



미국의 양돈 현황과 최근 질병동향

한국양돈연구회 포럼
2010년 7월 7일

윤경진, DVM, PhD, DACVM

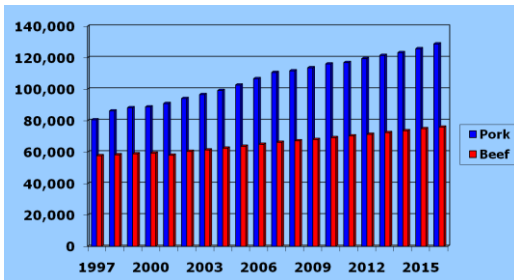
교수 및 바이러스과 과장
수의진단및산업동물의학과
아이오와 주립대학교

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Global Beef & Pork Consumption Growth



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

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Swine Industry Transition

1970's ➡ Raising Hogs

Today ➡ Producing food products which meet specific preferences



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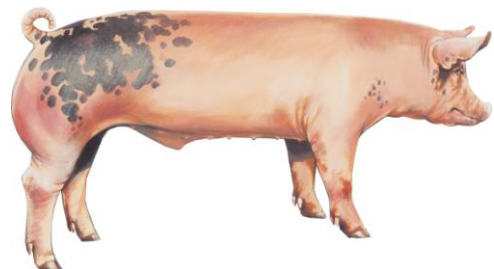
Consumer-Driven Industry

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



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Symbol III – Today's Ideal Pig



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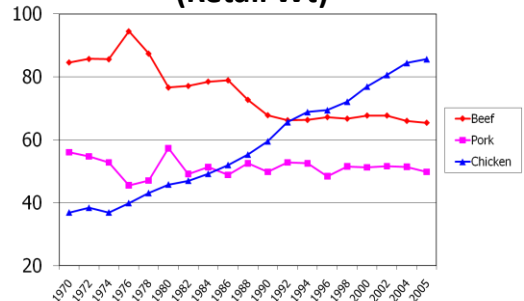
Top Pork Producing Countries - 2009 (Carcass Weight Equivalent)

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

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Source: USDA/FAS

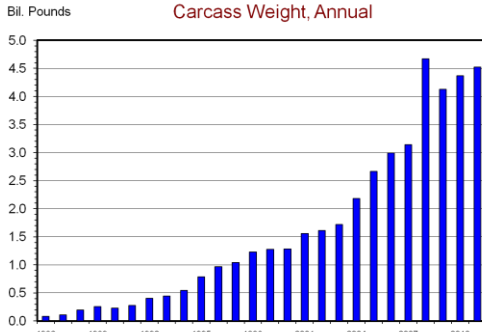
U.S. Per Capita Consumption (Retail Wt)



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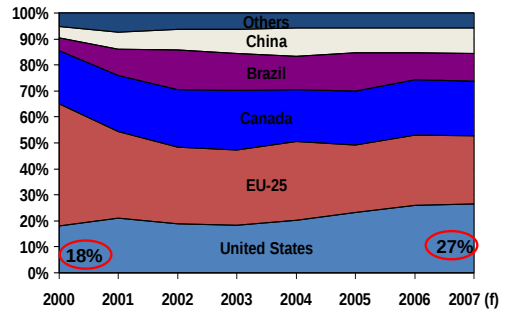
Data Source: USDA-ERS & FAS; Compiled & Forecasts by LMIC

U. S. PORK EXPORTS Carcass Weight, Annual



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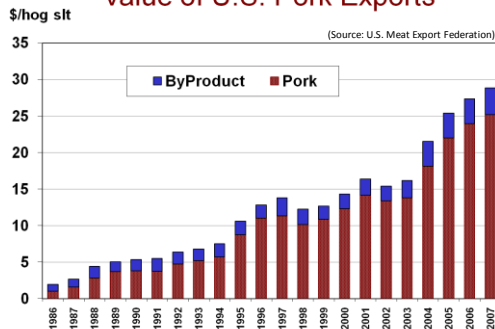
U.S. Now Has Over 27% Share of World Pork Exports



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Source: USDA

Value of U.S. Pork Exports



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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

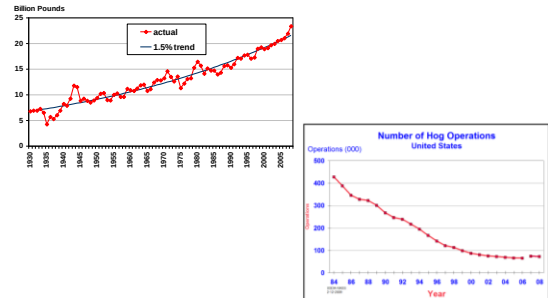
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Trends changing US swine industry

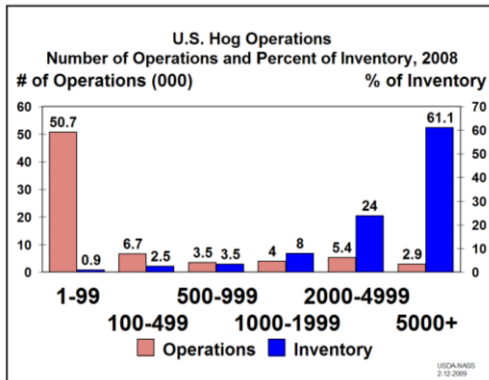
- Fewer & Bigger Hog Farms
- Improved Herd Performance
- Specialization
- Geographic Shift in Production
- Integration of Production & Packing
- Integration of Packing & Processing
- Contracting
- Globalization
- Niche/Alternative Markets
- Continued Improvements in Technology

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U.S. Pork Production Trend



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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

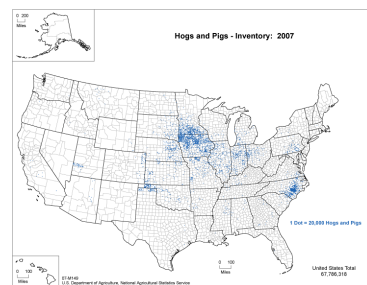
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Economies of Size Drives Farms to Get Bigger

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

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Swine Operations in U.S.



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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

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Pigs are produced near corn and soy production

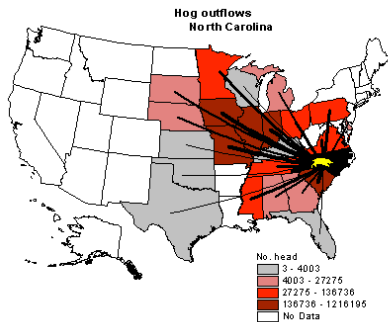
Soybean production



Corn production



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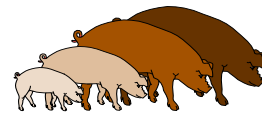


Source: State certificate data (generally 2001) compiled by Economic Research Service, USDA.

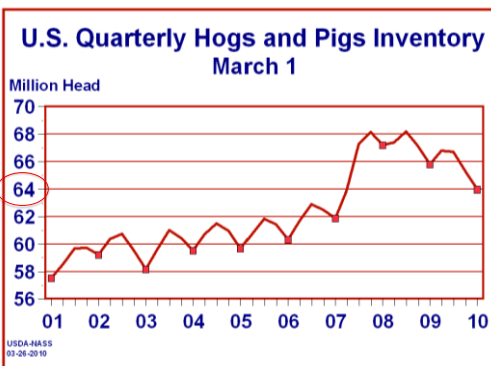
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Production Efficiency

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



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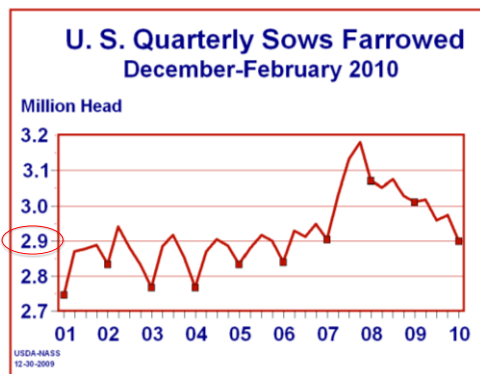


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	2009	2010
Inventory:		
All hogs and pigs	66.8*	64.4
Breeding pigs	6.0	5.8
Market hogs	60.8	58.6
Market hogs and pigs by Wt group (lb):		
<50	19.6	18.9
50-119	17.8	16.9
120-179	12.6	12.3
≥ 180	10.8	10.6

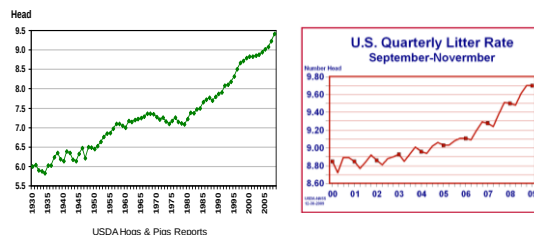
* unit: millions as of 6/1/2010

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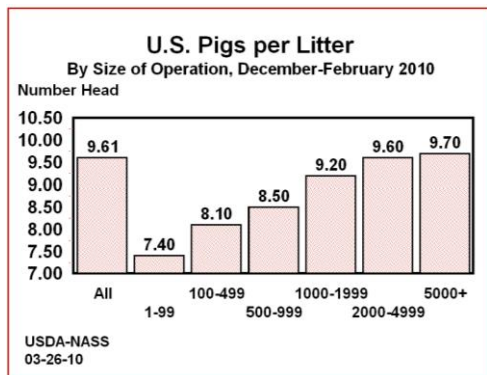


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Pigs Per Litter, 1930-2009

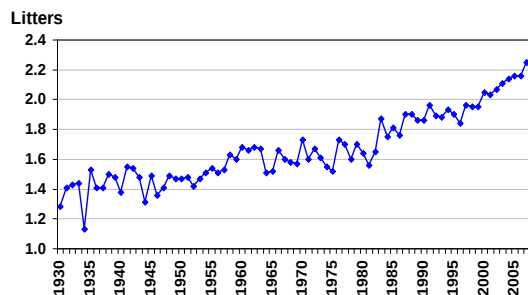


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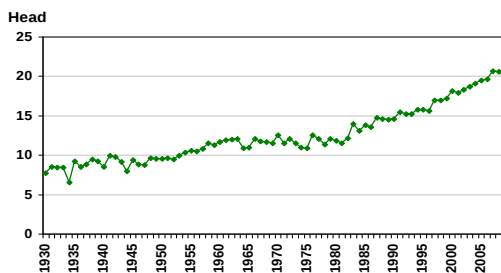
Litters Per Sow Per Year, 1930-2008



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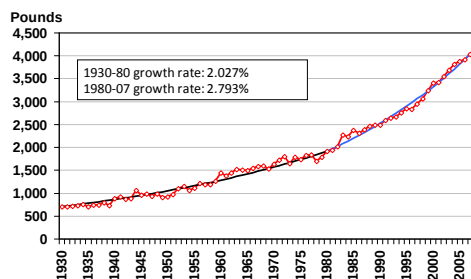
Pigs Per Sow Per Year, 1930-2008

USDA Hogs & Pigs Reports



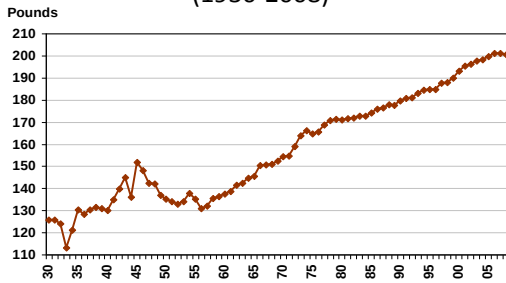
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Annual U.S. Pork Production Per Sow, 1930-2008



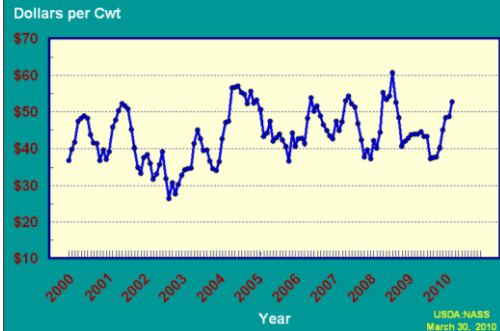
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Average U.S. Hog Carcass Weight (1930-2008)



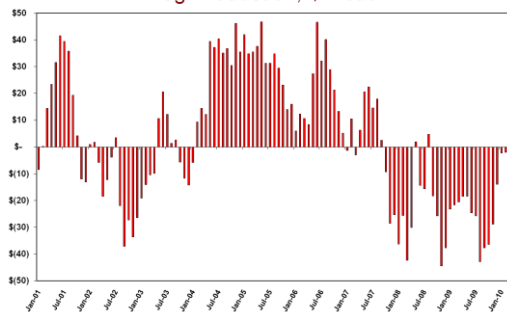
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Prices Received, Hogs, US



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



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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

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Current Issues and Topics

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

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Housing Options



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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

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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



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Examples of alternative sampling

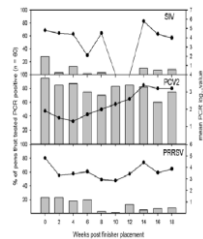


- Ear vein bleeding
- Ocular bleeding
- Tail bleeding
- Scraping
- Air sampling
- Oral fluid

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Oral fluid testing

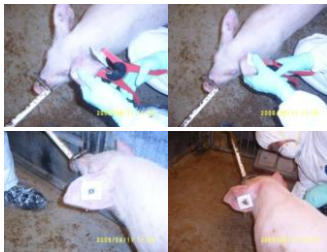
- Prognostic profiling
 - For monitoring the circulation of pathogens with the goal to forecast the health
 - Oral fluids are quick, easy, and inexpensive
 - Prognostic profiling is NOT a diagnostic procedure
- Oral fluid contains
 - Pathogens and antibodies
- Tests
 - PCR: PRRSV, PCV2, SIV, bacteria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



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TEGO™ Animal Blood Collection kit



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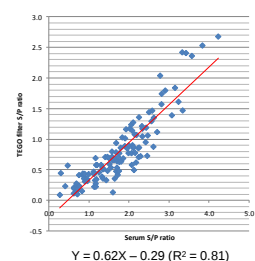
Comparison of test results between serum and TEGO sample

PRRS RT-PCR

		Serum	
		Pos	Neg
Filter	Pos	45	1
	Neg	3	191

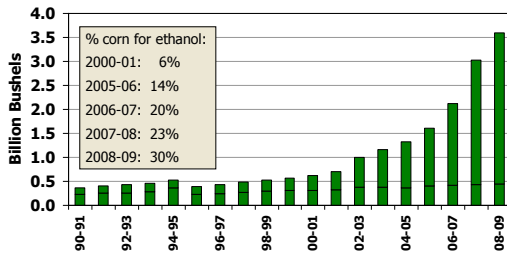
Agreement = 98.3%
Specificity = 99.5%
Sensitivity = 93.8%

PRRS ELISA



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Corn Milled for Ethanol



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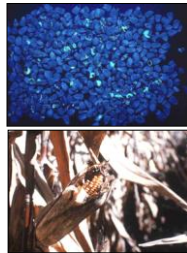
Prices Received, Corn, US



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Issues/Concerns

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



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Mycotoxin-related diseases

(Courtesy of Dr. Gary Osweiler)



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Environmental Regulations



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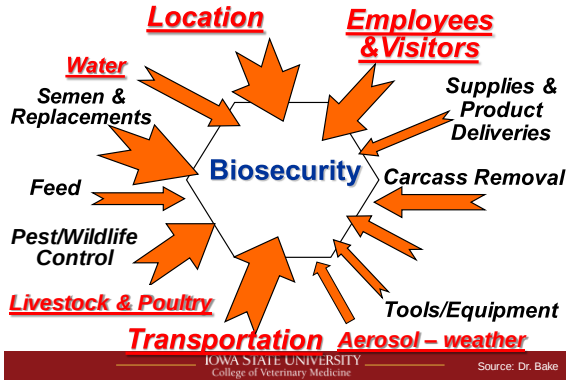
Nutrient Management Programs

- 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



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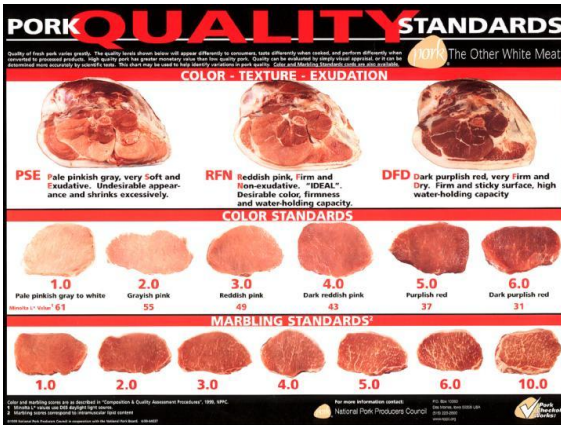
Biosecurity Considerations



What's Next?



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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.



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Today's U.S. Pork Industry

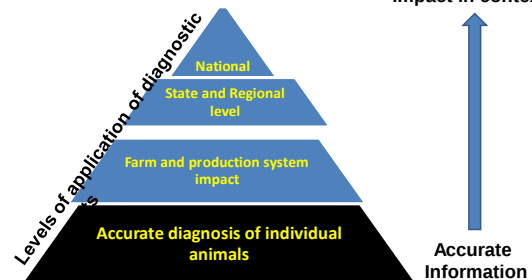
- Production is in relatively few hands
- Contracting is common practice
- Margins can be very small
- Risk is much greater
- Exports are integral part of production
- Technology is essential to reduce cost of production
- Welfare and environmental concerns are common



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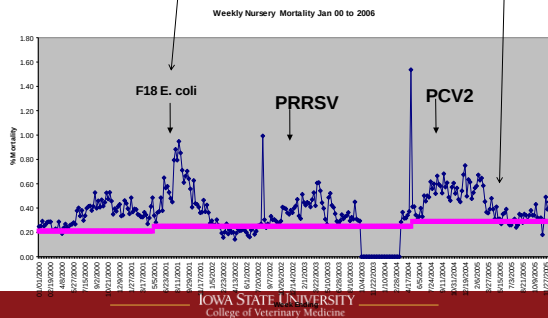
There is **value** in
Accurate, Timely, and Useful
Diagnostic Services

Objectively assess
impact in context

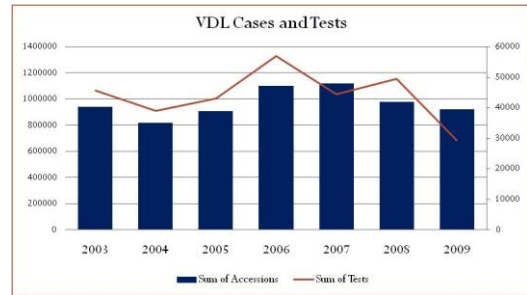


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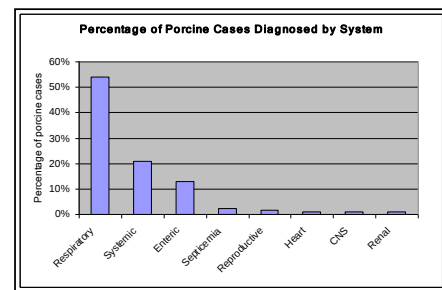
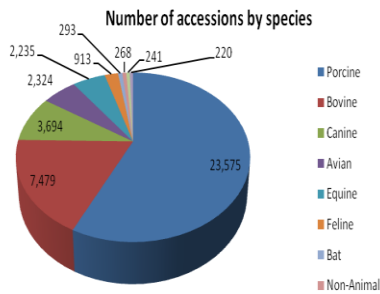
Combine Production Data and Disease Data
Assess Impact of Disease
Assess Impact of Interventions



ISUVDL Dx case summary

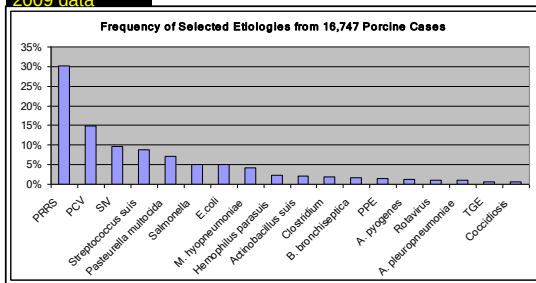


ISUVDL Dx case summary (cont'd)

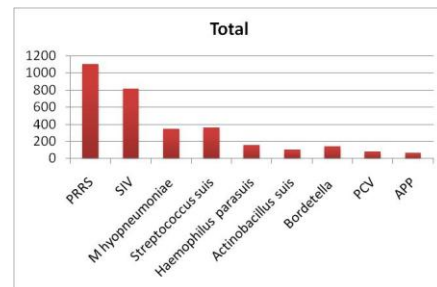


Frequency of Etiologic Diagnoses

2009 data



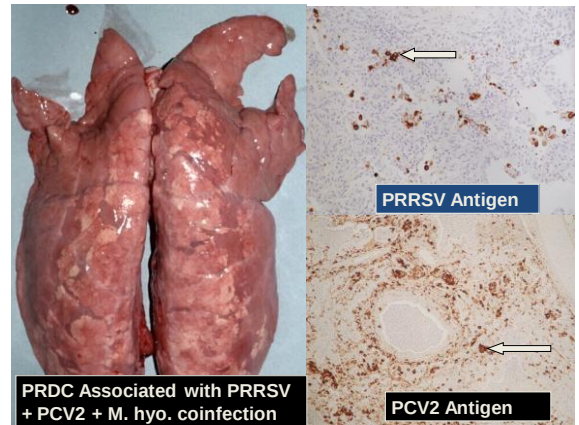
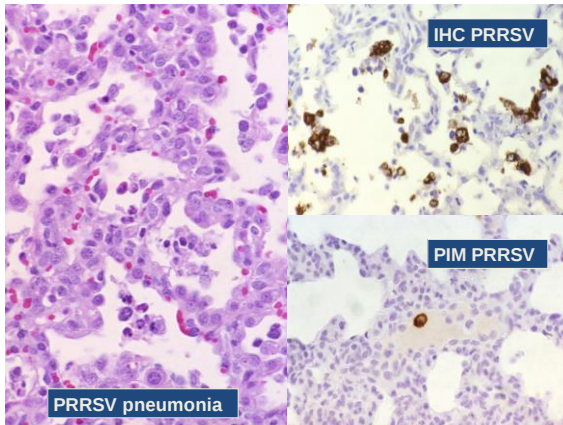
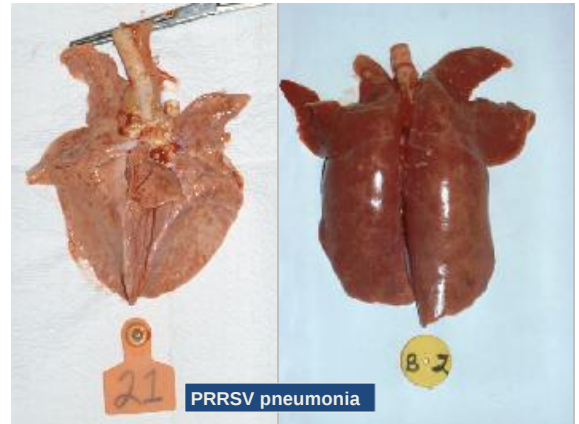
Pignostics – Respiratory Disease



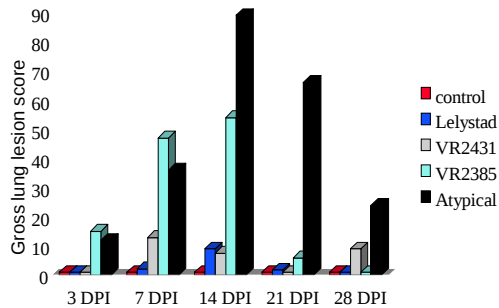
PRRSV

- 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

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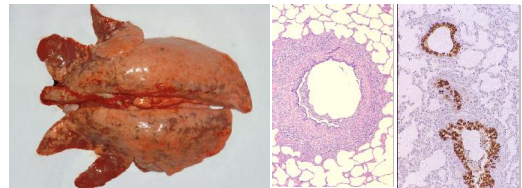


PRRSV-Induced Pneumonia



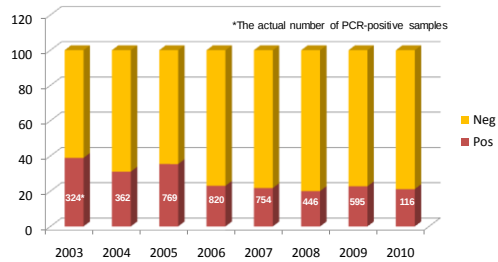
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SIV pneumonia



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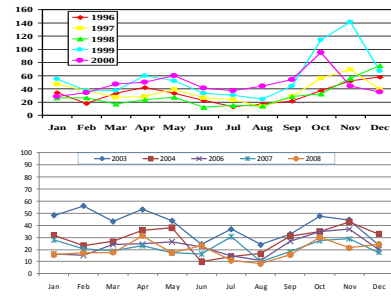
SIV Epidemiology in Iowa: Annual incidence (%)



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

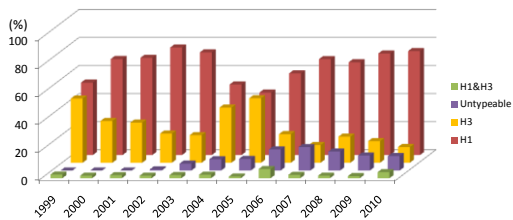
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Seasonality of influenza



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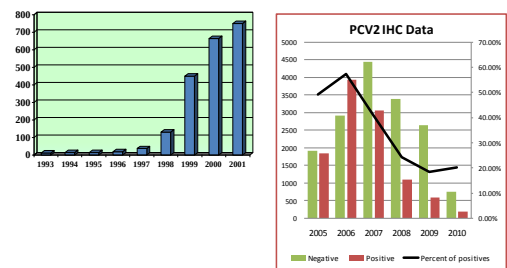
SIV Epidemiology in Iowa: Prevalence of subtypes over time



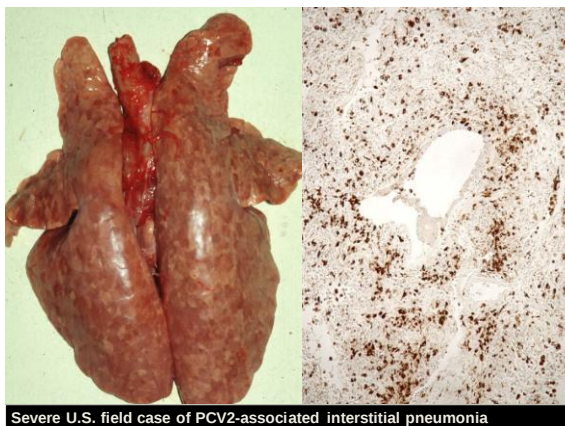
(Note: 2010 data as of 4/30/10)

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Trend in PCVAD at ISUVDL

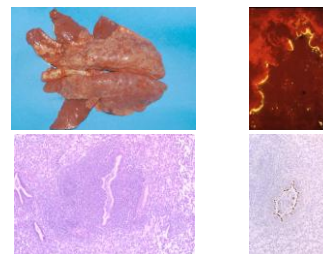


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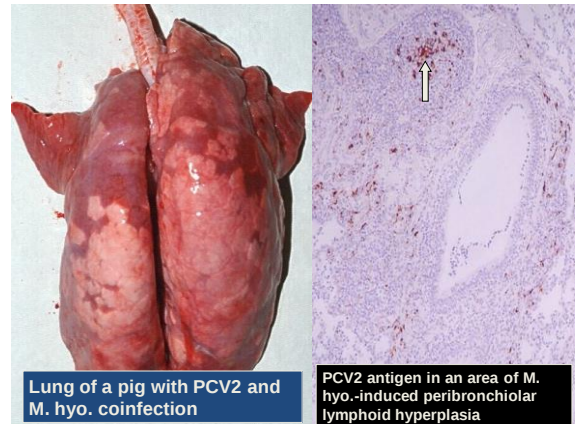
Severe U.S. field case of PCV2-associated interstitial pneumonia

M. hyo pneumonia



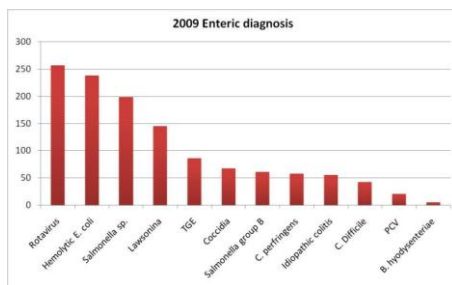
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M. hyopneumoniae and PRRSV



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Pignostics – Enteric Disease



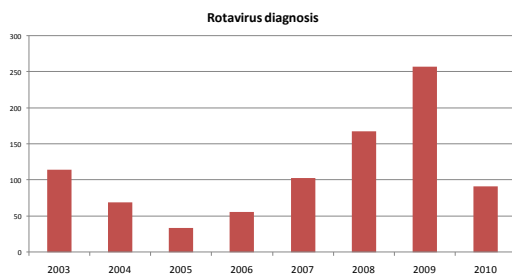
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Suckling pig diarrhea

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

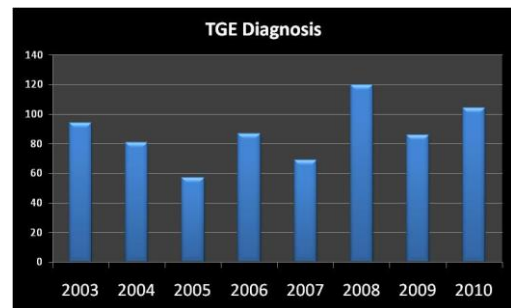
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Pignostics - Rotavirus



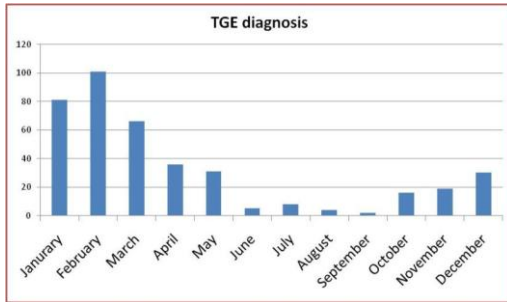
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Pignostics - TGE



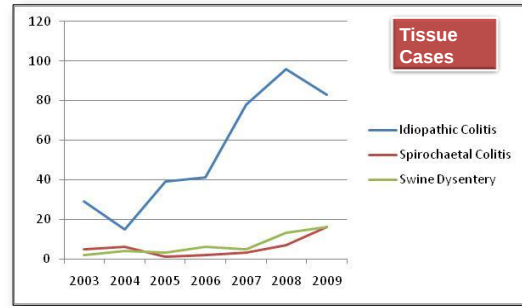
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Pignostics - TGE



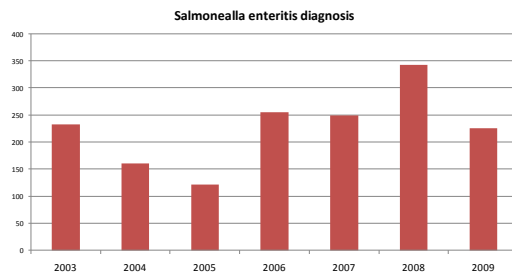
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Pignostics - Colitis



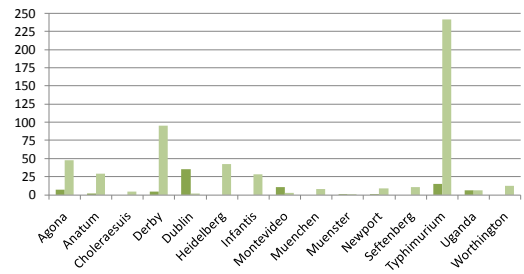
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Pignostics – enteritis/colitis



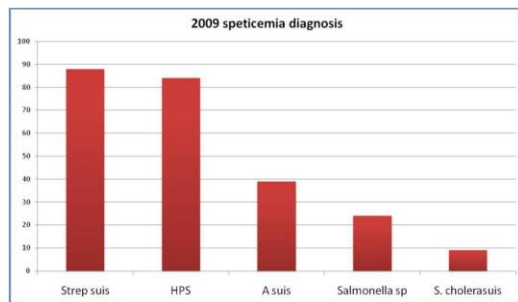
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Pignostics – enteritis/colitis



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Pignostics – Septicemia/Systemic infection



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