Effects of Bovine Viral Diarrhea Virus (BVDV) Persistently Infected (PI) Calves in the Feedyard and Management of PI Calves after Initial Identification

BVD Control; The Future is Now
January 31, 2006
Denver, Colo.

Bill Hessman DVM

Field Trials

Trial 1

- **Feedyard close-out performance comparing PI pens and Non-PI pens (Oct. 2003)**

Trial 2

- **Starter yard close-out performance comparing differing PI exposure levels. (July 2004)**

Trial 1

- Oct. 2003 – June 2004
- Prevalence, Morbidity, Mortality and Performance
- Southeastern, sale barn origin
- 5 Buyers
  - 1 pen removed from study
- PI and Non-PI groups
- 2284 head in 24 pens
- IHC tested at arrival

Results

- Prevalence Rate
  - .31% (7 PI animals)
- Pen Prevalence Rate
  - 19 Non-PI pens, 5 PI pens
  - 21% (5 of 24 pens placed had at least 1 PI)
    - 2 pens had 2 PI animals
- 5 of 7 PI's survived to slaughter (71 %)
- 3 of 7 PI's required antibiotic therapy (43 %)

Results (cont.)

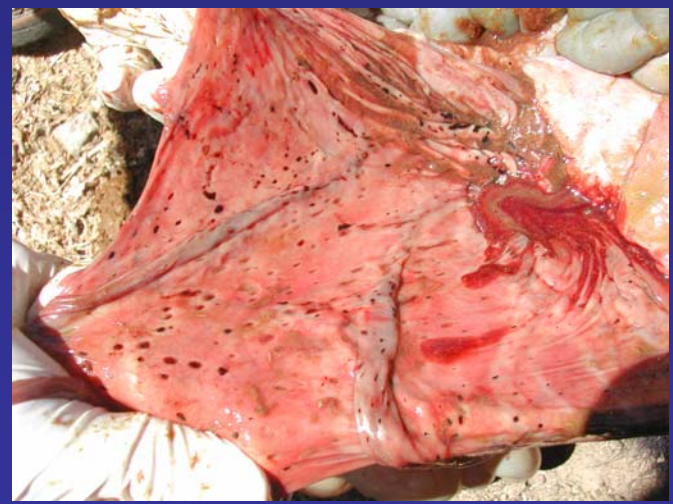
	# Head	Pens	Wt In	Wt Out Deads In	Wt Gain	DOF	ADG	Consump Dry	F/G Deads In	COG Deads In
NPI	1731	19	571	976	405	180	2.25	14.02	6.26	.691
PI	553	5	574	931	357	177	2.00	13.75	6.94	.767
P-value					.04	.58	.07	.53	.02	.05

Results (cont.)

	% Morb.	1st Relapse Rate	2nd Relapse Rate	# of Tx'	Med. Cost Per Head	% Mort.	% Railers
NPI	49.52	46.0	55.4	1.72	25.40	6.96	6.34
PI	42.31	43.7	54.8	1.68	23.10	10.37	6.39
p-VALUE	.22	.71	.93	.76	.43	.14	.97

Mortality by DOF

	< 31 DOF		< 61 DOF		< 91 DOF		< 121 DOF		< 151 DOF		Close Out	
	%	% DIFF	%	% DIFF	%	% DIFF	%	% DIFF	%	% DIFF	%	% DIFF
PI	4.95	+144	9.23	+83	9.91	+69	10.0	+56	10.1	+51	10.3	+49
NPI	2.03		5.03		5.88		6.43		6.68		6.90	



Effect of PI on BRD mortality versus No PI: Days on Feed

- 553 cattle with PI exposure
- 1731 cattle with no PI exposure
  - 31 DOF : P<0.0001
  - 61 DOF : P=0.0007
  - 91 DOF : P=0.0008
  - 121 DOF : P=0.0022
  - 151 DOF : P=0.0027
  - Closeout : P=0.0019

Trial 2

Evaluate the Effects of Persistent Infection with BVDV on Morbidity, Mortality and Performance in High Risk Feedlot Cattle.

Investigators

Bill Hessman DVM

Dave Sjeklocha DVM

Tim Murphy PhD

Robert Fulton DVM, PhD

Julia Ridpath PhD

Mark Payton PhD

Cattle Empire Trial

- Starter Phase (60 days)
  - July 1, 2004
  - New Starter yard (10,000 head)
  - 5 cwt
  - Southeastern sale barn origin
  - Limit fed
  - Not implanted

Testing and Confirmation

- Tested 21,743 head in 240 pens
- BVD PI test by Antigen Capture Elisa by ear notch on arrival by Haskell County Animal Hospital, Sublette, Ks.
  - Positive tests confirmed by Dr. Fulton at OSU
    - Ag Capture
    - IHC
    - PCR
    - VI
    - Viruses subtyped by sequencing of 5' UTR at USDA (Ridpath)

Processing

- On arrival
  - 5-way viral (MLV BHV 1, PI3, BRSV, killed BVD 1a and BVD 2a)
  - *Mannheimia* and *Pasteurella*
  - Dewormer
  - Clostridial
  - Metaphylactic Injection
  - Individual Identification and weighed
- Re-vaccination (day 10)
  - 5-way viral (MLV BHV 1, PI3, BRSV, BVD 1a and 2a)

Treatment Group Classification

- **PI**
  - **PI animal at arrival and left in pen**
- **PIR**
  - **PI animal at arrival and removed to quarantine pen**
- **NPIE**
  - **No PI animal at arrival, placed next to a PI pen**
- **NPIER**
  - **No PI animal at arrival, placed next to a PIR pen**
- **NPIU**
  - **No PI animal at arrival and remained totally unexposed**

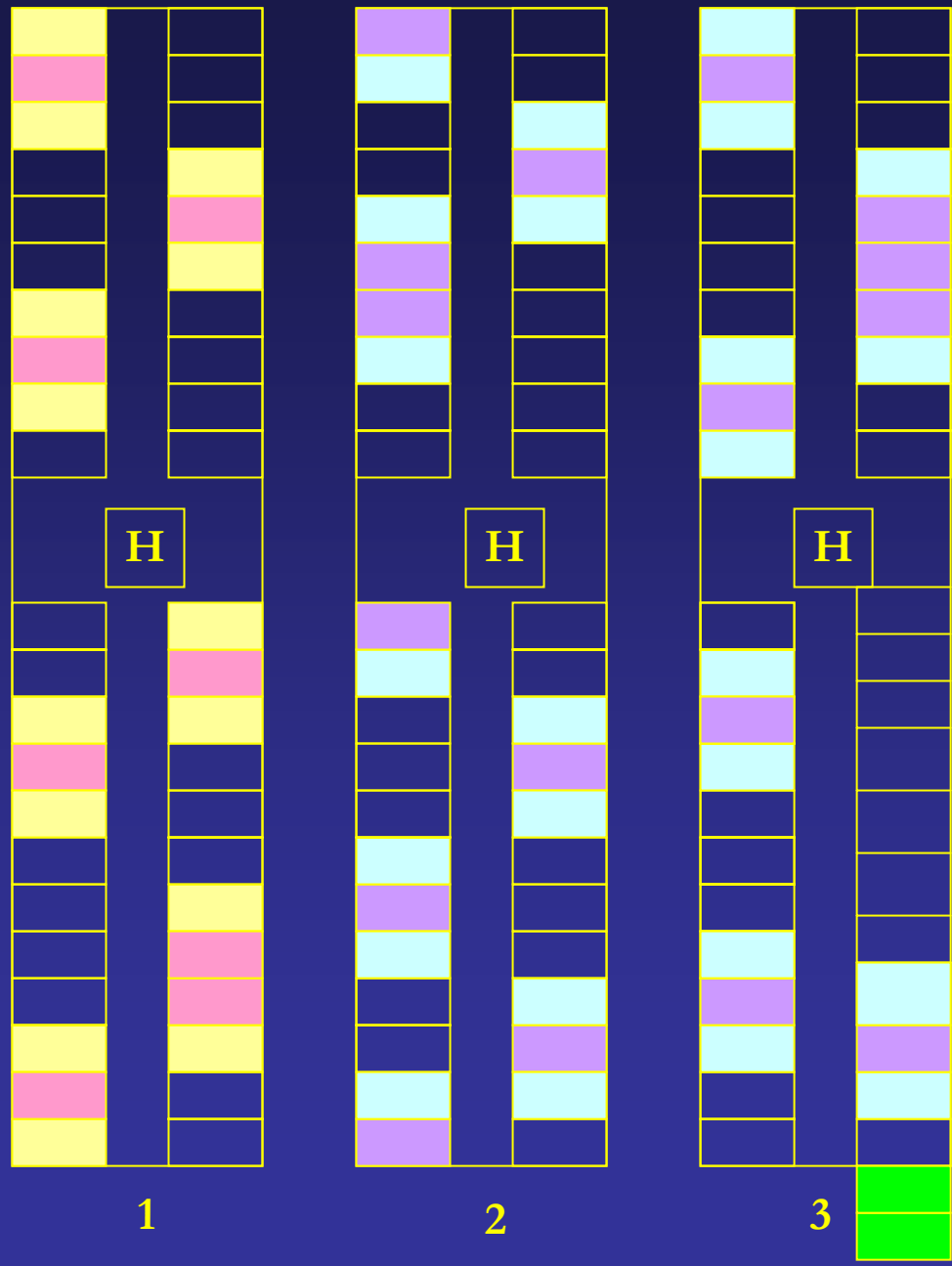
Trial 2: Evaluate the Effects of Persistent Infection with BVDV on Morbidity, Mortality and Performance in High Risk Feedlot Cattle: Performance

- Weight Gain
- Feed Gain Dry M
- Average Daily Gain
- Cost of Gain
- Morbidity %
- # 1st Pulls
- # 2nd Pulls
- Relapse rate 1st
- # 3rd Pulls
- Relapse rate 2nd
- # 4th Pulls
- Relapse rate 3rd
- Railer %
- Mortality %
- Treatment cost
- # treatments

Cattle Empire
BVD Trial

ALLEY 1-LEAVE PI'S IN
ALLEY 2-REMOVE PI'S
ALLEY 3-REMOVE PI'S

- PI PENS
- NPIE PENS
- PIR PENS
- NPIER PENS
- NPIU PENS
- QUARANTINE PENS



PI Animal Removal

- Ag Capture test ran daily
- Positive animals pulled from pen within 48 hrs of processing for re-sampling. Positives in alley 1 (PI) returned to pen. Positives in alley's 2 & 3 (PIR) removed to quarantine.
  - Follow-up samples for Dr. Fulton
    - Notch in PBS
    - Notch in formalin
    - Serum samples
    - Nasal swabs
- Animals in quarantine were not re-vaccinated or treated for health issues.

Quarantine Pens

Analysis

- **21,743 animals tested in 240 pens/lots**
- **Analysis based on:**
  - **Pens with majority of DOF at highest risk**
    - 214 pens with 19,336 head eligible for analysis
    - **Outliers removed (COG deads in outcome)**
      - 207 pens with 18,765 head eligible for analysis
  - **Pens with no status change throughout starter phase**
    - 167 pens with 15,348 head eligible for analysis
    - **Outliers removed (COG deads in outcome)**
      - 163 pens with 15,058 head eligible for analysis

Statistical analysis

- Analysis of variance procedures conducted on all response variables using PROC MIXED in PC SAS Versions 9.
- Pairwise t-tests(LSMEANS) statement with DIFF option to determine differences in status.
- Significance level of 0.05 was used for all comparisons

Ineligibility

- Pens removed from analysis
  - One lot of cattle placed in 2 pens with different status
    - Feedyard close-out data based on lot
  - Missing sample at processing
    - Dead on truck and not tested
  - 2 loads for 1 lot arriving at different date with PI in last load.

PI Prevalence Rate

- 88 Antigen Capture positives at HCAH
  - 2 animals subsequently found to be acutely infected
  - 86 true PI's of 21,743
    - Prevalence rate of .40%
- 74 pens PI positive (240 pens tested)
  - Positive pen rate of 31%
- 67 pens PI positive (pens with no status change and outliers removed)
  - Positive pen rate of 41%

PI Survival Rate

- 22/86 (25.6%) Died during starter phase
  - Cause of death
    - 14/22 (64%) Mucosal Disease
    - 6/22 (27%) Respiratory
    - 1/22 (4.5%) Other
    - 1/22 (4.5%) Bloat
- 4/37 (10.8%) Railed from PI pens-starter phase
- 43/86 (50%) Survival Rate - Sold to slaughter or railed light

PI Virus Subtypes

- BVDV 1b 77.9%
- BVDV 1a 11.6%
- BVDV 2 10.5%

Results – Performance Summary

PENS WITH NO STATUS CHANGE
OUTLIERS REMOVED

STATUS	PENS	WT GAIN D IN	F/G DRY D IN	ADG D IN	COG D IN
PI	32	78 ^{c}	11.02 ^{a}	1.25 ^{c}	1.63 ^{a}
PIR	35	87 ^{bc}	8.27 ^{ab}	1.36 ^{bc}	1.22 ^{ab}
NPIE	17	93 ^{bc}	7.27 ^{b}	1.49 ^{ab}	1.02 ^{b}
NPIER	16	105 ^{ab}	6.57 ^{b}	1.61 ^{a}	0.91 ^{b}
NPIU	63	111 ^{a}	6.44 ^{b}	1.65 ^{a}	0.89 ^{b}

Results – Health Summary

PENS WITH NO STATUS CHANGE

OUTLIERS REMOVED

STATUS	MORB %	1ST RELAPSE RATE	RAIL %	MORT %	TX $ / HD	AVG # OF TX'S
PI	34.0 ab	46% a	4.5 a	3.5 a	16.80 a	1.79 a
PIR	36.0 a	43% ab	4.7 a	2.9 a	15.84 a	1.73 a
NPIE	29.2 bc	45% ab	3.6 ab	2.4 ab	16.45 a	1.72 a
NPIER	24.8 c	35% c	2.7 b	1.3 b	14.30 a	1.58 a
NPIU	28.5 bc	39% bc	2.7 b	1.6 b	15.46 a	1.65 a

PI vs PIR and NPIE vs NPIER

Performance Outcomes

Pens with no status change and outliers removed

	PENS	WT. OUT D IN	WT. GAIN/HD D IN	F/G D IN	ADG D IN	COG D IN
PI	32	584	78	11.02	1.25	1.63
PIR	35	585	87	8.27	1.36	1.22
P-value		0.96	0.18	0.06	0.2	0.07

	PENS	WT. OUT D IN	WT. GAIN/HD D IN	F/G D IN	ADG D IN	COG D IN
NPIE	17	622	93	7.27	1.49	1.02
NPIER	16	638	105	6.57	1.61	0.91
P-value		0.39	0.27	0.74	0.3	0.73

PI vs PIR and NPIE vs NPIER

Health Outcomes

Pens with no status change and outliers removed

	MORB %	1ST RELAPSE	2ND RELAPSE	3RD RELAPSE	RAIL %	MORT %	TX COST	AVG # OF TX'S
PI	33.6	46	58	22	4.52	3.52	16.80	1.79
PIR	36.1	43	49	26	4.74	2.92	15.84	1.73
P-value	0.4	0.6	0.06	0.06	0.8	0.29	0.39	0.32

	MORB %	1ST RELAPSE	2ND RELAPSE	3RD RELAPSE	RAIL %	MORT %	TX COST	AVG # OF TX'S
NPIE	29.2	45.3	46	30.4	3.58	2.38	16.45	1.72
NPIER	24.8	35.1	49	23.6	2.68	1.27	14.30	1.58
P-value	0.32	0.03	0.66	0.48	0.45	0.18	0.19	0.13

Biologic Groups
Performance Outcomes

Pens with no status change and outliers removed

TREATMENT GROUP	PENS	WT GAIN D IN	F/G D IN	ADG D IN	COG D IN
PI & NPIE	49	83	9.72	1.33	1.42
PIR & NPIER	51	93	7.74	1.44	1.12
P-VALUE		.09	.17	.11	.18

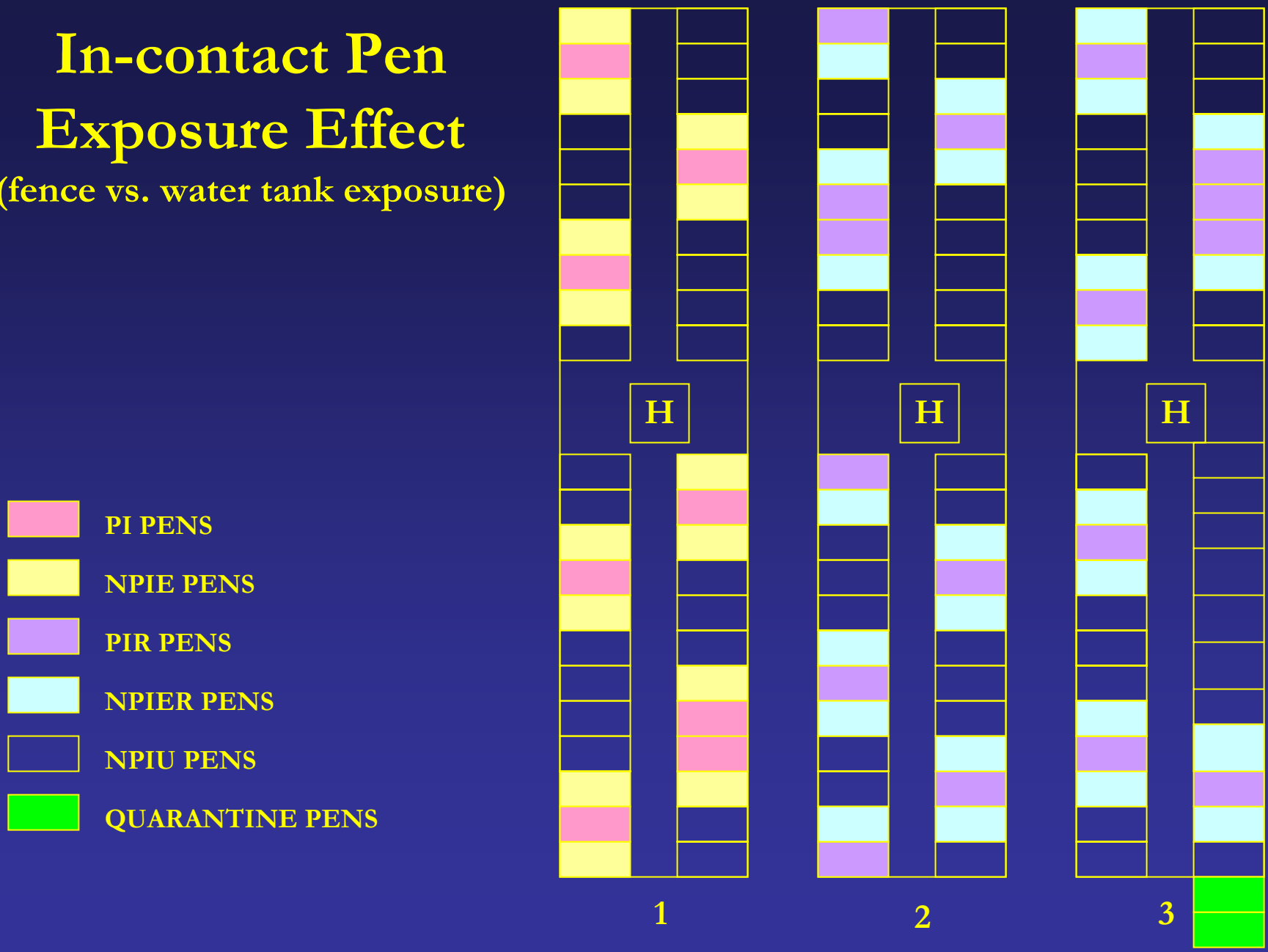
Biologic Groups
Health Outcomes

Pens with no status change and outliers removed

TREATMENT GROUP	MORB %	1ST RELAPSE %	RAIL %	MORT %	TX COST /HD PLACED	# OF TX'S
PI & NPIE	32	46	4.2	3.1	16.68	1.77
PIR & NPIER	33	41	4.1	2.4	15.36	1.68
P - VALUE	.73	.03	.63	.09	.11	.07

In-contact Pen Exposure Effect

(fence vs. water tank exposure)



Fence vs Water Tank Exposure

Pens with no status change and outliers removed

TREANMENT GROUP	PENS	WT GAIN D IN	F/G D IN	ADG D IN	COG D IN
FENCE	5	99	7.18	1.49	0.951
WATER TANK	7	89	7.55	1.42	1.097
P - VALUE		.53	.73	.66	.38

Fence vs Water Tank Exposure

Pens with no status change and outliers removed

TREATMENT GROUP	MORB %	BRD MORB %	1ST RELAPSE %	RAIL %	MORT %	BRD MORT %	TX COST /HD PLACED	AVG # OF TX'S
FENCE	24.91	23.37	41.5	2.37	2.90	1.73	14.72	1.68
WATER TANK	32.45	32.45	48.3	3.64	2.39	2.26	17.40	1.74
P - VALUE	.41	.32	.41	.51	.68	.62	.34	.70

Economic Analysis

- Based on purchase costs, production costs and mortality differences.

- Trial 1
  - Cost/head in PI pens
    - $47.43

- Trial 2
  - Cost/head in exposed population
    - $67.49
  - Cost/head in total population
    - $41.17

ADDED VALUE?