效果不佳时停用  
抗生素



# Summary: Antibiotic use challenges in swine

结语： 抗生素使用挑战养猪业

- Dramatically changed animal “flow” patterns that create nearly naive populations and epidemic disease conditions 生产流程的巨大变化造就几乎完全敏感的群体和容易发生流行病的条件



# Summary: Antibiotic use challenges in swine

结语： 抗生素使用挑战养猪业

- Viral infections that are common in nursery and finishing swine limit antibiotic effectiveness
- 保育期和肥育期中常见的病毒感染可限制抗生素的效用
  - **PRRSV**猪繁殖和呼吸综合征(PRRS)病毒
  - **PCV 2 II**型猪圆环病毒



# Summary: Antibiotic use challenges in swine

结语：抗生素使用挑战养猪业

- Antibiotics appear less effective against bacterial diseases such as *M. hyopneumoniae* during co-infections involving immunosuppressive viruses like PRRSV and possibly PCV2在并发免疫抑制性病毒感染(比如猪繁殖和呼吸综合征病毒，也许还有II型猪圆环病毒)时，抗生素对猪肺炎支原体的疗效不佳

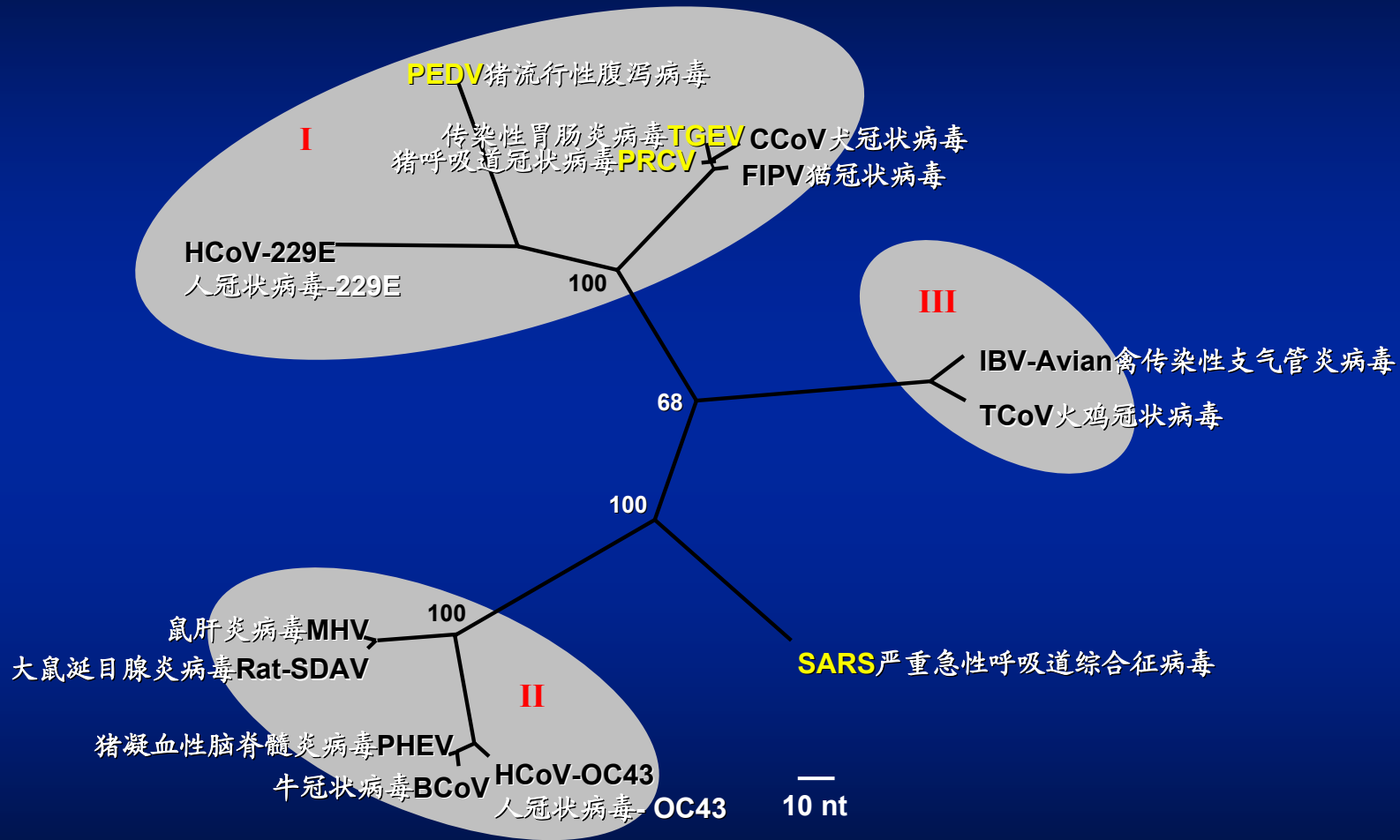


# Transmissible Gastroenteritis Virus (TGEV) and TGE-like Coronaviruses

传染性胃肠炎病毒和  
传染性胃肠炎类冠状病毒



# Coronaviruses 冠状病毒



# TGEV-Clinical Signs

## 传染性胃肠炎临床症状

- Epizootic-Vomiting and Profuse diarrhea in pigs under 2 weeks of age with high morbidity and high mortality (up to 90%)  
Sows also become sick 流行性-2周龄以下仔猪呕吐和严重腹泻，发病率和死亡率都很高(高达90%)，母猪也会发病
- Enzootic-pigs 6 days-2 weeks mild diarrhea with lower mortality (10-20%)  
地方性-6天到2周轻微腹泻，死亡率低(10~20%)



# TGEV-Epidemiology

## 传染性胃肠炎-流行病学

- Seasonal季节性
  - Epizootic-Winter流行性-冬季
  - Enzootic-Year round地方性-周年发生



# TGEV and Porcine Respiratory Coronavirus (PRCV)

## 传染性胃肠炎病毒和猪呼吸道冠状病毒

- PRCV first described in Europe 1986
- 猪呼吸道冠状病毒首次在1986年报告于欧洲
- Large deletion in TGEV protein
- 传染性胃肠炎病毒蛋白质
- High seropositive rate up to 100%
- 血清阳性率高达100%
- Often mixed infection with TGEV
- 常与传染性胃肠炎病毒混合感染



# PRCV

## 猪呼吸道冠状病毒

- **Clinical - inapparent-mild respiratory**
- 临床症状-不明显-轻微的呼吸道症状



# TGE and PRCV

## 传染性胃肠炎和猪呼吸道冠状病毒

- Exposure to PRCV virus results in long-term immunity
- 感染猪呼吸道冠状病毒会产生长期免疫力
- Crossprotects against TGEV- 对传染性胃肠炎有交叉保护力
  - ↓ TGEV Incidence 传染性胃肠炎发病率下降



# TGE-Diagnosis ADRDL

传染性胃肠炎-诊断

动物疾病研究诊断实验室

	#positive 阳性
2004	1
2003	0
2002	0
2001	0
2000	15



# TGEV-Control

## 传染性胃肠炎-防制

- **Natural TGEV infection-long immunity**
- 自然感染传染性胃肠炎病毒-长期免疫力
- **Gilt and Sow vaccination-TGEV**
- 小母猪和母猪免疫接种-传染性胃肠炎
- **somewhat effective- intramammary**
- 有些效果-乳房内
- **PRCV infection-effective cross protection**
- 猪呼吸道冠状病毒感染-有效的交叉保护



# Porcine Epidemic Diarrhea Virus (PEDV)

猪流行性腹泻病毒



# PEDV猪流行性腹泻病毒

- Disease first recognized in the 1970's in Europe 该病首次在七十年代报告于欧洲
- Two Syndromes 二类综合征
  - Porcine Epidemic Diarrhea I- weaned to adult pigs 猪流行性腹泻 I -断奶至成年猪
  - Porcine Epidemic Diarrhea II- also effected nursing pigs 猪流行性腹泻 II -也危害保育期仔猪



# PEDV猪流行性腹泻病毒

- PED I & PED II- associated with high morbidity and low mortality (< 3%)
- 猪流行性腹泻 I 和 II：发病率高，死亡率低(< 3%)
- In Europe, incidence as decreased
- 在欧洲，发病率下降
  - Britain 2% compared to 16% for PRCV-TGEV in 1999 英国1999年2%，猪呼吸道冠状病毒-传染性胃肠炎病毒16%
  - Belgium from 69% in 1986 to 41% 1994
  - 比利时1986年69%，1994年41%



# PEDV猪流行性腹泻病毒

- Emerging Disease-Asia
- 亚洲-正在出现的疾病
  - Korea 2000 韩国2000年
    - Epizootic Form 流行型
      - A seasonal (winter) TGEV like disease
      - 季节性(冬季)类似传染性胃肠炎
      - Nursing pigs up to 7 days of age 对仔猪哺乳至7日龄
      - 95% morbidity and 100% mortality 95%发病, 100%死亡
    - Enzootic Form 地方型
      - Persistent preweaning diarrhea- year round
      - 顽固性断奶前腹泻-周年发生
      - High morbidity 发病率高



# PEDV猪流行性腹泻病毒

- Experimental Vaccine
- 实验性疫苗
  - MLV, oral attenuated PEDV strain CV-77
  - 弱毒活苗，口服猪流行性腹泻病毒CV-77株
  - 100% protection against disease
  - 有100%保护力
  - 50% prevented shedding
  - 50%预防排毒



# Severe Acute Respiratory Syndrome Virus (SARS)

严重急性呼吸道综合征病毒  
(SARS)



# SARS严重急性呼吸道综合征

- **First described in November 2002**
- 首次报告于**2002年11月**
- **Coronavirus or Paramyxovirus (metapneumovirus)**
- 冠状病毒或副粘病毒
- **Started in Guangdong Province**
- 开始于广东省



# Emerging Diseases: Domestic Animals and Wildlife

正在出现的疾病：家畜和野兽



# Emerging Viruses: Wildlife and Domestic Animals

## 新出现的病毒：野兽和家畜

Disease 疾病	Pathogen 病原体	Host 宿主
SARS 严重急性呼吸道综合征	SARSCV 严重急性呼吸道综合征病毒	Human, Palm Civet, Rat?? 人, 果子狸, 大鼠??
Nipah	Nipah virus paramyxovirus Nipah 病毒, 副粘病毒	Human, Swine, Fruit Bat 人, 猪, 果蝠
Flu 流感	Influenza virus orthomyxovirus 流感病毒, 正粘病毒	Human, Swine, Horses, Avian, 人, 猪, 马, 禽



# E.coli in Nursing and Post-Weaning Diarrheas

哺乳期和断奶后腹泻：大肠杆菌



# Enteritis Diagnosis in Young Pigs at the ADRDL

动物疾病研究和诊断实验室：幼猪肠炎的诊断

	<b>Nursing Pigs</b> 哺乳仔猪	<b>Weaning Pigs</b> 断奶猪	<b>E.coli</b> 大肠杆菌	<b>Rota</b> 轮状病毒
<b>2004</b>	<b>98</b>	<b>159</b>	<b>104</b>	<b>40</b>
<b>2003</b>	<b>122</b>	<b>211</b>	<b>161</b>	<b>68</b>
<b>2002</b>	<b>176</b>	<b>251</b>	<b>172</b>	<b>73</b>
<b>2001</b>	<b>162</b>	<b>223</b>	<b>127</b>	<b>114</b>
<b>2000</b>	<b>206</b>	<b>193</b>	<b>97</b>	<b>107</b>

\*Number of E.coli cases includes isolations from both weaned and nursing pigs 大肠杆菌感染病例包括了断奶后和哺乳期的猪



# Clinical signs of E.coli infection in young pigs

## 幼猪大肠杆菌感染的临床症状

- Nursing pigs 哺乳仔猪
  - Profuse watery diarrhea 0-4 days 0 ~ 4日龄明显水泻
  - Dehydration 脱水
- Weaning pigs 断奶猪
  - Diarrhea 1-4 days post-weaning 断奶后1 ~ 4天
  - Sudden death 突然死亡
  - Edema disease (edema of eyelids, nervous signs)
  - 水肿病(眼睑水肿, 神经症状)



# Pathogenesis of E.coli Diarrhea

## 大肠杆菌性腹泻的发病机理

- Attachment- Bacterial pili to cellular receptor
- 附着-菌毛附着于细胞受体
- Enterotoxin production 产生肠毒素



# *E.coli* Characteristics

## 大肠杆菌的特点

- **Nursing** 哺乳期
  - F4, F5, F6 F41 pili (individually or any combination) and STa, STb or LT enterotoxins **F4、F5、F6和F41菌毛 (单独或任一组合)以及Sta、STb或LT肠毒素**
- **Postweaning** 断奶后
  - F4 pilus and LT and STb enterotoxins
  - **F4菌毛以及LT和STb肠毒素**
  - F18 pilus and STa, STb and STX2e enterotoxins
  - **F18菌毛以及STa、STb和STX2e肠毒素**



# Weaning E.coli-Changing Patterns 1998-2000

## 断奶猪大肠杆菌性腹泻-病状的变化1998 ~ 2000

- Pilus types-F4 59%,F18 31%,Untypable 10%
- 菌毛型-F4 59%， F18 31%， 未分型10%
- Abnormal Enterotoxin Patterns- F4 13%, F18 60%异常肠毒素型-F4 13%， F18 60%



# E.coli Control-Antibiotics

## 大肠杆菌性腹泻-抗生素应用

- **Treatment**治疗
  - Oral口服
  - Injectable注射
- **Prophylactic**预防
  - Oral口服
- **Resistance Develops Quickly - Eliminate Underlying Cause**
- 抵抗力产生迅速-驱除主要病因



# E.coli Control-Environment

## 大肠杆菌性腹泻的防制-环境

- **Underventilated- Tube ventilation-Dead spots**通风不良-管道通风-死角
- **Overventilated-Drafts**通风过渡-贼风
- **Improper location of heat sensors-pig area**温度传感器位置不当-猪生活区



# E.coli Prevention-Vaccines

## 大肠杆菌性腹泻的预防-疫苗

- **Nursing pigs** 哺乳仔猪
  - Gilt and Sow vaccination-highly effective 母猪免疫接种-高度有效
- **Post Weaning** 断奶后
  - Sow vaccination- ineffective 母猪免疫接种-无效
  - Young pig vaccination 幼猪免疫接种
    - IM or SC are not effective 肌肉注射或皮下注射无效
    - Oral 口服
      - Live fimbriated E.coli 有菌毛的活大肠杆菌
      - Subunit purified E.coli fimbriae 提纯的亚单位大肠杆菌菌毛



# Pseudorabies Virus (PRV)

伪狂犬病病毒



# PRV-Clinical Signs

## 伪狂犬病-临床症状

- **Nursing pigs-CNS signs tremors, dog-sitting, diarrhea and vomiting- mortality >90%** 哺乳仔猪- 中枢神经系统症状: 震颤、犬坐式、腹泻和呕吐, 死亡率>90%
- **Weaned pigs-Some CNS, some respiratory disease- mortality <50%** 断奶猪: 一定程度中枢神经系统症状, 一定程度的呼吸道疾病, 死亡率<50%
- **Grower-Finisher-respiratory, sneezing and pneumonia, morbidity>95%, mortality 1-2%** 生长肥育猪: 呼吸道症状, 喷嚏和肺炎, 发病率>95%, 死亡率1~2%

**Adult- pregnant sows-abortion, respiratory signs** 成年猪-怀孕母猪: 流产, 呼吸道症状



# PRV-Prevention & Control

## 伪狂犬病-预防和控制

- PRV Marker Vaccines- Serological Testing differentiate vaccinated animals from natural infections 伪狂犬病标记疫苗-用血清学试验区分免疫动物和自然感染动物
- Quarantine, test and slaughter-US Eradication Program 检疫、检测和屠宰-美国的根治方案



# PRV-Control Eradication in US

## 美国对伪狂犬病的控制和根治

Year年份	# of states PRV-free无伪狂犬病的州(个数)
1993	3
1994	4
1995	5
1996	8
1997	5
1998	2
1999	2
2000	8
2001	1
2002	3
2003	5
2004	4



# PRV-Serology ADRDL

伪狂犬病血清学试验

动物疾病研究和诊断实验室

	#positive 阳性数	Total 总数
2004	84 (.4%)	20,673
2003	143(.3%)	40,875
2002	265 (.5%)	49,621
2001	2124 (3.4%)	60,864
2000	1869 (2.9%)	64,785



