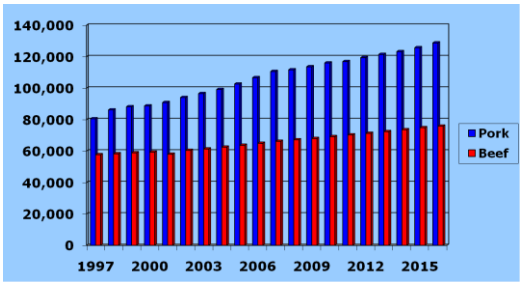
미국의 양돈 현황과 최근 질병동향

한국양돈연구회 포럼
2010년 7 월 7일

윤경진, DVM, PhD, DACVM
교수 및 바이러스과 과장
수의진단및산업동물의학과
아이오와 주립대학교



Global Beef & Pork Consumption Growth



Source: OECD/FAO Agricultural Outlook 2007, Thousand metric tons

Swine Industry Transition

1970's → Raising Hogs

Today → Producing *food products* which meet specific preferences



→



Consumer-Driven Industry

- Diet/Health Concerns
- Nutritional Value
- Food Safety/Public Health
- Animal Welfare
- Environmental Concerns



Symbol III – Today's Ideal Pig

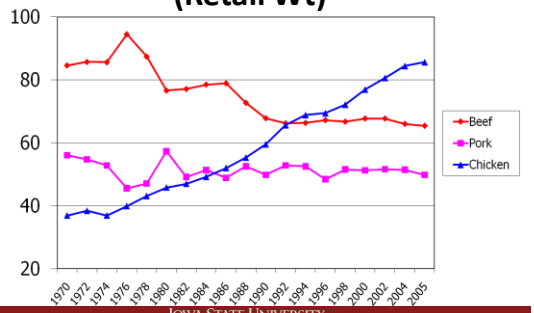


Top Pork Producing Countries - 2009
(Carcass Weight Equivalent)

Country	1,000 Metric Tons
China	48,500
EU-27	22,000
United States	10,446
Brazil	3,123
Russian Federation	2,205
Vietnam	1,850
Canada	1,790
Japan	1,285
Philippines	1,225
Mexico	1,150

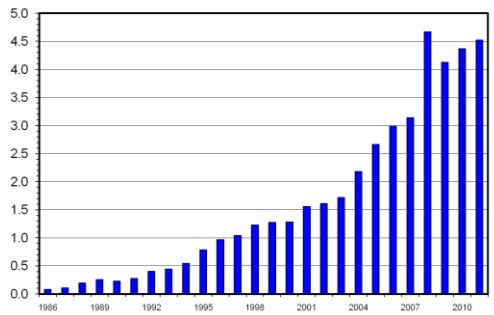
Source: USDA/FAS

U.S. Per Capita Consumption (Retail Wt)

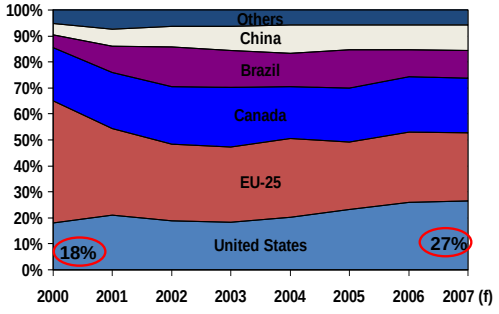


Data Source: USDA-ERS & FAS; Compiled & Forecasts by LMIC

U. S. PORK EXPORTS
Carcass Weight, Annual

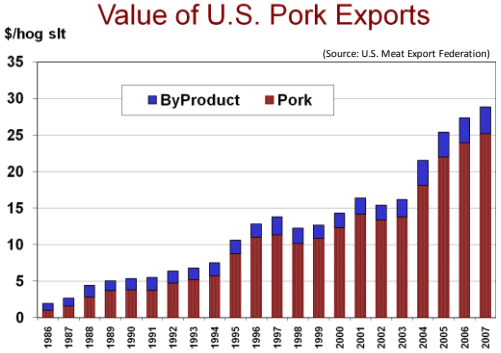


U.S. Now Has Over 27% Share of World Pork Exports



Source: USDA

Value of U.S. Pork Exports



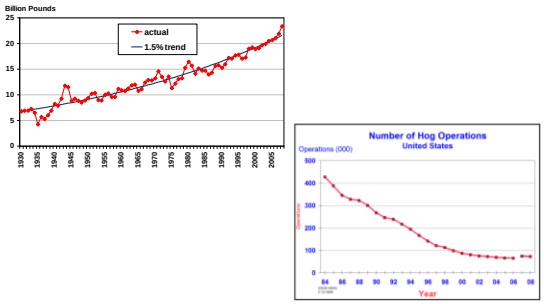
Production Goals of Large U.S. Producers

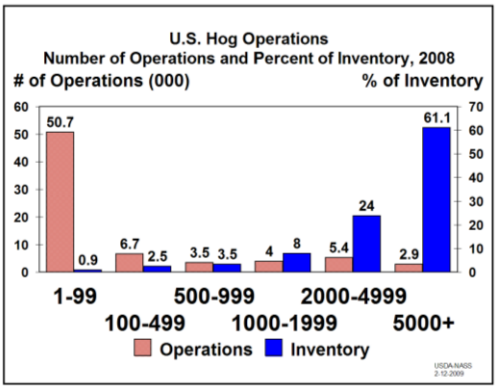
- Yearly Average - Some Units/Periods Better
  - 2.4 litters per year – 25-27 pigs/sow/year
  - Farrowing rate: 85-90%
  - Born alive: 13.0
  - Weaned/litter: 11.0
  - 21 days - 14 lb (6.4 kg)
  - 1.7 lb (0.77 kg) daily gain from weaning to market
  - 2.35 feed efficiency

Trends changing US swine industry

- Fewer & Bigger Hog Farms
- Improved Herd Performance
- Specialization
- Geographic Shift in Production
- Integration of Production & Packing
- Integration of Packing & Processing
- Contracting
- Globalization
- Niche/Alternative Markets
- Continued Improvements in Technology

U.S. Pork Production Trend





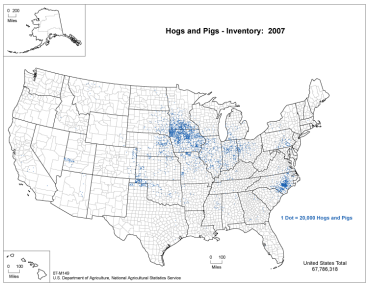
U.S. Pork Powerhouses

Company	2008	2007
Smithfield Foods, VA	1,020,000	1,027,000
Triumph Foods, MO	396,000	403,700
Seaboard Foods, KS	213,600	213,600
Iowa Select Farms, IA	160,000	150,000
Pipestone System, MN	143,600	135,600
Prestage Farms, NC	140,000	142,000
The Maschhoffs, IL	130,000	115,000
Cargill, MN	116,000	107,000
Maxwell Foods, NC	87,000	85,000
AMVC Management, IA	82,000	95,000

Economies of Size Drives Farms to Get Bigger

- For most U.S. hog farms, getting bigger means they may have the opportunity to:
  - Buy lower
  - Sell higher
  - Be more efficient

Swine Operations in U.S.

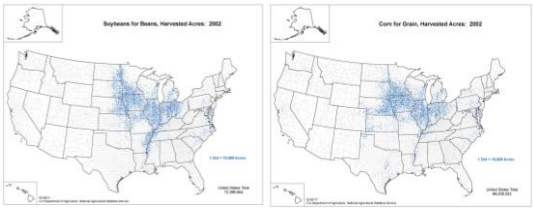


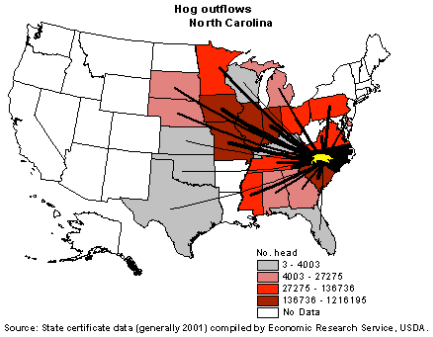
Market Hog Inventory (Dec. 1, '09)

Rank	State	Market Inventory (1,000 head)
1	IA	18,280
2	NC	8,770
3	MN	6,840
4	IL	3,870
5	IN	3,370
6	NE	2,780
7	MO	2,740
8	OK	1,900
9	OH	1,855
10	KS	1,630
Total	U.S.	59,957

Pigs are produced near corn and soy production

Soybean production **Corn production**

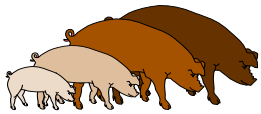


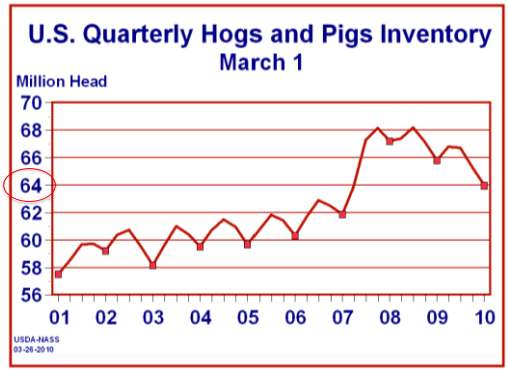


Source: State certificate data (generally 2001) compiled by Economic Research Service, USDA.

Production Efficiency

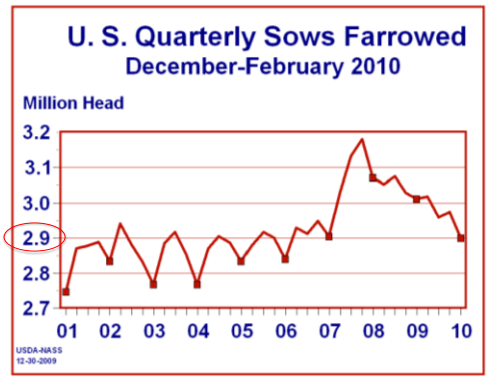
Since 1930, the U.S. has reduced sow inventory by 42% and increased annual pork production by 221%



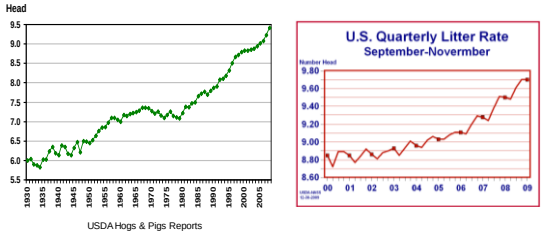


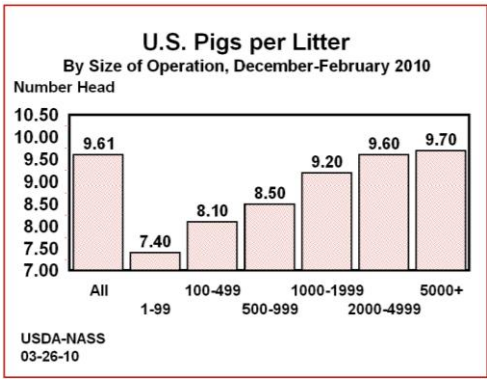
	2009	2010
Inventory:		
All hogs and pigs	66.8*	64.4
Breeding pigs	6.0	5.8
Market hogs	60.8	58.6
Market hogs and pigs by Wt group (lb):		
<50	19.6	18.9
50-119	17.8	16.9
120-179	12.6	12.3
≥ 180	10.8	10.6

* unit: millions as of 6/1/2010

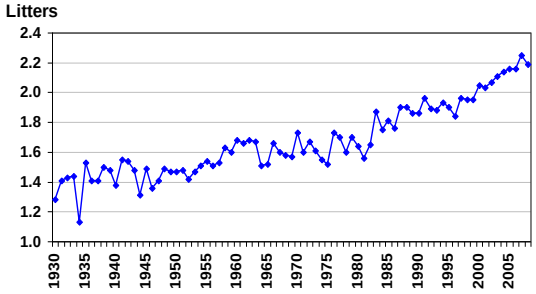


Pigs Per Litter, 1930-2009



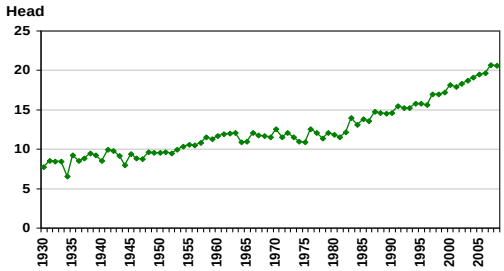


Litters Per Sow Per Year, 1930-2008

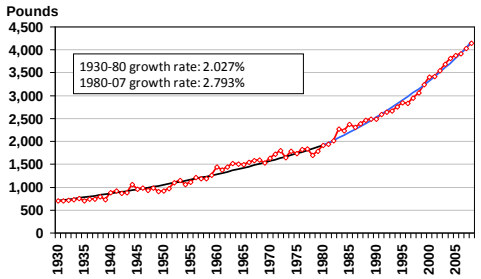


Pigs Per Sow Per Year, 1930-2008

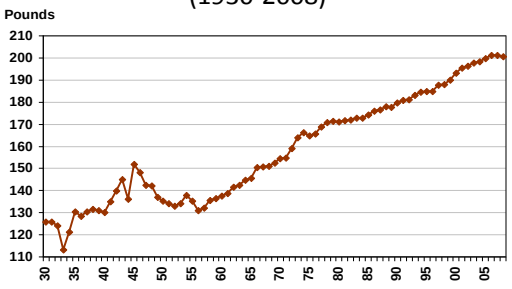
USDA Hogs & Pigs Reports



Annual U.S. Pork Production Per Sow, 1930-2008

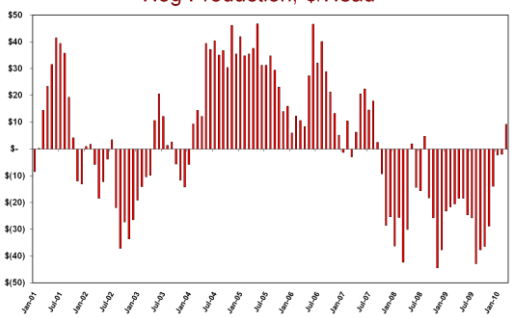


Average U.S. Hog Carcass Weight
(1930-2008)





Estimated Returns to Farrow to Finish
Hog Production, $/Head



Source: ISU Extension

Prediction of hog price

(carcass per hundred weight)

- Western Cornbelt market
  - $75.00 for 3rd Q 2010
  - $62.75 for 4th Q 2010
  - $64.75 for 1st Q 2011
- Iowa/Southern Minnesota market
  - $71 .0 for 3rd Q 2010
  - $67.5 for 4th Q 2010
  - $70.0 for 1st Q 2011
- Eastern Cornbelt market
  - $78 for 3rd Q 2010
  - $68 for 4th Q 2010
  - $69 for 1st Q 2011

Current Issues and Topics

- Housing -- use of gestation stalls
- Corn prices – ethanol demand for corn
- Environmental regulations
- Profitability
- Pork quality
- Quality assurance programs
- Welfare





Housing Options





Gestation Stalls

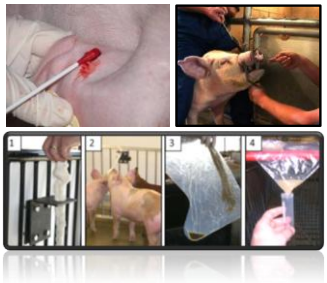
- January 2007 – Smithfield Foods announced that they would phase out gestation crates from their farms within 10 years
- Six states have banned gestation stalls
  - More are in discussion
- Burger King – Will buy >10% of pork from suppliers that do not use crates
  - 2% of eggs from "cage-free" suppliers
- Producers are considering options

Blood collection

- Ante-mortem sample for agent and/or antibody
  - Typically collected via venapuncture (jugular vein)
  - Animal welfare and personnel safety
- Desire for less invasive and/or easy-to-use sampling methods
  - Methods may vary based on purpose/need
    - Acute vs chronic
    - Monitoring vs diagnosis



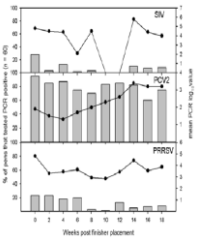
Examples of alternative sampling



- Ear vein bleeding
- Ocular bleeding
- Tail bleeding
- Scraping
- Air sampling
- Oral fluid

Oral fluid testing

- Prognostic profiling
  - For monitoring the circulation of pathogens with the goal to forecast the health
  - Oral fluids are quick, easy, and inexpensive
  - Prognostic profiling is NOT a diagnostic procedure
- Oral fluid contains
  - Pathogens and antibodies
- Tests
  - PCR: PRRSV, PCV2, SIV, bacteria
  - Serology: PRRSV ELISA





TEGO™ Animal Blood Collection kit



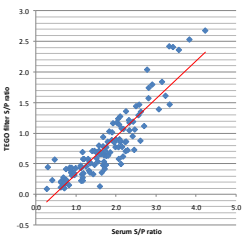
Comparison of test results between serum and TEGO sample

PRRS RT-PCR

		Serum	
		Pos	Neg
Filter	Pos	45	1
	Neg	3	191

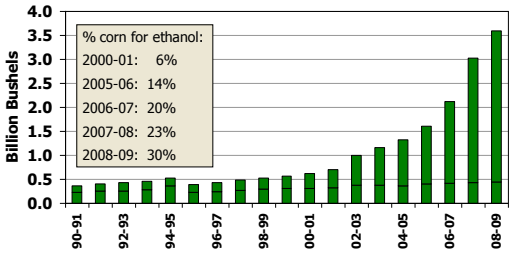
Agreement = 98.3%
Specificity = 99.5%
Sensitivity = 93.8%

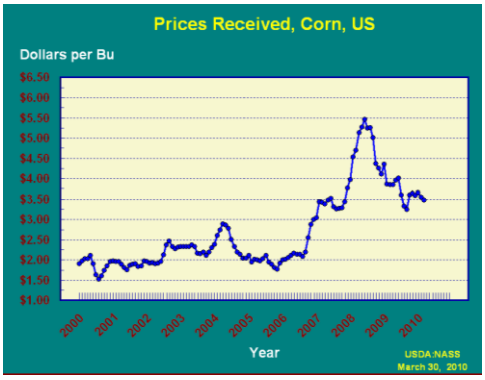
PRRS ELISA



$Y = 0.62X - 0.29$ ($R^2 = 0.81$)

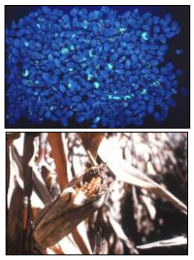
Corn Milled for Ethanol





Issues/Concerns

- Corn price for production
- Consumption of DGSS
- Wet feed storage
  - Mycotoxin



Mycotoxin-related diseases

(Courtesy of Dr. Gary Osweiler)









Environmental Regulations



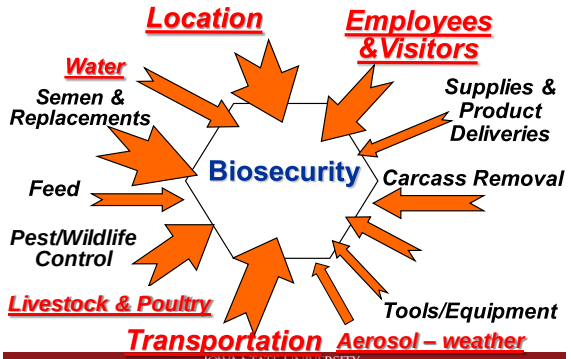
Nutrient Management Programs

- Treat manure as an asset for crop production
- Returns valuable nutrients back to the soil
- Reduces need for commercial fertilizers
- Reduces negative effects on the environment





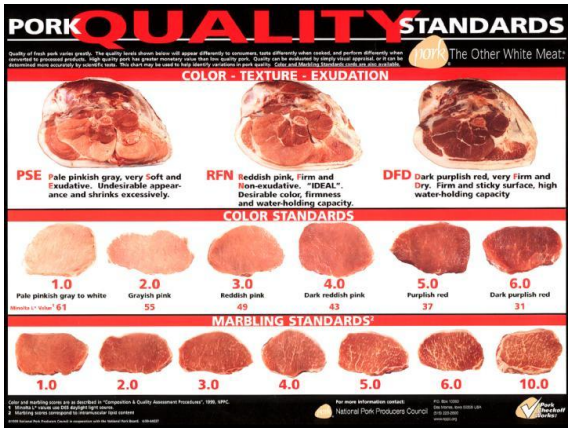
Biosecurity Considerations



Source: Dr. Bake

What's Next?





Quality Assurance Programs

- PQA Plus
  - Food safety and animal well-being
  - 10 Good Production Practices
  - On-farm assessments
  - Certification required by packers
- Transport Quality Assurance
  - Designed for transporters, producers, handlers
  - Focuses on transportation, loading, unloading
  - Understand effect on pig well-being and pork quality

TQA™ A quality assurance program for transporters, producers, and handlers of pigs.

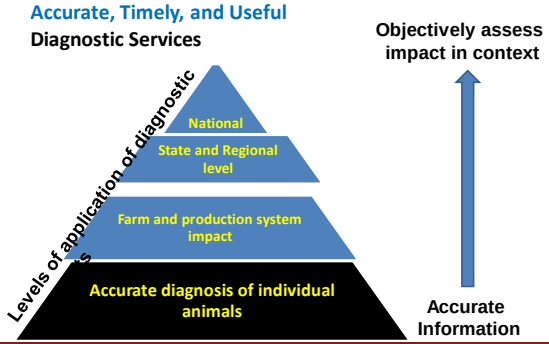


Today's U.S. Pork Industry

- Production is in relatively few hands
- Contracting is common practice
- Margins can be very small
- Risk is much greater
- Exports are integral part of production
- Technology is essential to reduce cost of production
- Welfare and environmental concerns are common



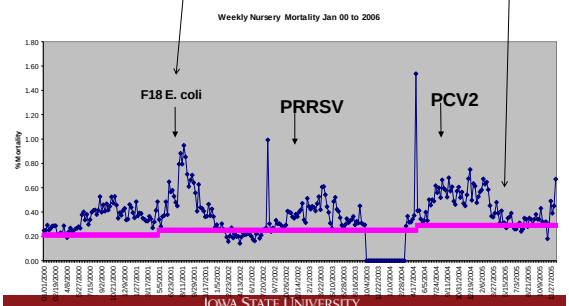
There is value in Accurate, Timely, and Useful Diagnostic Services



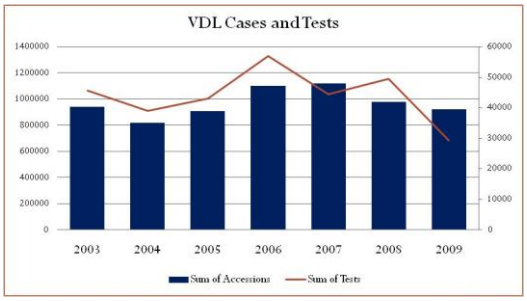
Combine Production Data and Disease Data

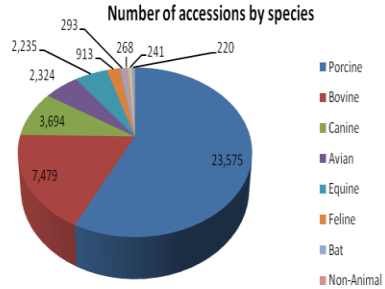
Assess Impact of Disease

Assess Impact of Interventions

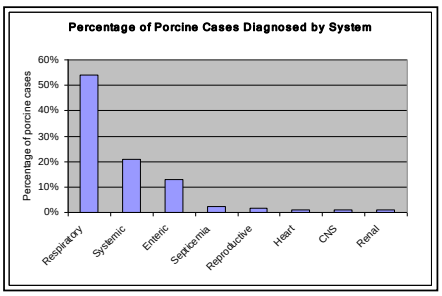


ISUVDL Dx case summary



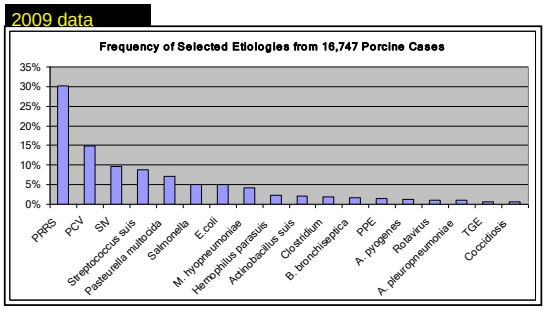


ISUVDL Dx case summary (cont'd)

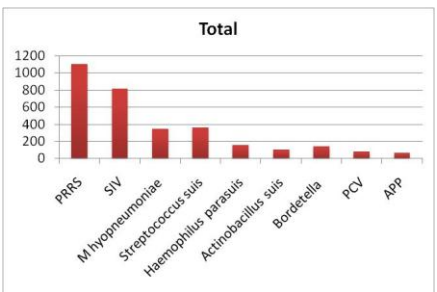


Frequency of Etiologic Diagnoses

2009 data

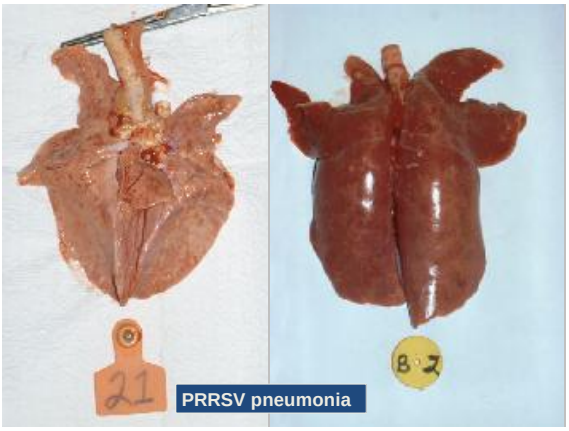


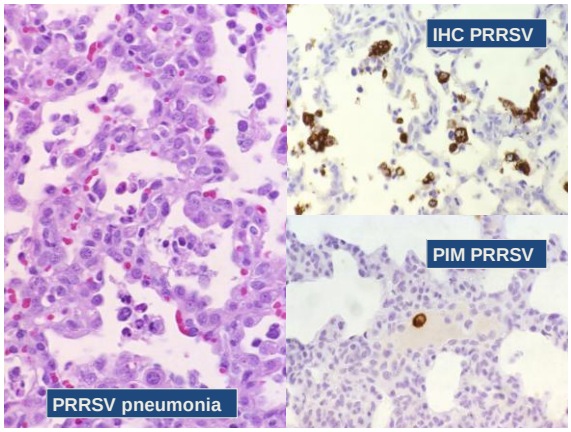
Pignostics – Respiratory Disease

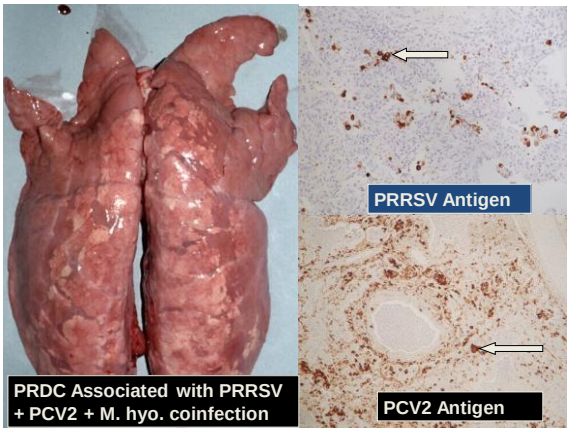


PRRSV

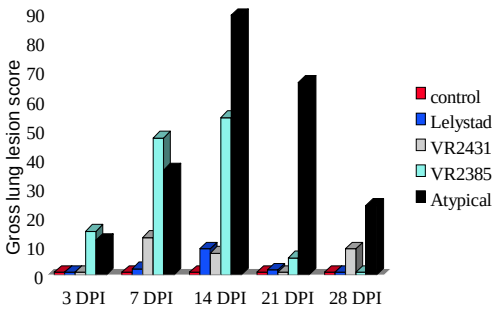
- Many farms in US are subclinically infected
  - 65-70% seropositive
  - NA (80-85%) versus EU (15-20%) types
- Clinical presentations:
  - Sows: resp., reproductive (abortions, stillborn, weakborn, mummified fetuses), infertility
  - Neonates/nurseries: resp., enteric, CNS disease
  - Grow-Finishers:
    - can be subclinical if uncomplicated
    - facilitates other resp. and systemic diseases
      - M hyo, PM, Salmonella, APP, SS, HPS
      - SIV, PRV, PCV2, PRCV



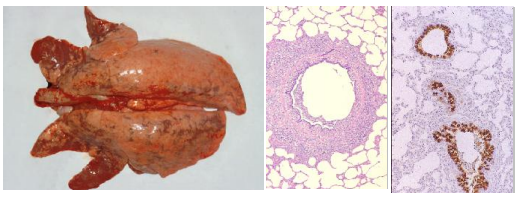




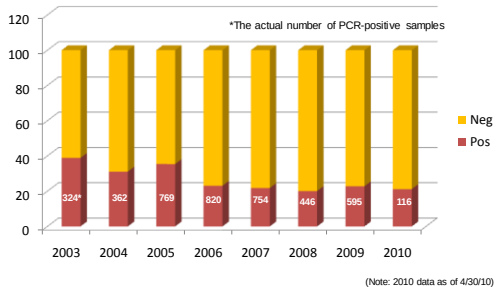
PRRSV-Induced Pneumonia



SIV pneumonia

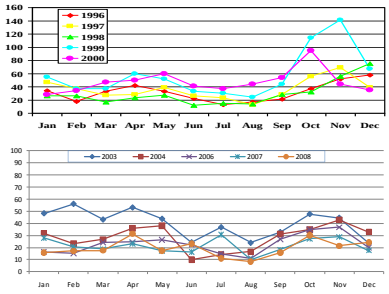


SIV Epidemiology in Iowa:
Annual incidence (%)

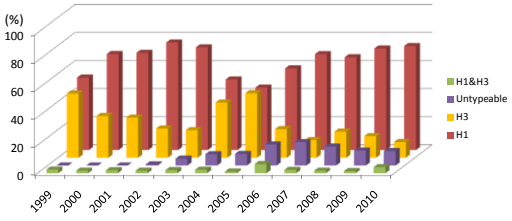


(Note: 2010 data as of 4/30/10)

Seasonality of influenza

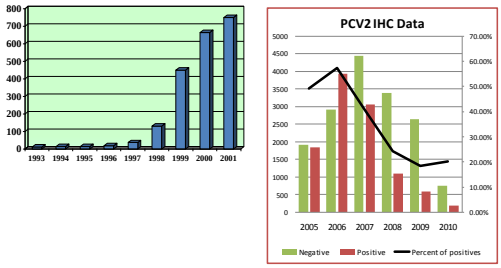


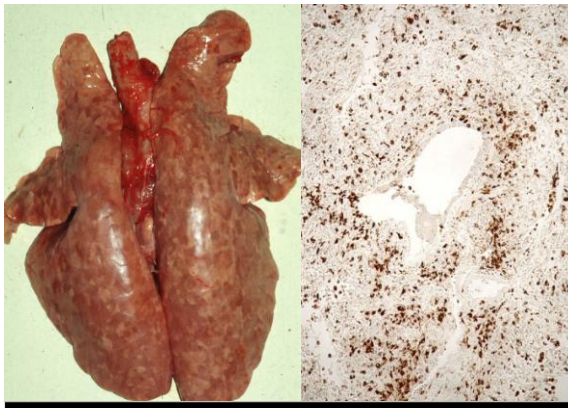
SIV Epidemiology in Iowa:
Prevalence of subtypes over time



(Note: 2010 data as of 4/30/10)

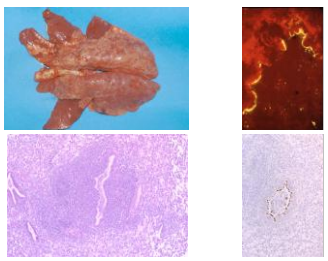
Trend in PCVAD at ISUVDL





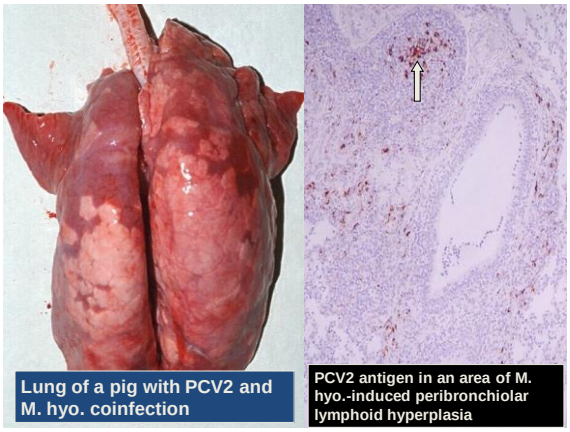
Severe U.S. field case of PCV2-associated interstitial pneumonia

M. hyo pneumonia



M. hyopneumoniae and PRRSV

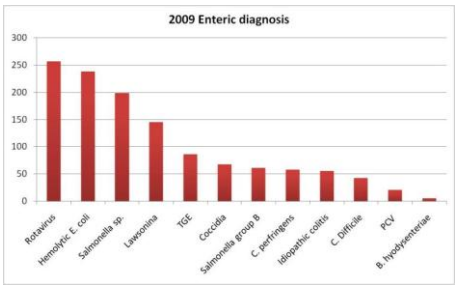




Lung of a pig with PCV2 and M. hyo. coinfection

PCV2 antigen in an area of M. hyo.-induced peribronchiolar lymphoid hyperplasia

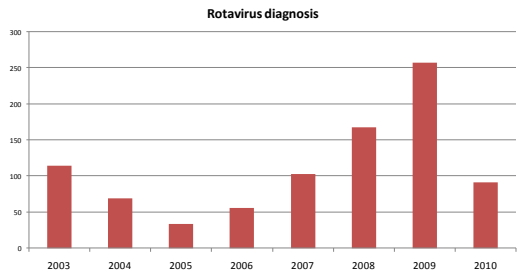
Pignostics – Enteric Disease



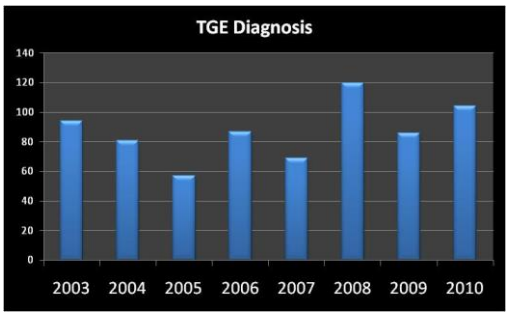
Suckling pig diarrhea

Agent	2007	2001	1988
Rota	25%	13%	8%
C. difficile	36%	27%	??
PRRSV	13%	12%	??
TGE	4%	9%	26%
E. coli	14%	19%	26%
C. perf C	3%	5%	18%
C. perf A	47% ??	82% ??	??

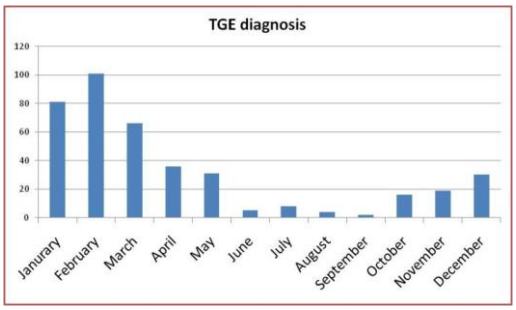
Pignostics - Rotavirus



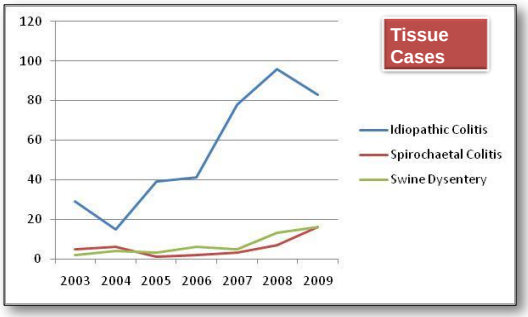
Pignostics - TGE



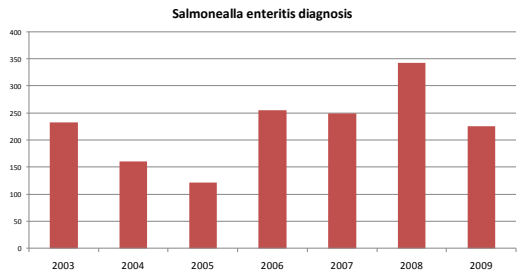
Pignostics - TGE



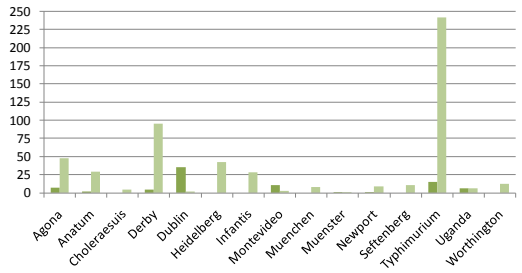
Pignostics - Colitis



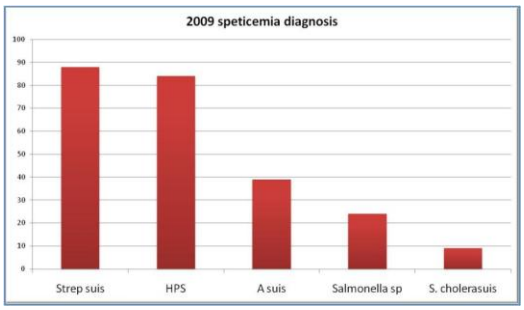
Pignostics – enteritis/colitis



Pignostics – enteritis/colitis



Pignostics – Septicemia/Systemic infection



Acknolwedgement

- Dr. Tom Baas, Department of Animal Science
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