





The Systematic Management Of BVDV in Beef Herds



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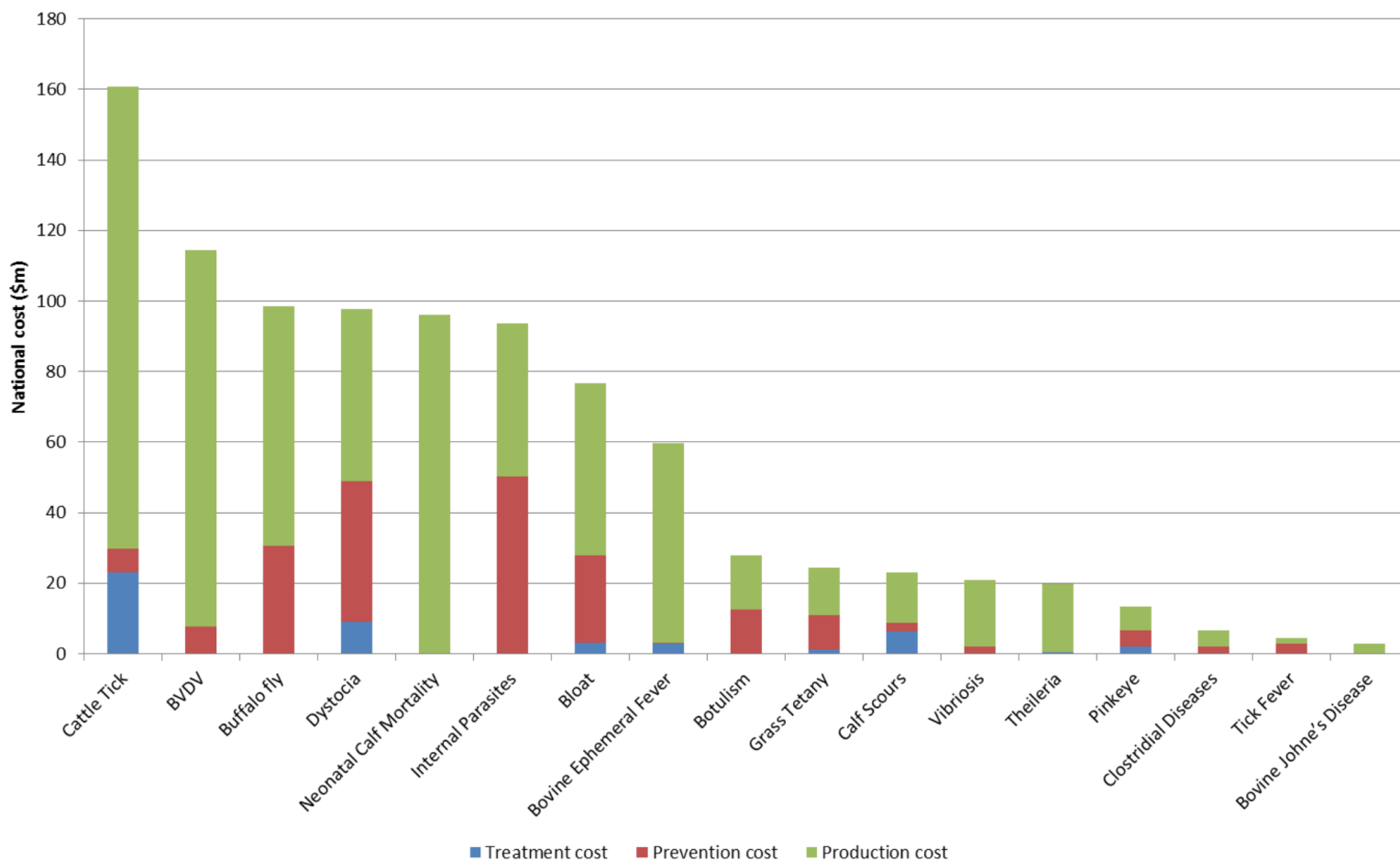
A R C B A

Australian Registered
Cattle Breeders' Association



Endemic Disease Economic Impact

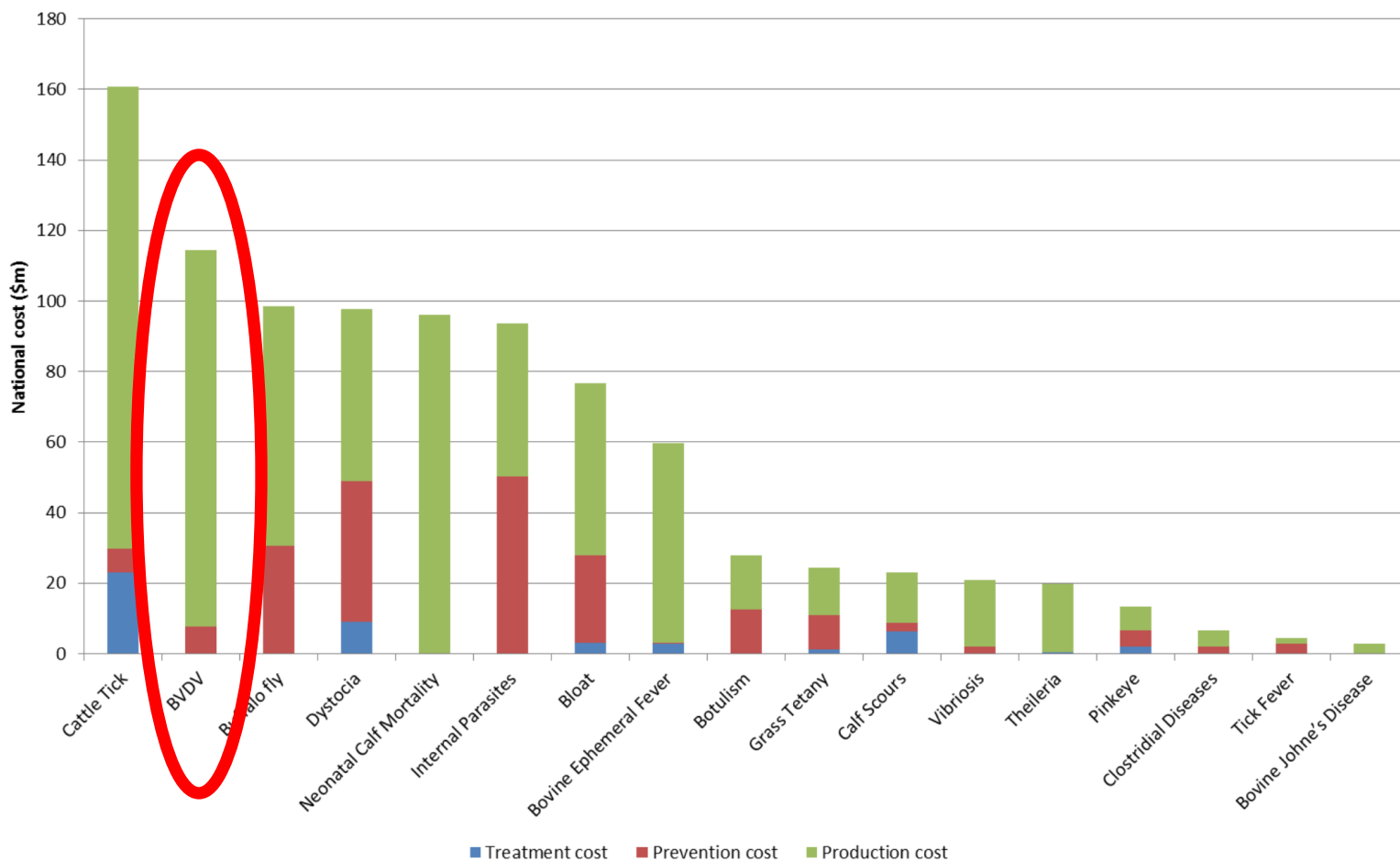
Cattle (northern and southern)





Endemic Disease Economic Impact

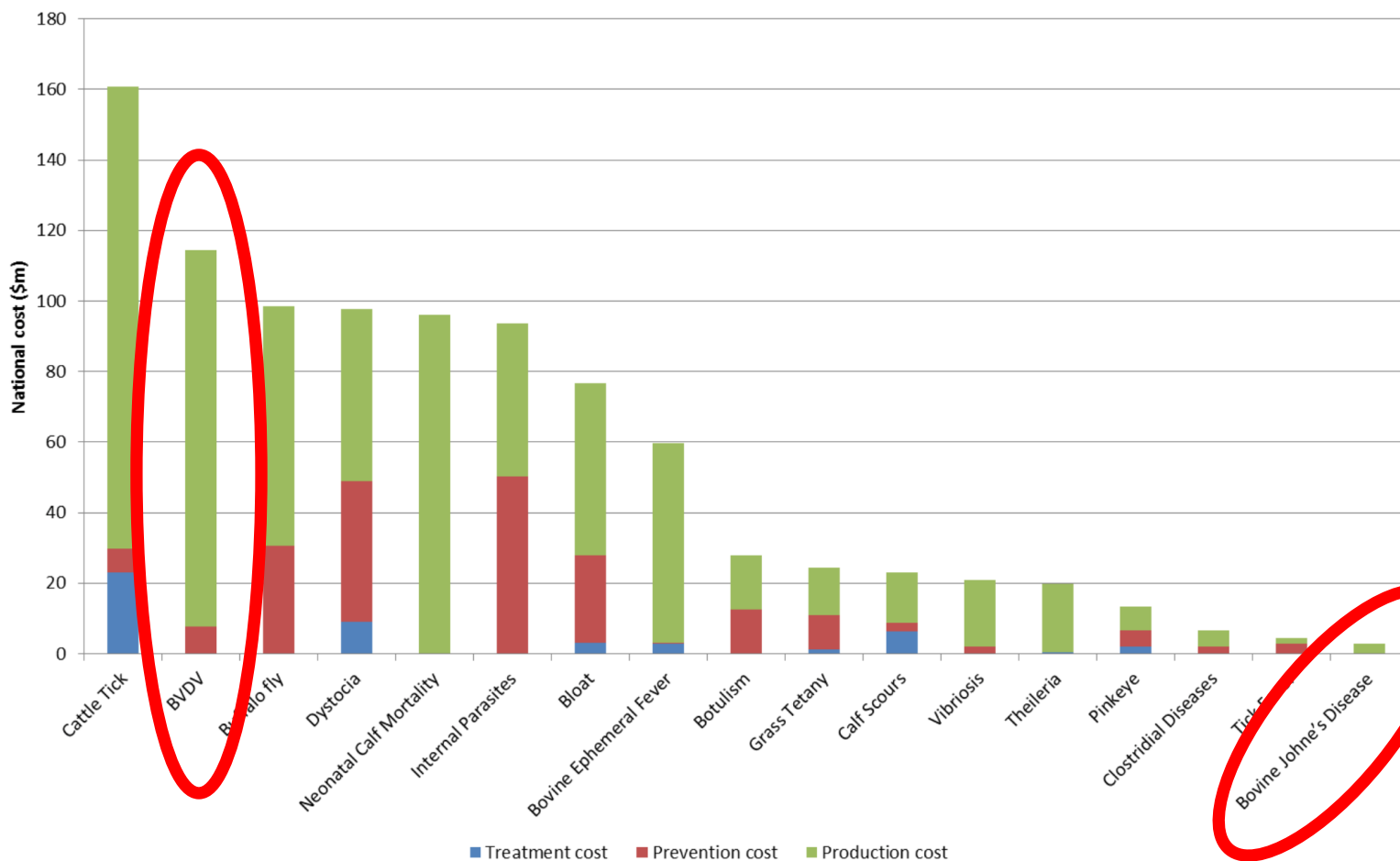
Cattle (northern and southern)





Endemic Disease Economic Impact

Cattle (northern and southern)





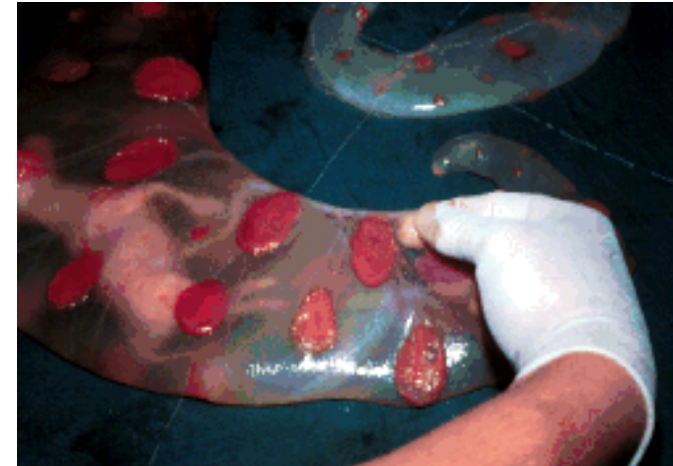
Bovine Viral Diarrhea Virus

- BVDV/BVD
- Bovine Pestivirus
- Mucosal Disease



Two types of BVDV Infection

- Acute/Transient Infection (TI)
 - When an animal is exposed at a point wherein their immune system is functional
- Persistent Infection (PI)
 - When an animal is exposed prior to having a functional immune system
 - Under the first 4 months
 - of gestation
 - Smaller than a cat





BVDV is all about timing...



PERFECTLY TIMED PHOTOS.COM

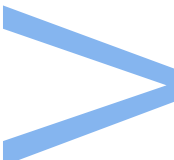
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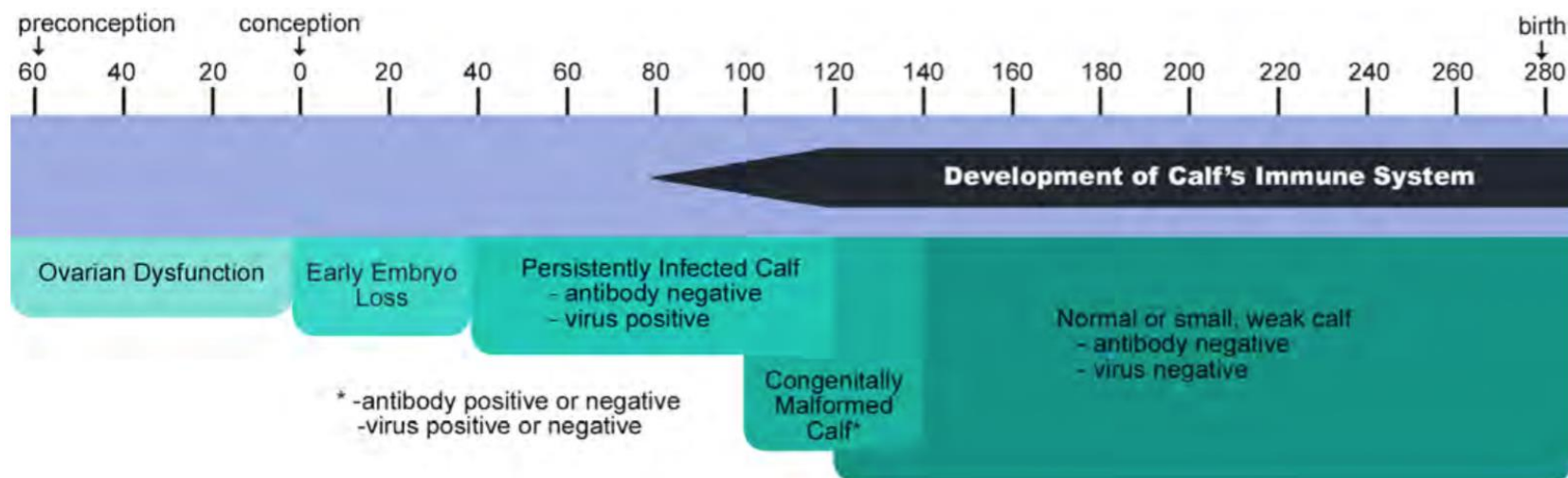
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Timing of Exposure to BVDV Changes Outcome



Get it wrong...



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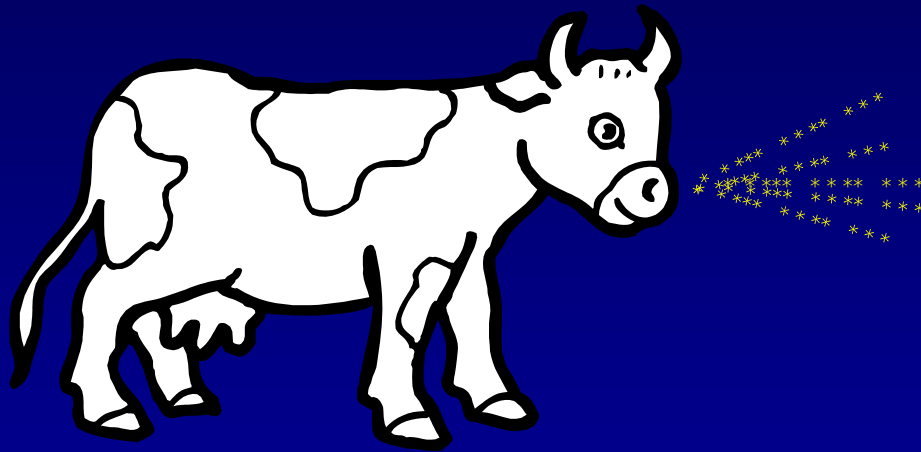
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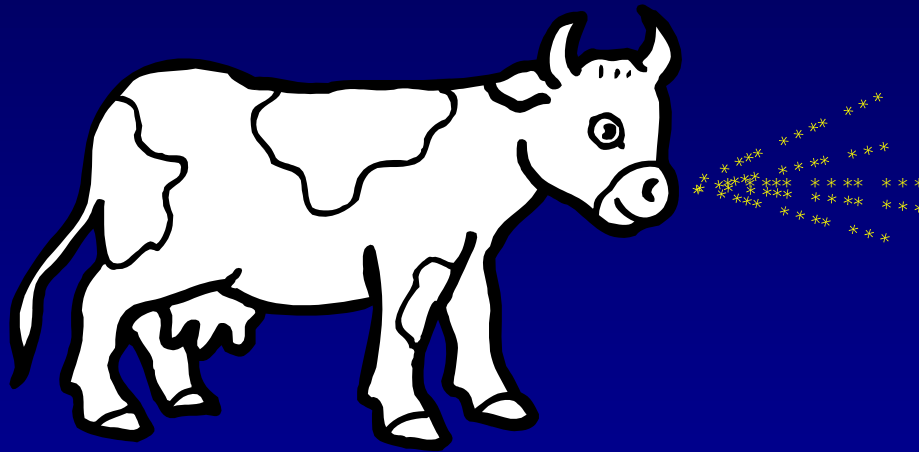
”Virulence of Acute/Transient Exposure”



Shed 1,000 to 10,000 virus per ml of secretion
for 7 to 10 days

”Virulence of Acute/Transient Exposure”

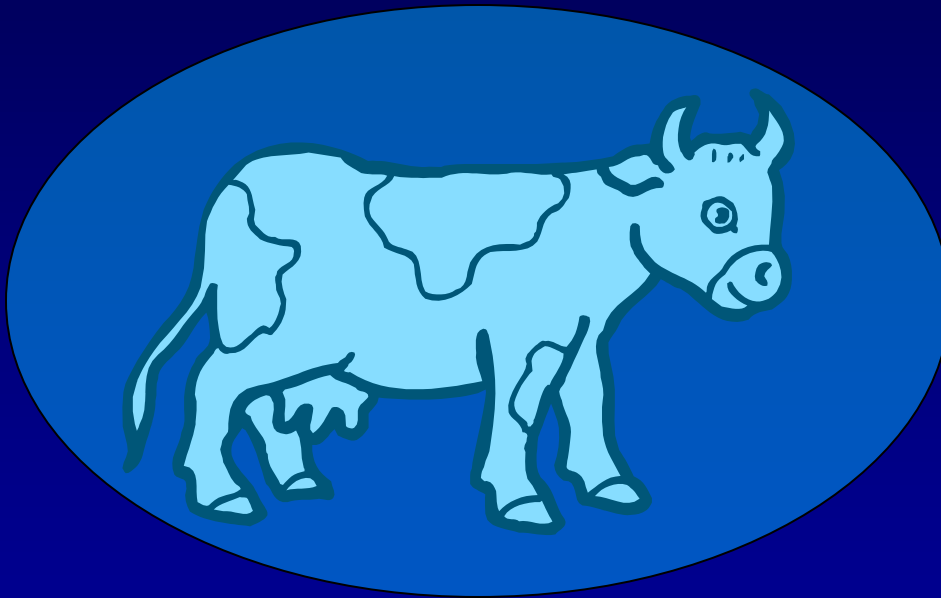
$$R_0 = <1$$



Shed 1,000 to 10,000 virus per ml of secretion
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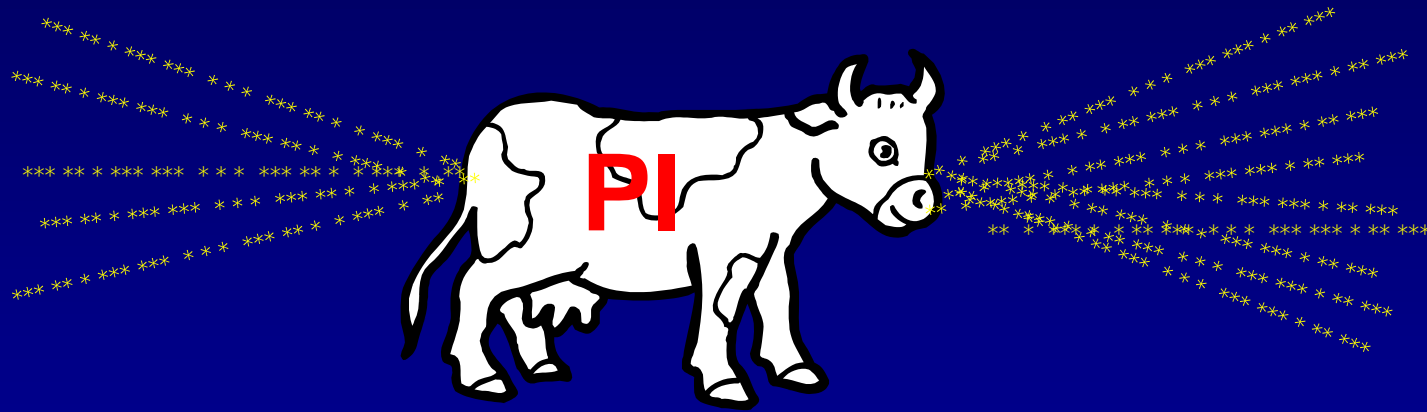
”Virulence of Acute/Transient Exposure”

$$R_0 = <1$$



Acute Infection Followed By Long Lasting Immunity
Animal Now ANTIBODY Positive

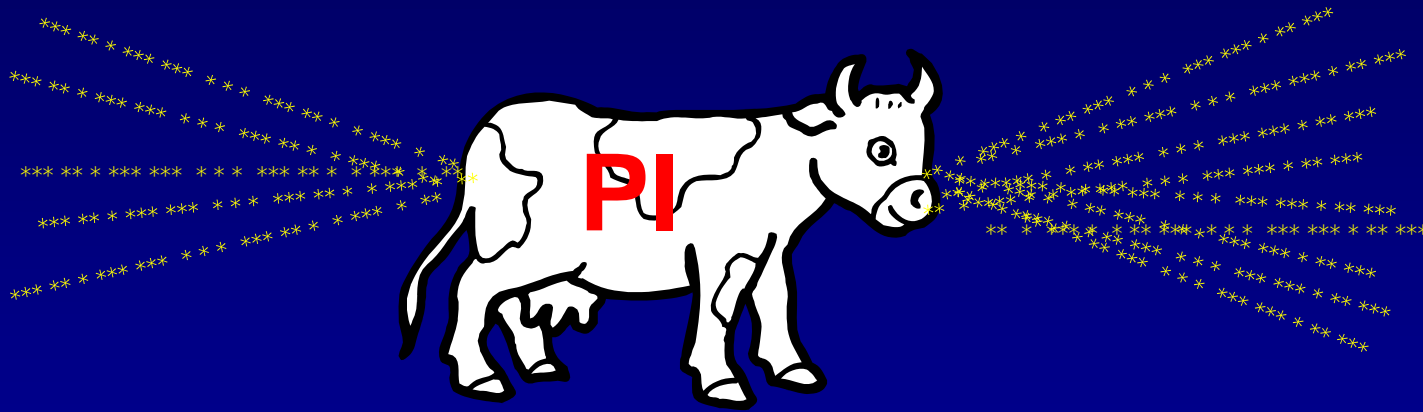
”Virulence of PI Exposure”



Shed 1,000,000 to 1,000,000,000 virus per ml of secretion
for their ENTIRE life

”Virulence of PI Exposure”

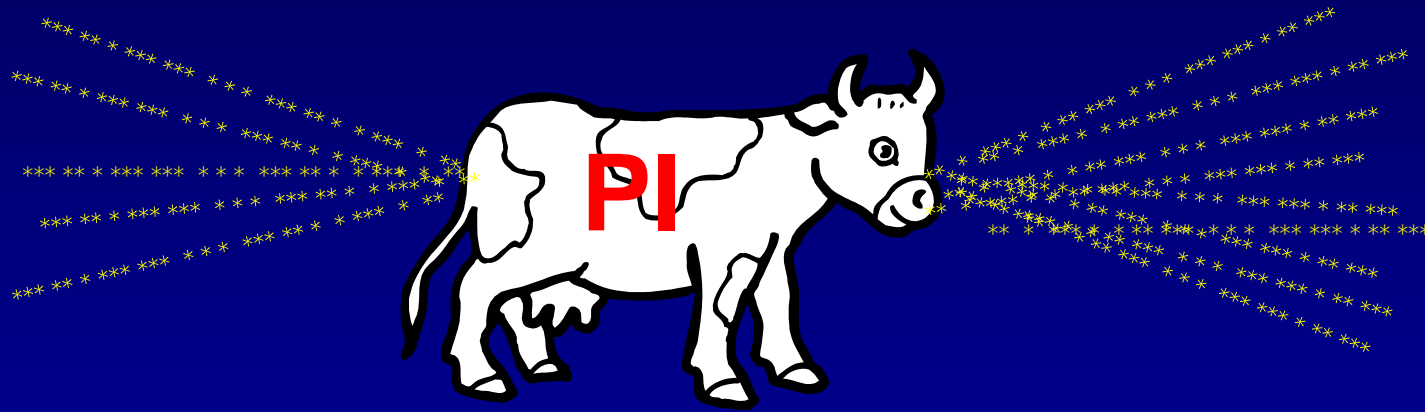
$$R_0 = \text{Infectivity} \times \text{Time Infectious}$$



Shed 1,000,000 to 1,000,000,000 virus per ml of secretion
for their ENTIRE life

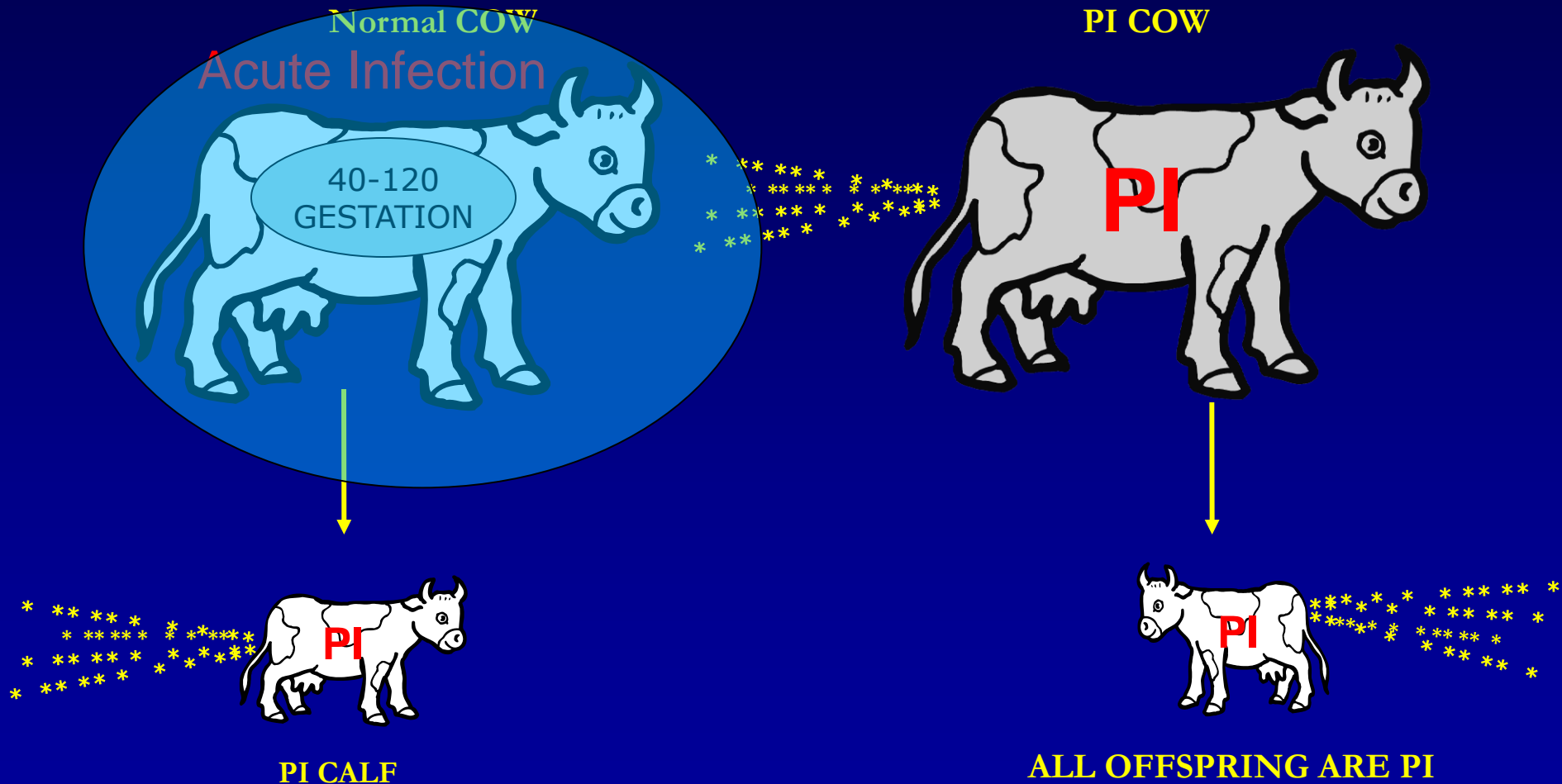
”Virulence of PI Exposure”

$R_0 = \text{To Infinity and Beyond}$

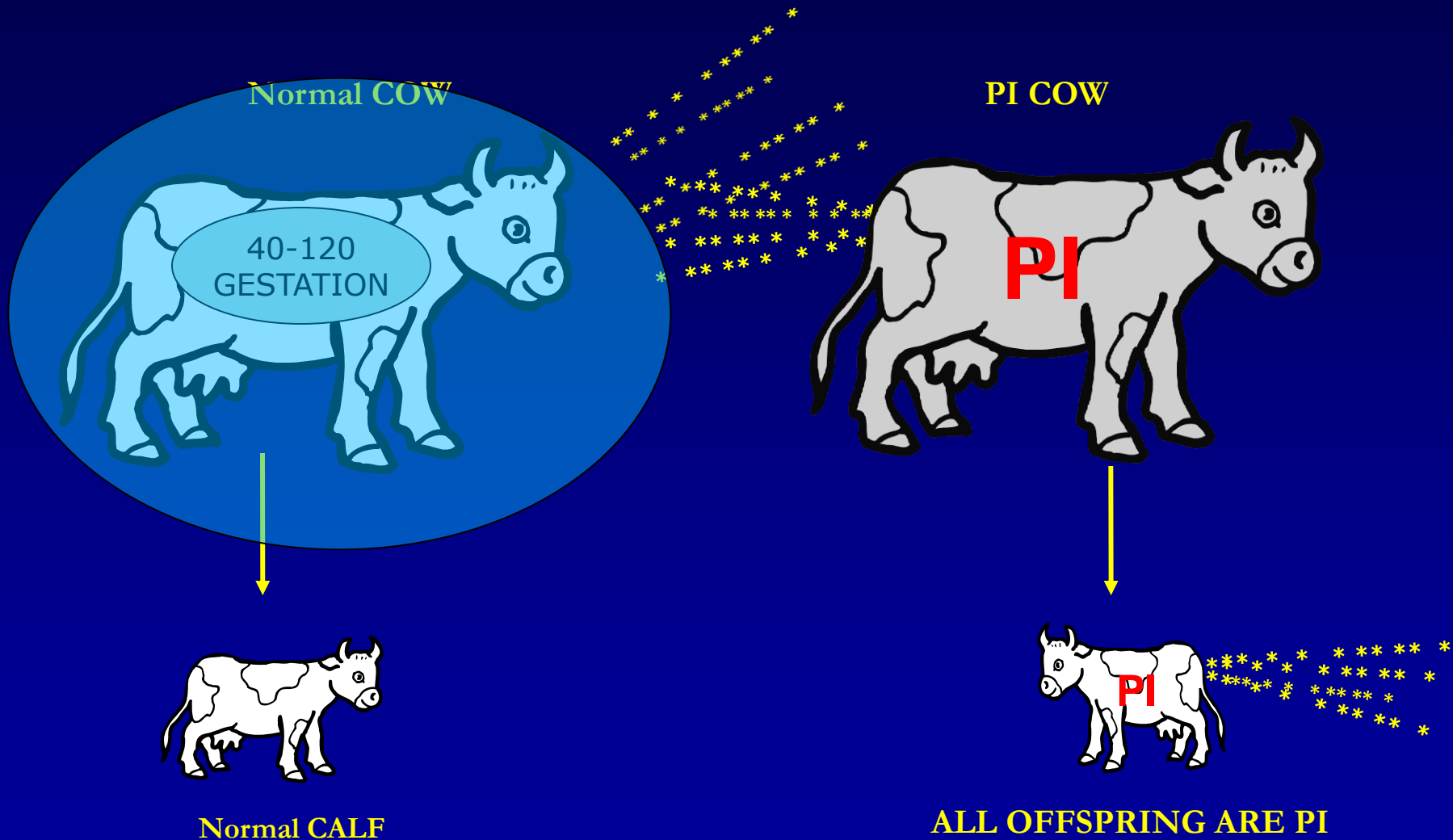


Shed 1,000,000 to 1,000,000,000 virus per ml of secretion
for their ENTIRE life

PRODUCTION OF PI ANIMALS



PRODUCTION OF PI ANIMALS





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2012 Perth Royal Show

- 700 PI Screenings
 - 13 PI Animals Diagnosed
 - 1.9%



Grand Parade at the Perth Royal Show

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Restocking Considerations

- Immune Status of Existing Population
- Immune Status of Introduced Population
- Stage of Pregnancies
- Internal Biosecurity
- Access to Animals



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Restocking Considerations

- Immune Status of Existing Population
- Immune Status of Introduced Population
- Stage of Pregnancies
- Internal Biosecurity
- Access to Animals
- **PI Presence**



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A Classic BVDV “Wreck”



When groups of animals without immunity meet PI animals at inopportune times...



Case Study

- “Y”
 - September 2003
 - Heifer Y born Persistently Infected
 - December 2004
 - PI heifer Y and 350 other heifers joined
 - AI program followed by natural cover

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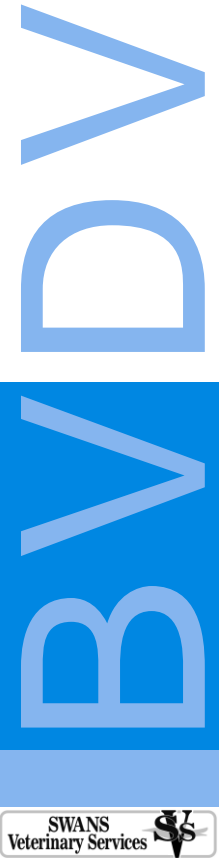
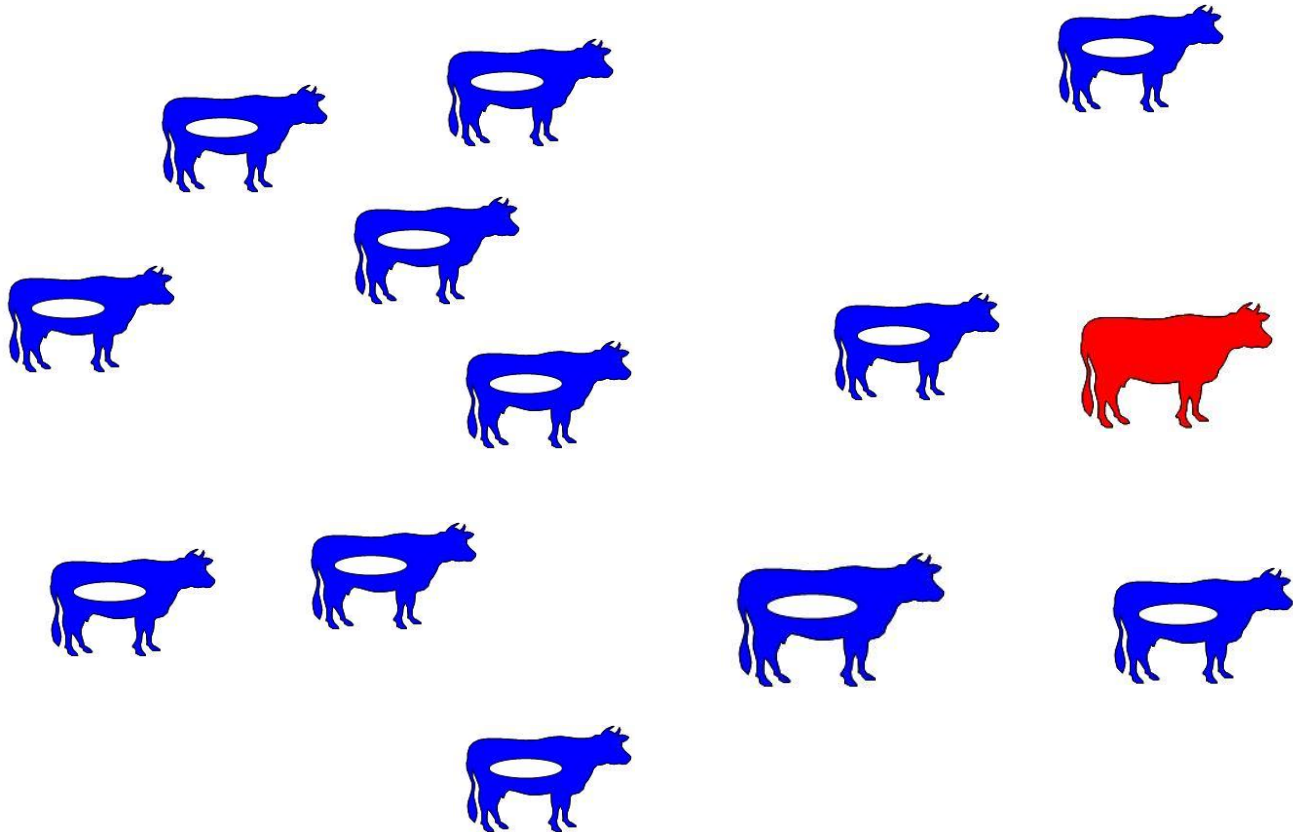
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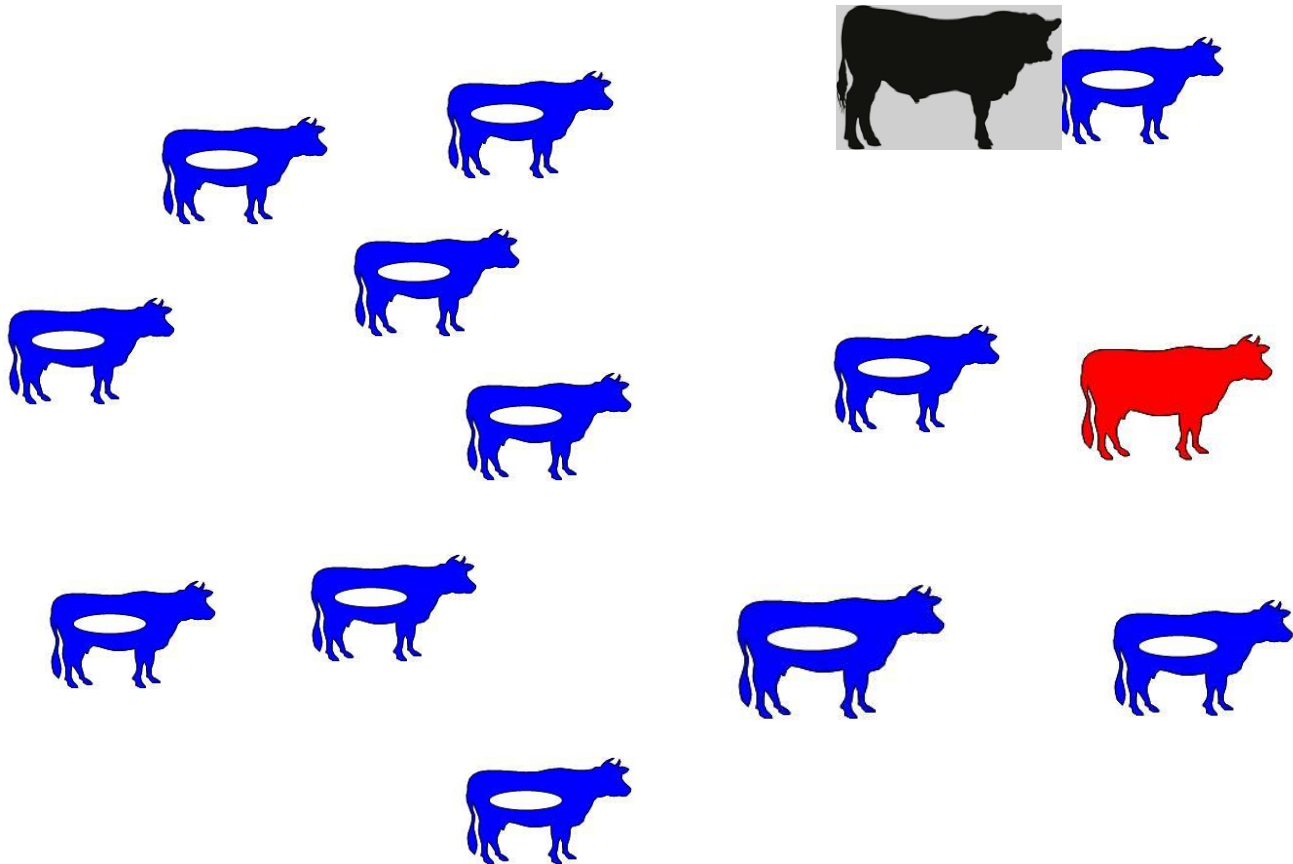


Y Heifer Mob





Y Heifer Mob



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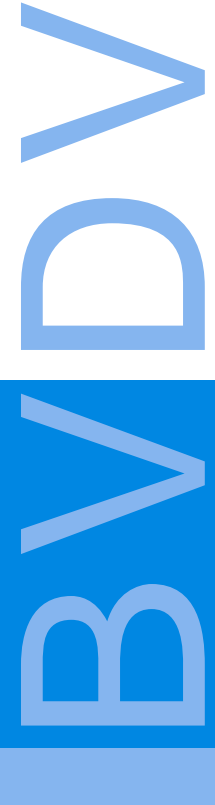
Case Study

- “Y”
 - September 2003
 - Heifer Y born Persistently Infected
 - December 2004
 - PI heifer Y joined
 - AI Program followed by natural cover
 - September 2005
 - PI heifer Y gives birth to a PI heifer calf A
 - All other heifers calve normally



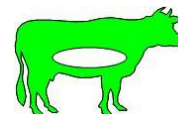
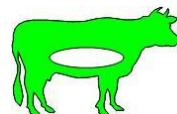
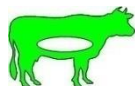
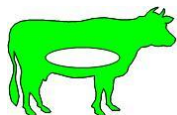
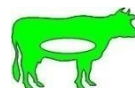
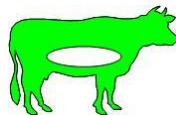
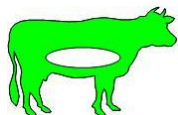
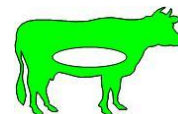
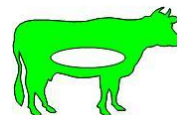
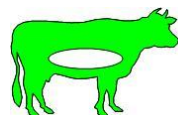
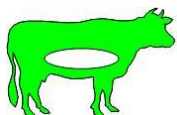
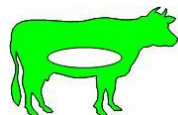
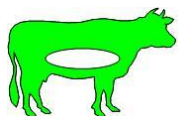
Case Study

- “Z Heifers”
 - November 2005
 - AI Program followed by natural cover





Z Heifer Mob



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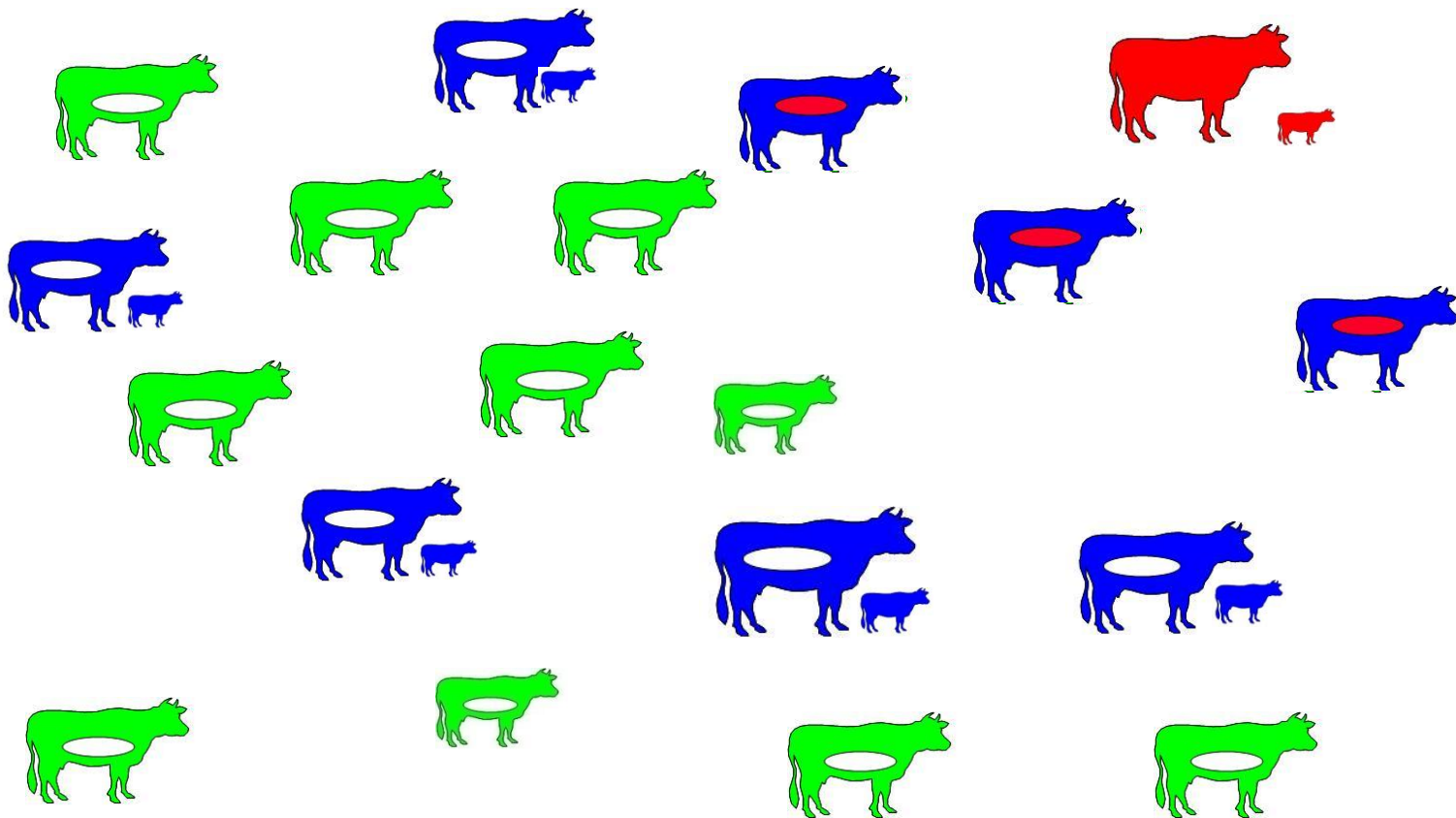


Case Study

- “Z Heifers”
 - November 2005
 - AI Program followed by natural cover
 - February 2006
 - Preg Tested and then boxed with the first calvers and their calves
 - Including PI's Y and A



Boxed with 2 PI's







Case Study

- Z Heifer Calving
 - 48 of 335 PTIC's failed to calve
 - 47 calves died
 - 120 of the remaining 240 calves were diagnosed as persistently infected with BVDV
 - PI's sold direct to slaughter or destroyed



Case Study

- Z Heifer Calving
 - 48 of 335 PTIC's failed to calve
 - 47 calves died
 - 120 of the remaining 240 calves were diagnosed as persistently infected with BVDV
 - PI's sold direct to slaughter or destroyed
- **215 Affected Calves**
- **Half a Million Dollars in Losses**



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Diagnosing BVDV Infection

- Antigen Testing – The Bad Guys
 - The virus itself or pieces thereof
 - Used to diagnose PI Animals
 - Direct Indicator of PI Presence
- Antibody Testing – The Good Guys
 - Produced by the immune system
 - Protective against the effect of antigen
 - Classify herd risk and herd level infection
 - Immune Status
 - Indirect Indicator of PI Presence
 - **PI Animals are Antibody Negative!**



Diagnosing BVDV Infection

- Antigen Testing – The Bad Guys
 - The virus itself or pieces thereof
 - Used to diagnose PI Animals
 - Direct Indicator of PI Presence

Are you a PI?



Diagnosing BVDV Infection

- Antigen Testing – The Bad Guys
 - The virus itself or pieces thereof
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 - Direct Indicator of PI Presence

Lifetime Status!



Diagnosing BVDV Infection

- Antigen Testing – The Bad Guys
 - The virus itself or pieces thereof
 - Used to diagnose PI Animals
 - Direct Indicator of PI Presence

Ear Notch



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HerdChek® BVDV Ear Notch Test

- ✓ Extremely accurate
- ✓ Test animals at any age
- ✓ Simple crush side ear notch collection
- ✓ Quick turnaround to results

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LABORATORIES







Allflex Tissue Sampling Unit



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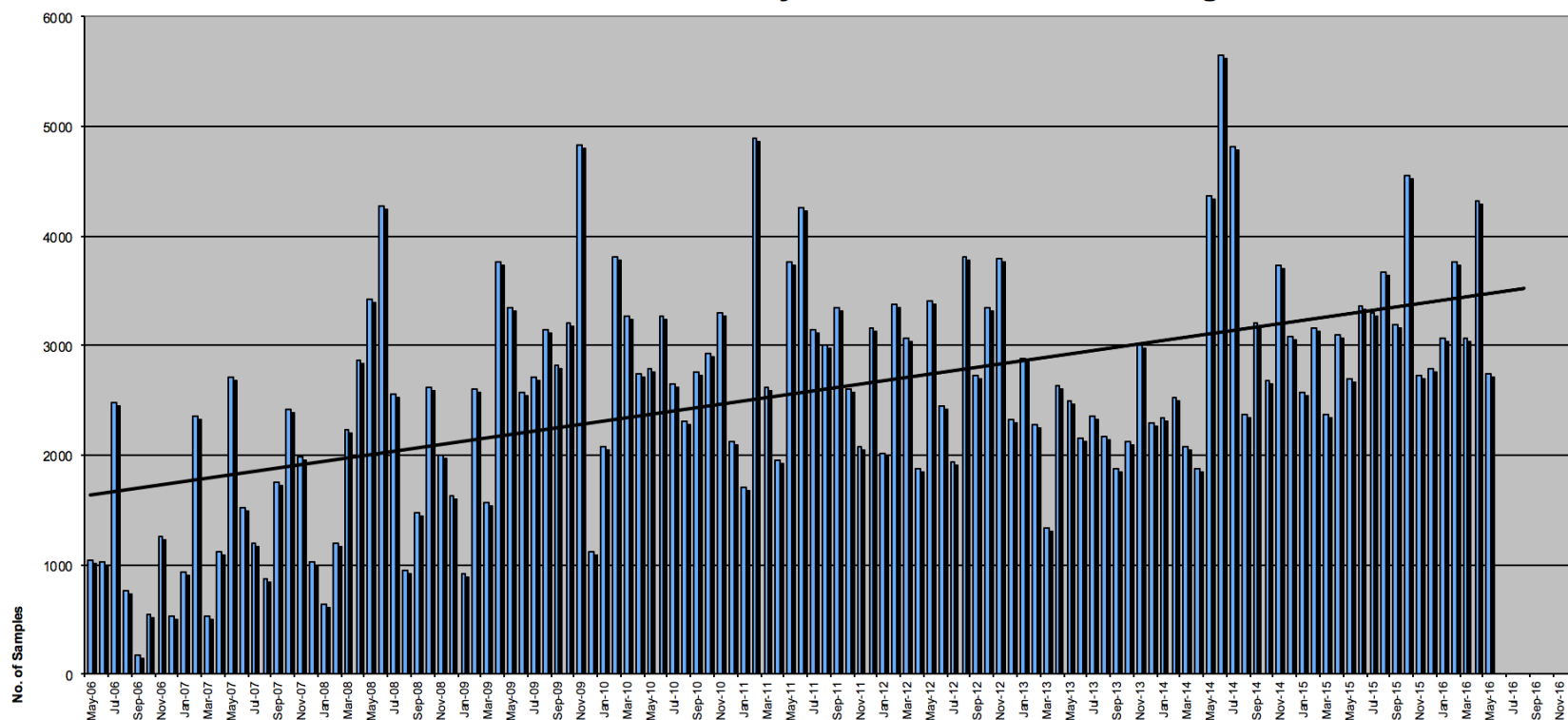
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Monthly Ear Notch Testing

Monthly BVDV Lab Ear Notch Testing



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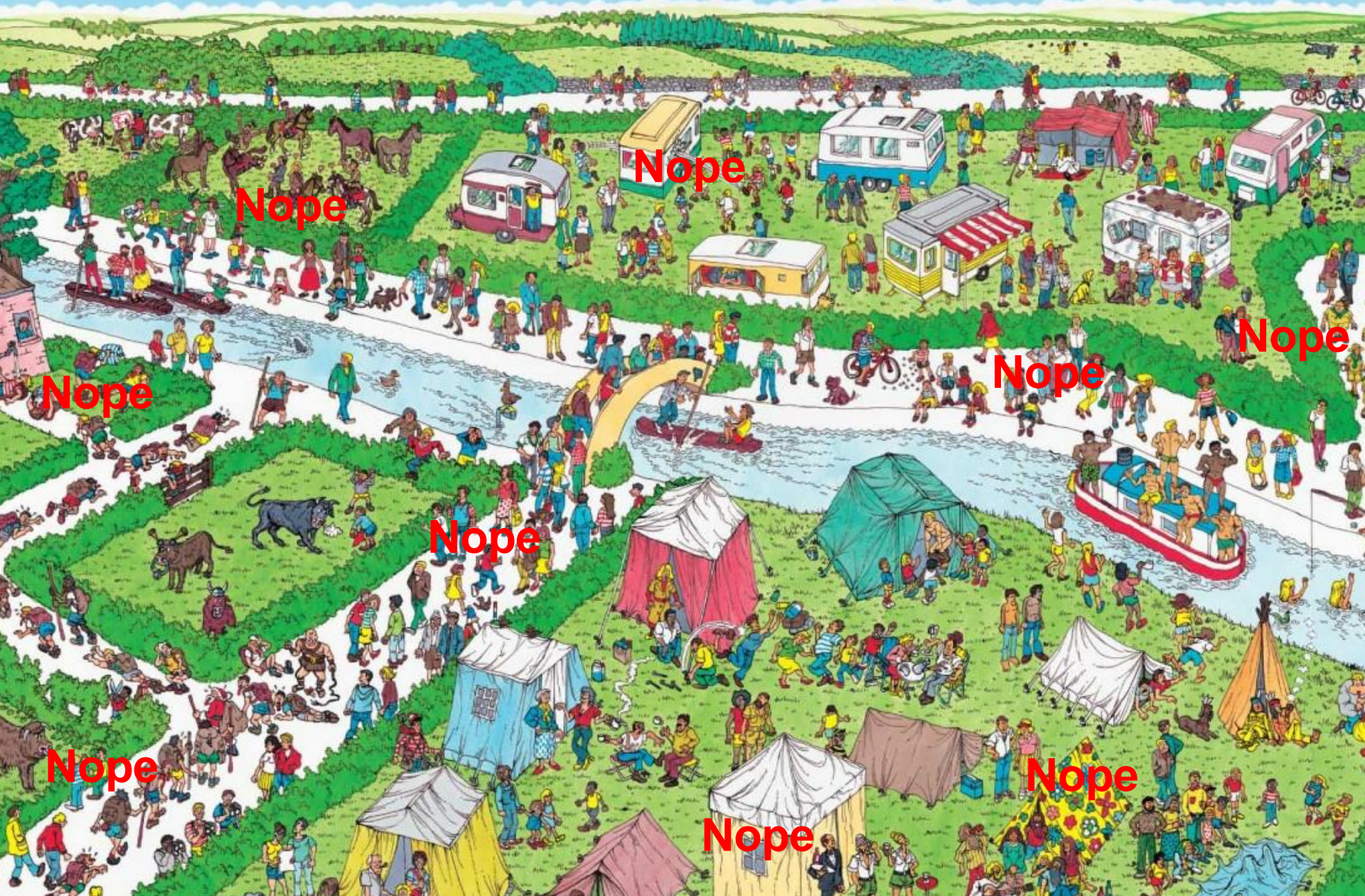
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Where's Wally?





Diagnosing BVDV Infection

Hey mate! Have you ever met a PI?

- Antibody Testing – The Good Guys
 - Produced by the immune system
 - Protective against the effect of antigen
 - Classify herd risk and herd level infection
 - Immune Status
 - Indirect Indicator of PI Presence
 - **PI Animals are Antibody Negative!**

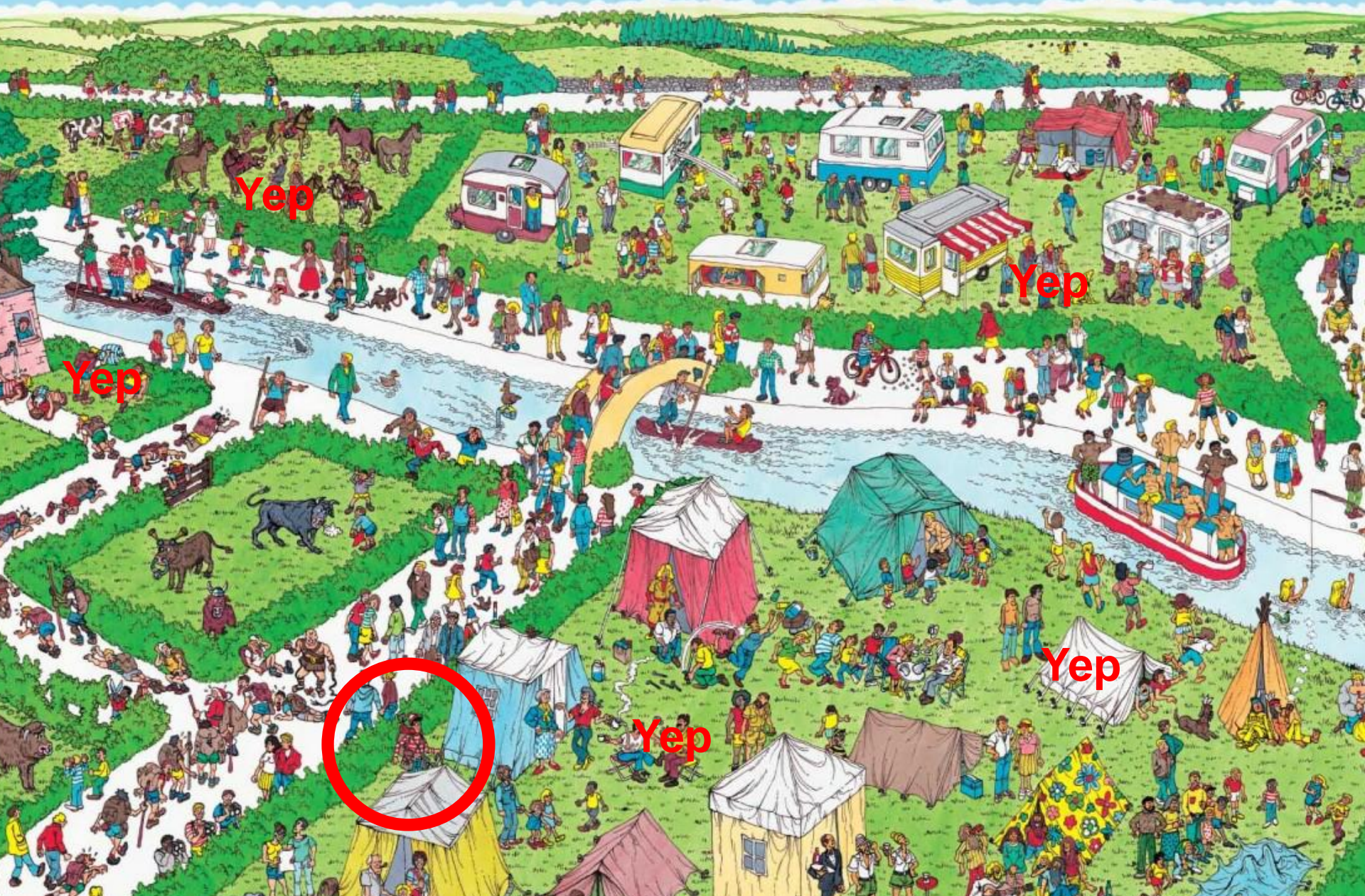


Diagnosing BVDV Infection

Blood Test

- Antibody Testing – The Good Guys
 - Produced by the immune system
 - Protective against the effect of antigen
 - Classify herd risk and herd level infection
 - Immune Status
 - Indirect Indicator of PI Presence
 - **PI Animals are Antibody Negative!**

Anybody Seen Wally?





BVDV Blood Testing Options

- AGID (Agar Gel Immuno-Diffusion)
 - Very useful to measure and age recent infection.
 - Scoring system from 0 to 3+
 - Higher score indicates more recent exposure
 - Immune animals eventually produce negative antibody results.
 - Underestimates level of herd immunity
 - Doesn't usually identify or measure immunity from vaccination.



BVDV Blood Testing Options

- Antibody ELISA
 - More sensitive
 - Objective rather than subjective measurement
 - Typically less expensive
 - Less sample required
 - Blood samples very stable
 - Can tolerate poor handling



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DV

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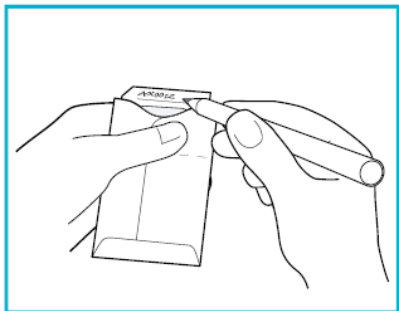
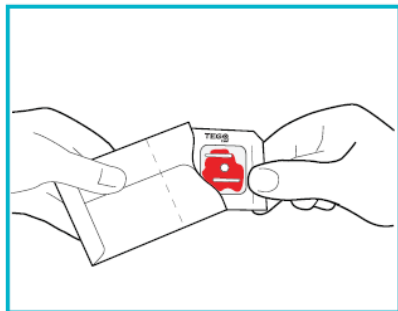
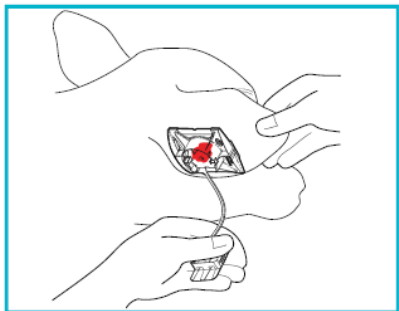
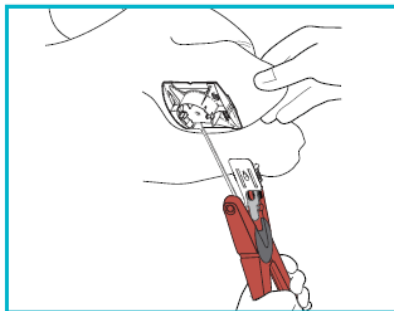
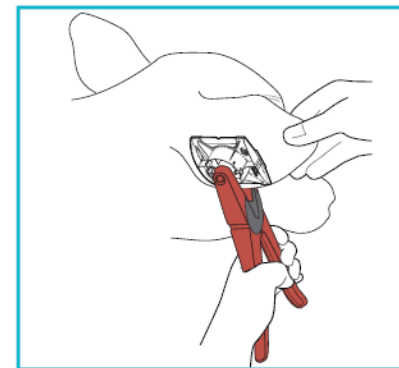
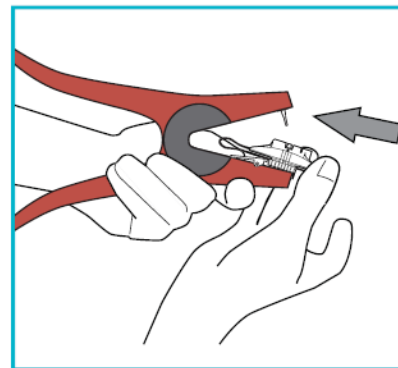
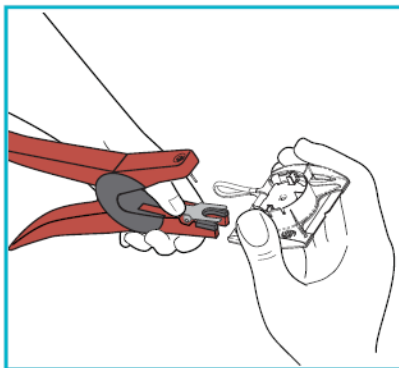
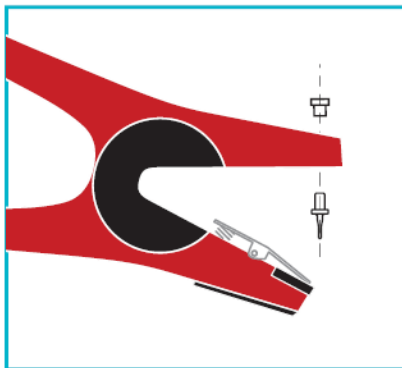
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TEGO Device



TEGO Device



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Information Equals Flexibility



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FLEXIBILITY





Blood Testing Pays Dividends

If 5% of a management group were blood tested for antibodies to BVDV at a cost of \$20 per sample, the cost of serology would be equivalent to \$1 per head.

The cost of vaccination, at \$5 per dose is \$10 for the first year and \$5 per year for the life of the animal.

The cost of ear notching an animal is \$10.

Serology is a wise investment...



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Questions?





Non-Systematic Management

- Partial programs result in partial control
- Partial control results in reductions in losses
 - ie. fewer PI's
- Fewer PI's result in less “natural exposure”
- Less “natural exposure” results in a higher proportion of at risk females
- Higher proportions of at risk females can mean a “wreck” if unmanaged

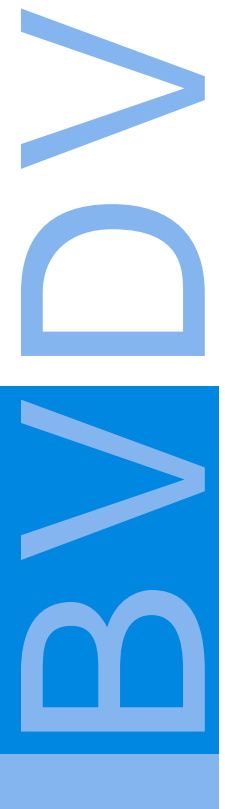
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Random PI Hunting



Auto Vaccination: Can we do better?





Auto Vaccination Considerations

- Auto vaccinators must be confirmed as Persistently Infected
- Ensure sufficient time for “Auto Vaccinated” animals to recover prior to mating
 - Transient infection is highly immune suppressive and interferes with ovarian function
- PI animals are susceptible to illness and can act as reservoirs and/or multipliers of disease



Auto Vaccination Considerations

- Mismatched heifers or adjacent pregnancies represent considerable risk
 - Potential liability regarding neighbors
- “Auto Vaccinated” animals should be screened for evidence of seroconversion
- If effective, maintaining a safe supply of PI animals is difficult
- PI animals usually die prematurely, painfully, and without salvage value

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~~Auto Vaccination~~

Strategic Infection





Blanket Vaccination

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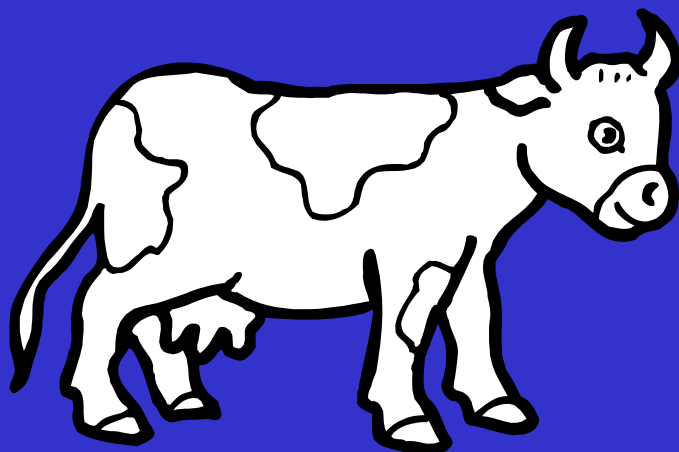


Pestigard

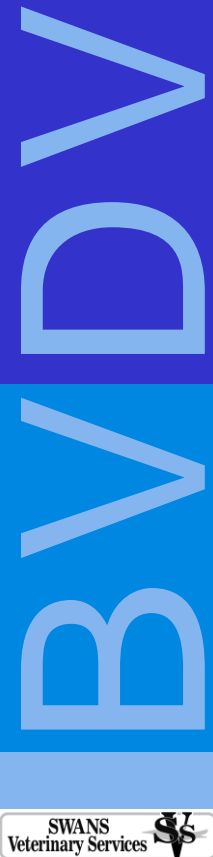
- Vaccination
 - Two doses of Pestigard initially
 - At least four weeks apart
 - No further than six months apart
 - Second dose preferably a month prior to joining
 - Boosters annually thereafter
 - At least a month prior to joining
 - Prior to calving is appropriate
 - No calves at foot
 - Inclusion of antibody in colostrum

Level of Challenge

Acute Infection

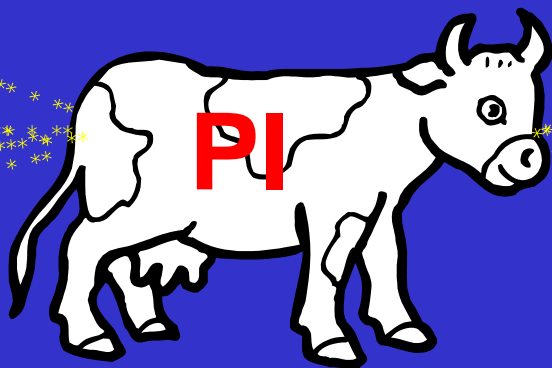
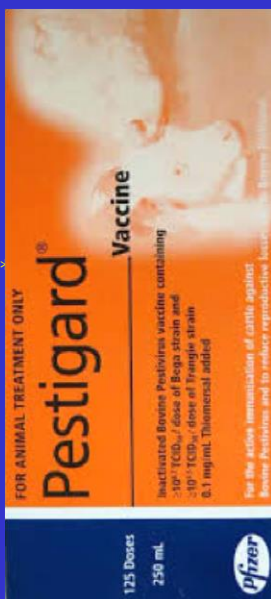


Shed 1,000 to 10,000 virus per ml of secretion
for only 7 to 10 days



Level of Challenge

Persistent infection



Shed 1,000,000 to 1,000,000,000 virus per ml of secretion
for their ENTIRE life



Do Nothing



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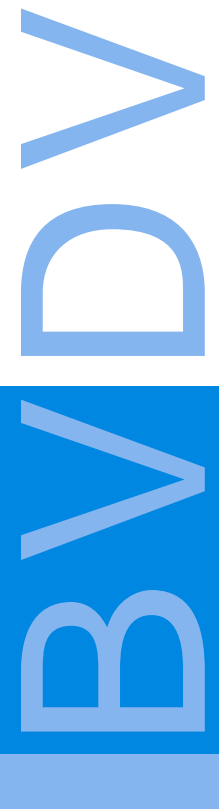

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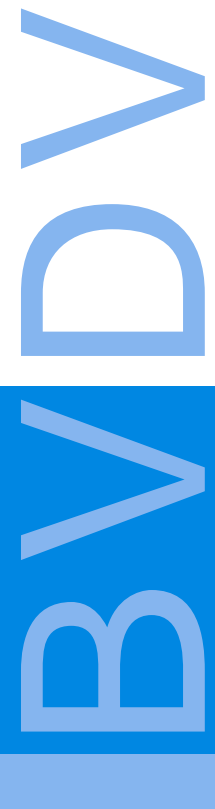
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What We Know...



We know it is all about timing...





What We Know...

- Persistently Infected (PI) animals are responsible for almost all transmission of the BVDV virus
- PI animals typically live shortened lives
- Animals of reproductive age without immunity to BVDV are likely to suffer significant production losses should they meet a PI
- Animals in contact with PI animals typically become infected with BVDV and mount relatively long lasting immunity

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Therefore...

- If we ensure that every new group of replacement heifers is **both** immune and PI free
 - The replacement heifers will not represent a risk to other management groups
 - The replacement heifers will be less likely to produce PI calves
 - Over time, the entire adult population will become:
 - PI Free
 - Immune

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Systematic BVDV Control

- Initially Screen All Management Groups for Evidence of Immunity (Herd Profiling)
 - Don't Vaccinate Immune Groups
 - Vaccinate Naive Groups
- Annually Screen Heifers for Evidence of Immunity and Presence of PI Heifers Prior to Joining
 - Vaccinate Seronegative Management Groups
 - Ear Notch Seropositive Management Groups

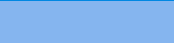
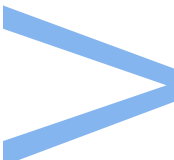


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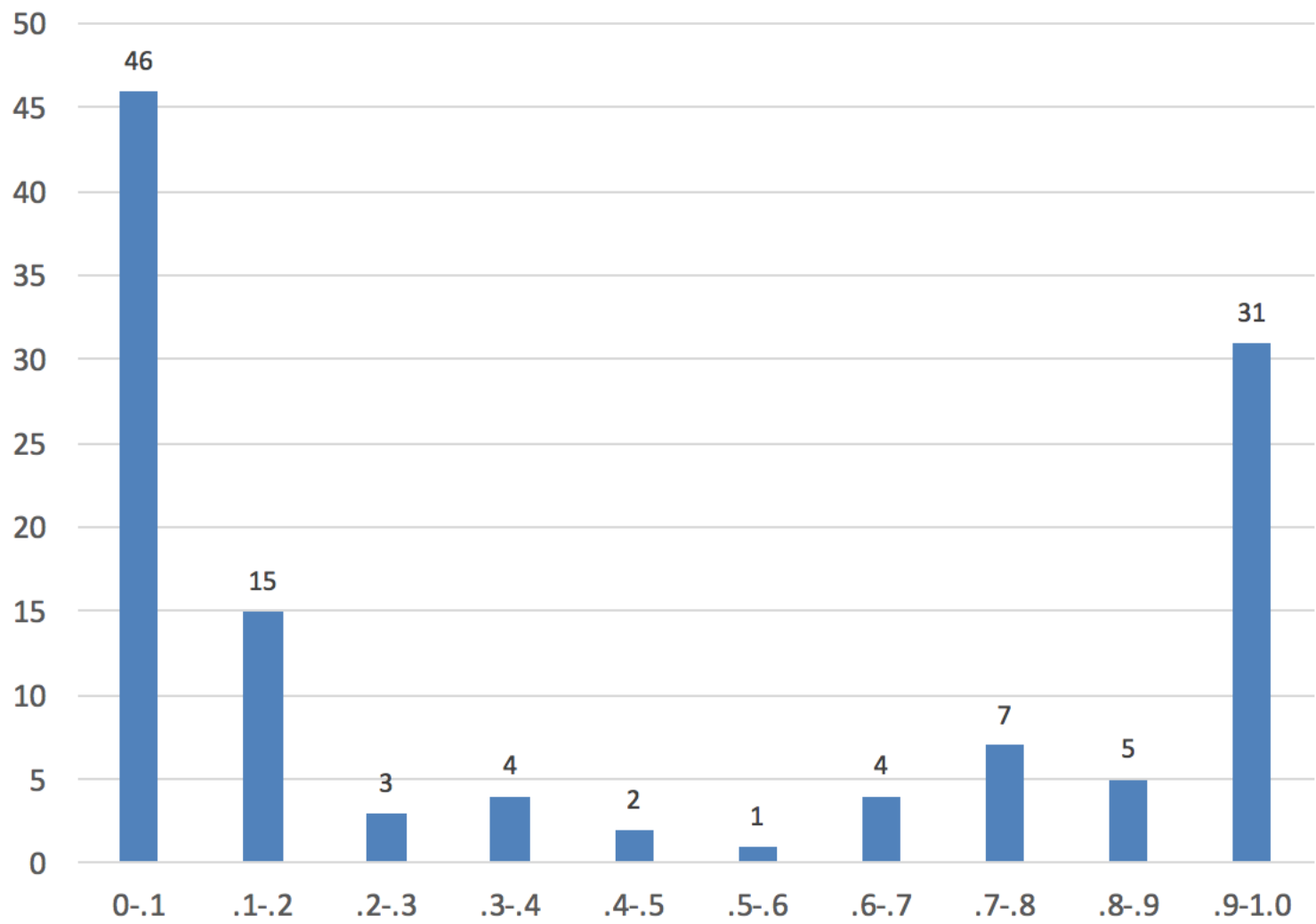
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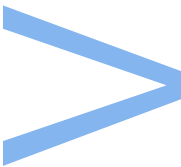
Future
Beef

IDEXX



Proportion Seropositive

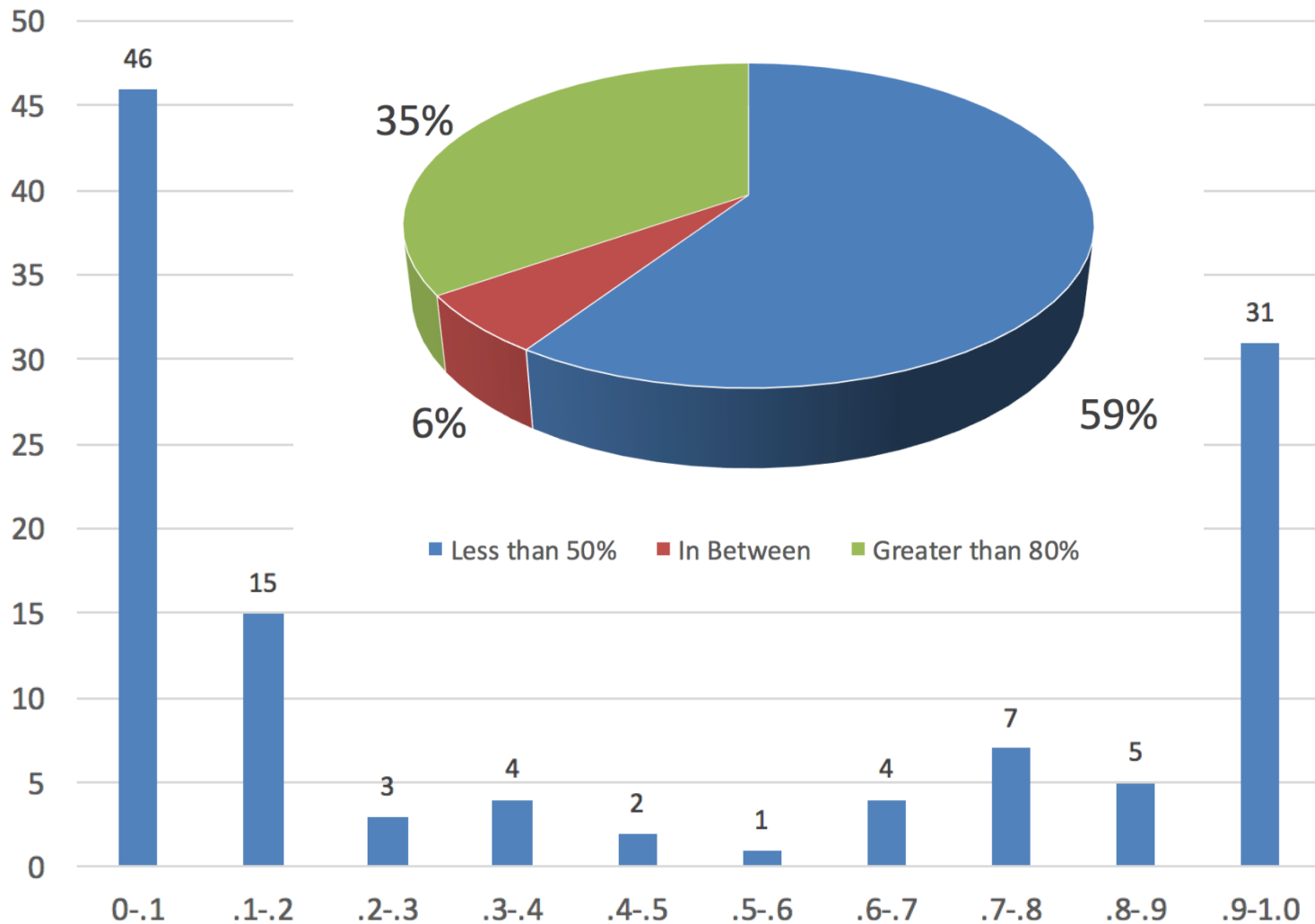




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Proportion Seropositive





BVDV

Bovine Viral Diarrhoea Virus

MANAGEMENT GUIDE

- Beef Edition -



Australian Cattle Veterinarians
a special interest group of the Australian Veterinary Association

BVDV

BVDV

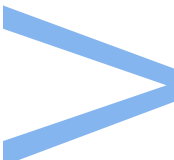
SWANS
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CENTRAL


**Future
Beef**

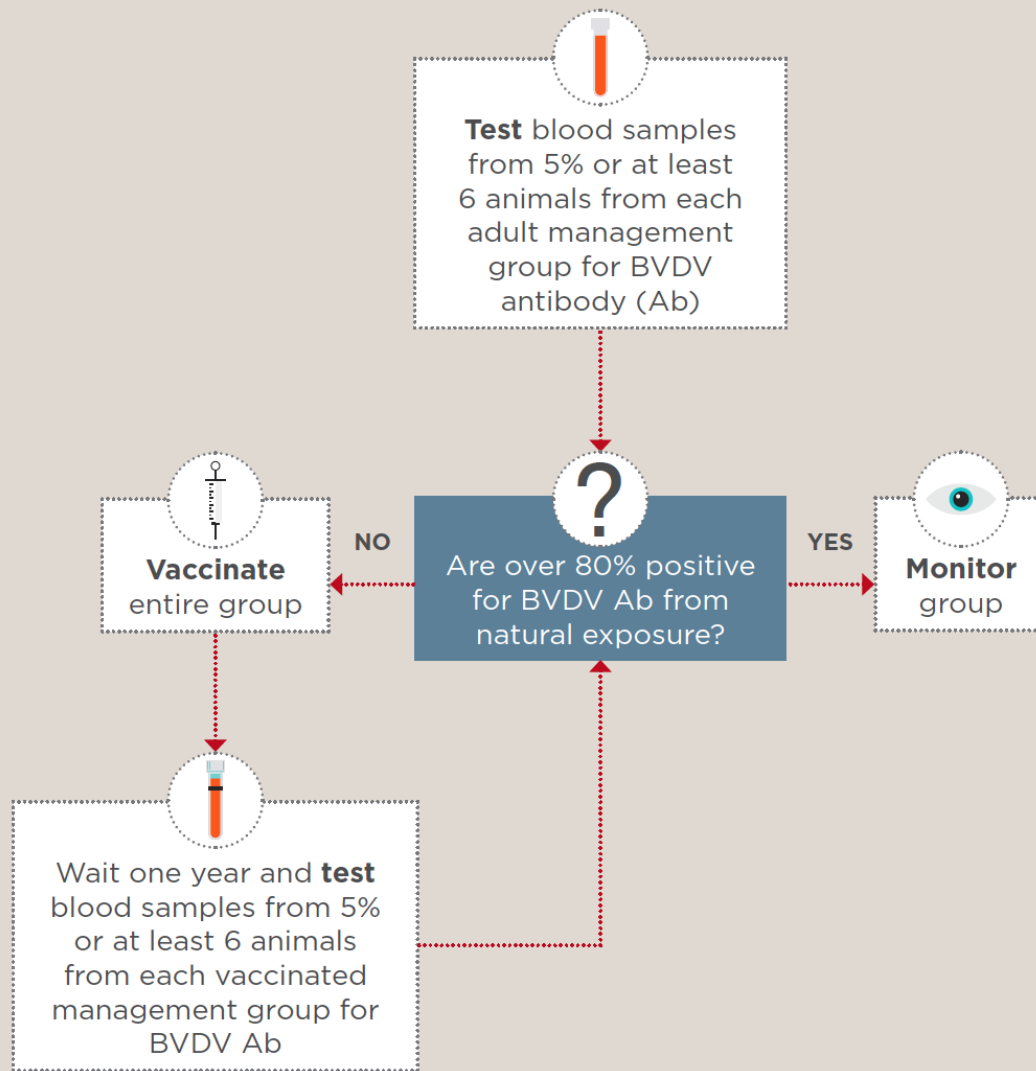
IDEXX

29th September 2016



ESTABLISHING ADULT MANAGEMENT GROUP INDIVIDUAL RISK AND IMMUNE STATUS

Animals from each management group need to have been in stable contact for at least two months without new additions





End of the Road?



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IDEXX

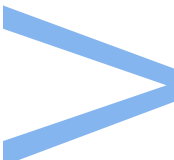
29th September 2016



My Goal:

To See Every Group of Australian Replacement Heifers Screened Annually for Immunity to BVDV Prior to Mating





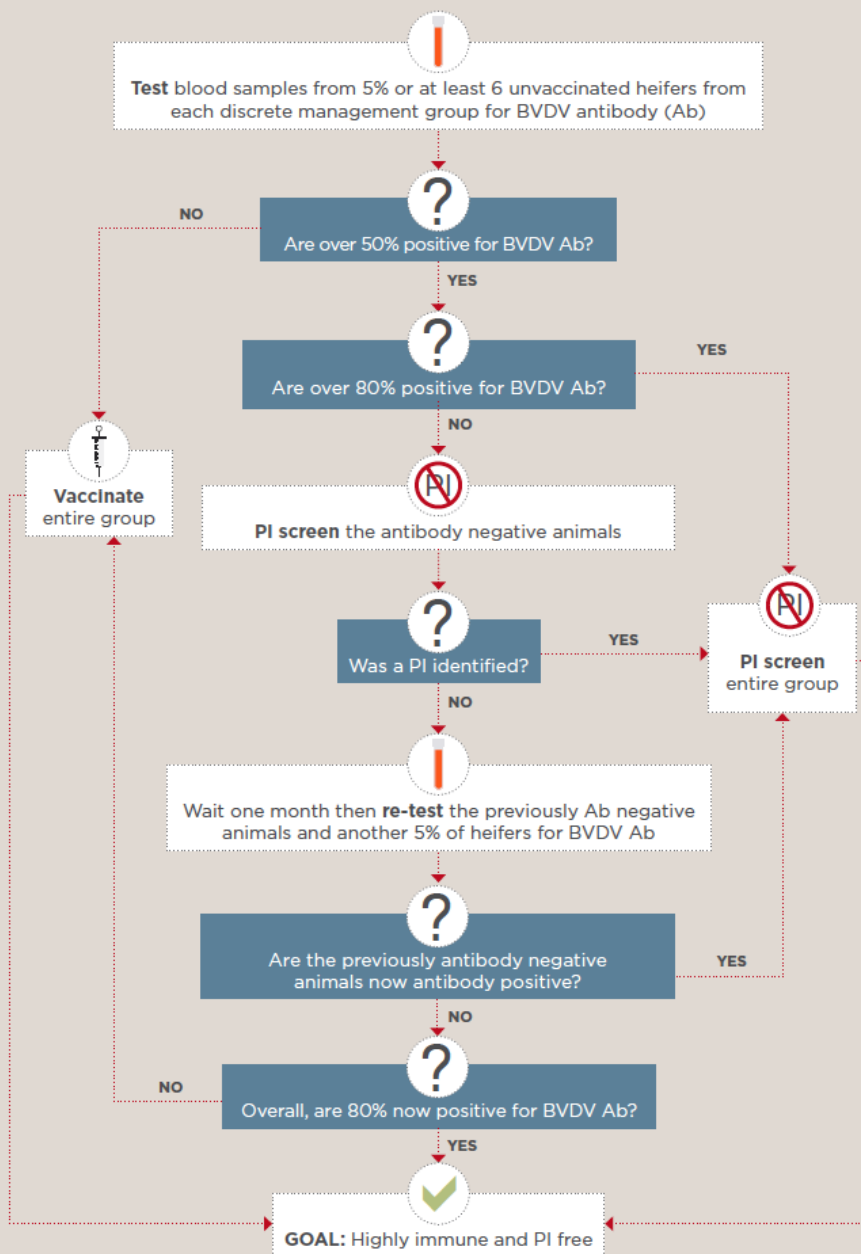
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ANNUAL HEIFER PRE MATING SCREENING

Heifers must be at least 8 months old and have been in stable contact for at least 2 months

Test blood samples from 5% or at least 6 unvaccinated heifers from each discrete management group for BVDV antibody (Ab)





V

D

V

B

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IDEXX

ANNUAL HEIFER PRE MATING SCREENING

Heifers must be at least 8 months old and have been in stable contact for at least 2 months



Test blood samples from 5% or at least 6 unvaccinated heifers from each discrete management group for BVDV antibody (Ab)



NO

Are over 50% positive for BVDV Ab?

YES



Are over 80% positive for BVDV Ab?

NO



Vaccinate
entire group

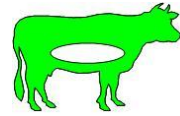
YES



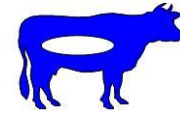
PI screen
entire group



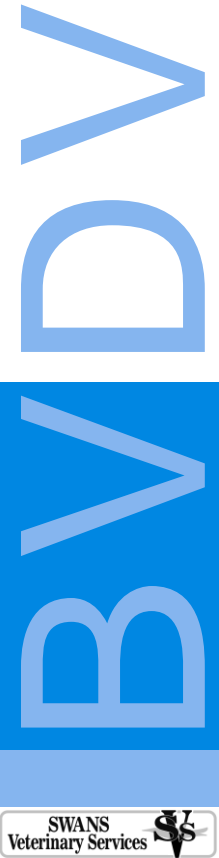
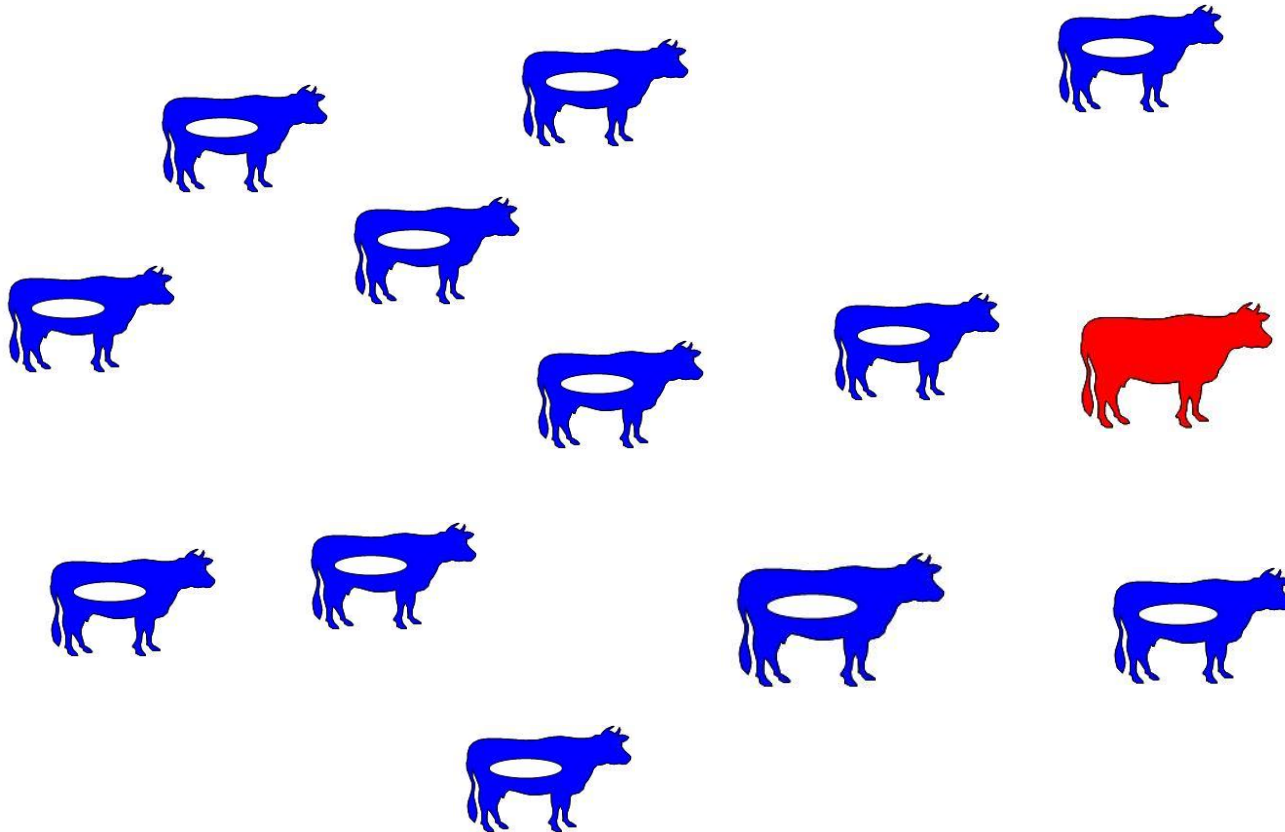
Y Heifer Mob



Naive

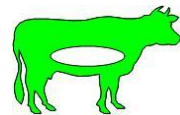


Immune

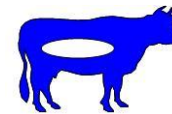




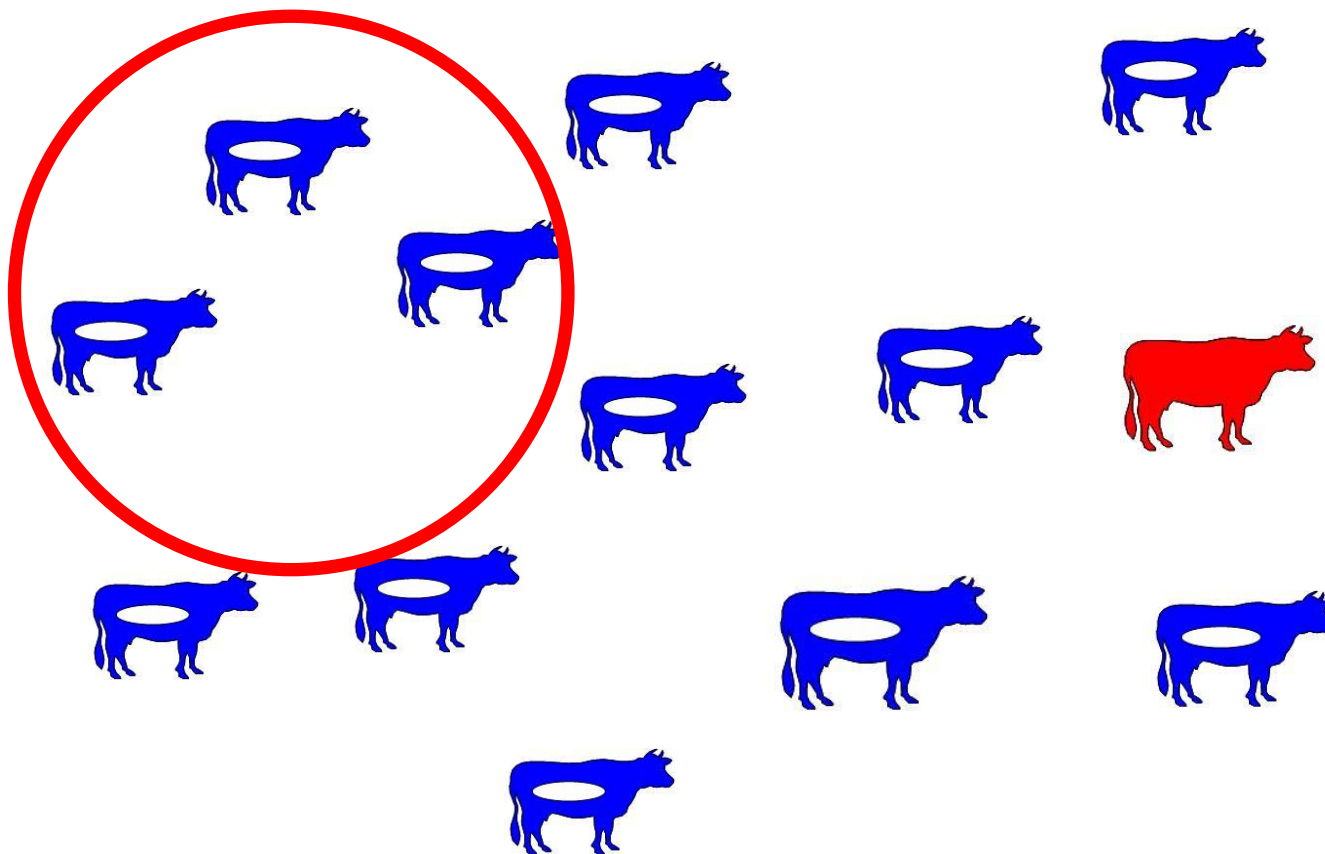
Y Heifer Mob



Naive



Immune



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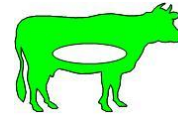

Future
Beef

IDEXX

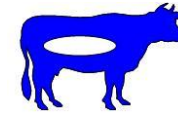
29th September 2016



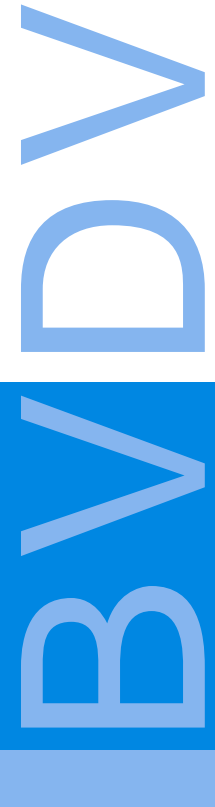
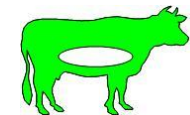
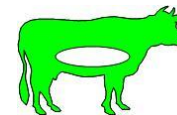
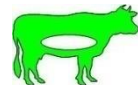
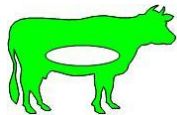
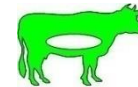
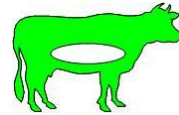
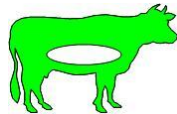
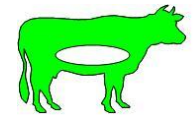
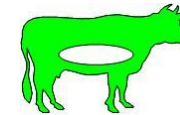
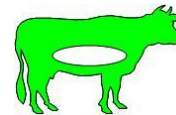
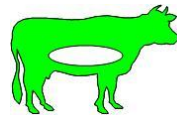
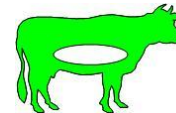
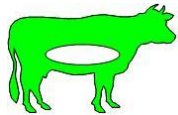
Z Heifer Mob



Naive



Immune



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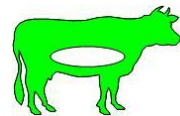
BEEF
CENTRAL

Future
Beef

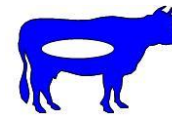
IDEXX



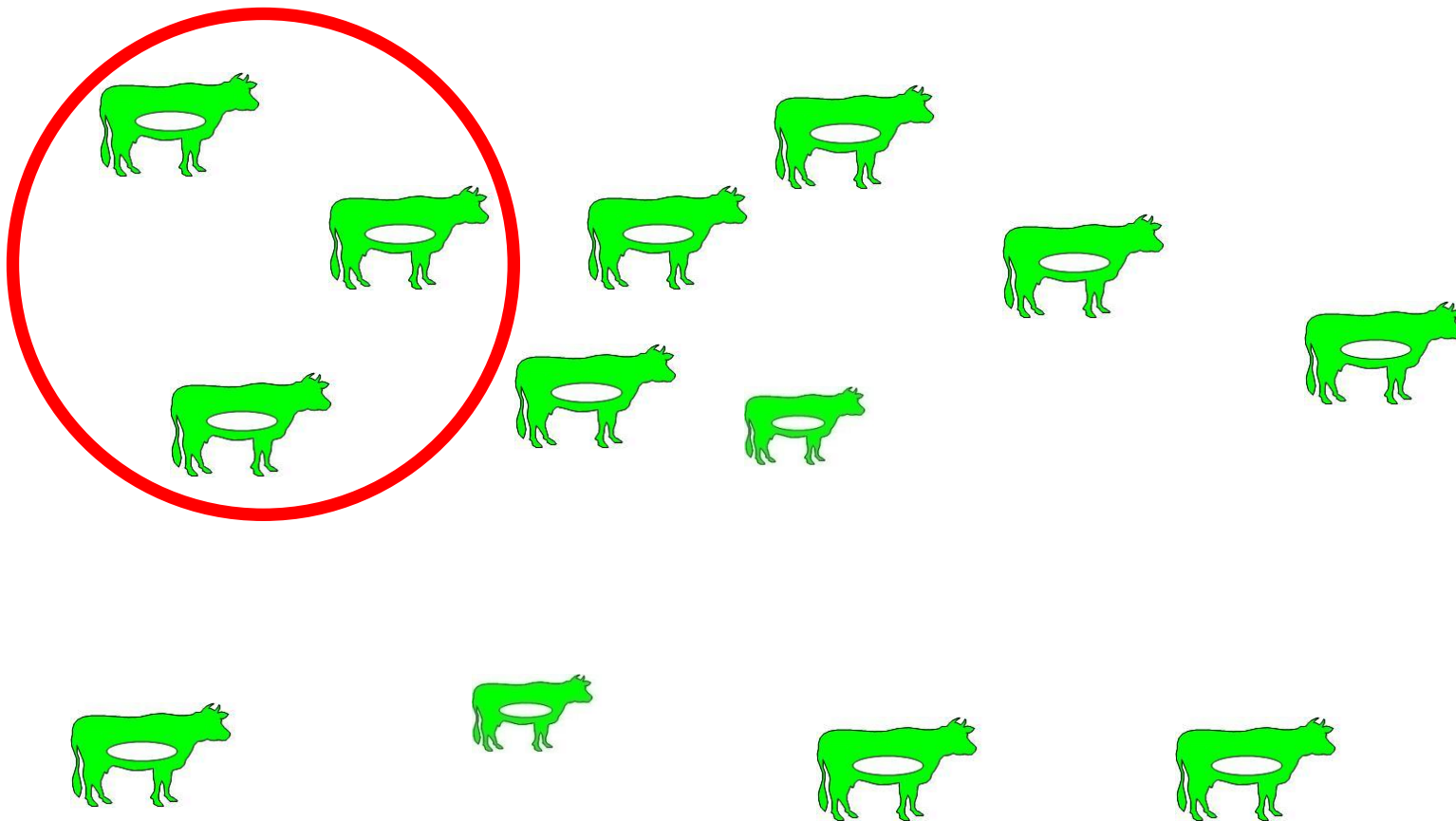
Z Heifer Mob



Naive



Immune



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IDEXX

29th September 2016



Mixed Antibody Results

- Four Basic Reasons
 - Heifers without immunity to BVDV are Persistently Infected (PI Present)
 - Historic Exposure
 - Some of the heifers were exposed to BVDV prior to commingling (No PI)
 - Ongoing Exposure
 - One or more of the untested heifers from the mob is a PI (PI Present)
 - The heifers are being exposed to BVDV from outside of the group (No PI)



V

D

V

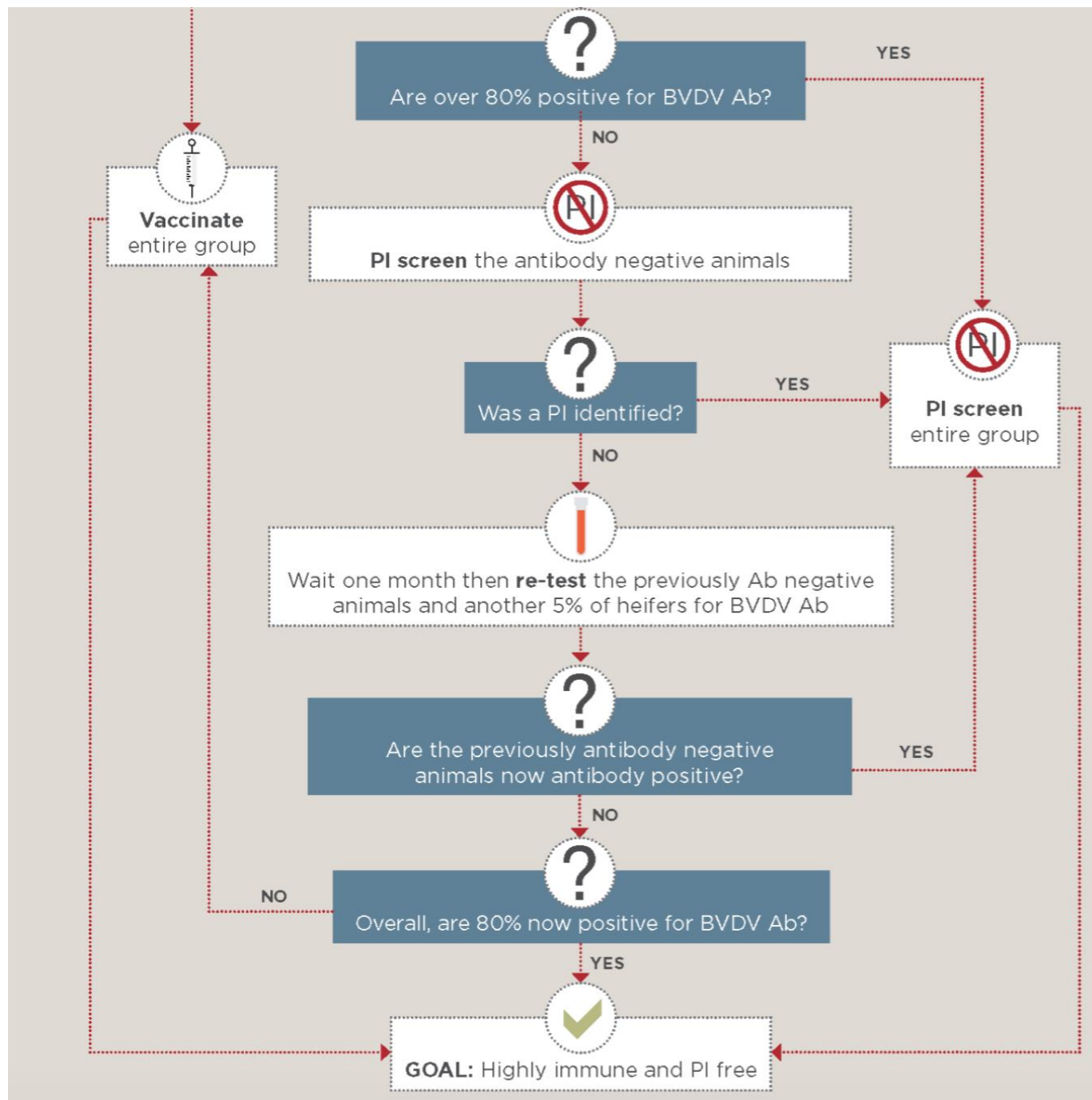
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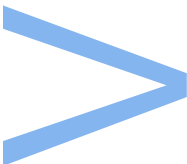
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CENTRAL


**Future
Beef**

IDEXX





BVDV Laboratory
BVDV Blood/Serum Testing Results

Address: Lot 83 Sheldon Road, Esperance, WA 6450 Phone: 08 90715777 Email: lab@swansvet.com

Submission Details:

Report date: **12.04.16** Invoice No.: **170455**
Vet details: **Terang Vet Clinic** Client details: **Milky Towers**
6773 Princes Highway
Terang VIC 3264

Collection date: **06.04.16** No. of Samples: **06**

BVDV Antibody Results:

Sample ID	Animal ID	Result	S/P Ratio
Uno Farm			
A1	15111	Negative	0.01
A2	15094	Negative	0.01
A3	15061	POSITIVE	1.20
A4	15079	Negative	0.03
A5	1504	Negative	-0.12
Dos Farm			
B1	15151	POSITIVE	0.96
B2	15189	POSITIVE	1.34
B3	15290	POSITIVE	1.11
B4	15197	Negative	0.21
B5	15161	Negative	0.03
B6	15230	POSITIVE	1.18
Tres Farm			
C1	15305	POSITIVE	1.00
C2	15412	POSITIVE	0.99
C3	15400	POSITIVE	1.24
C4	15341	POSITIVE	1.32
C5	15398	POSITIVE	1.60
C6	15311	Negative	0.00

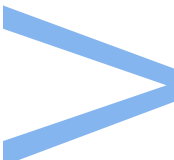
Sample interpretation:

<0.3	≥0.3	≥0.65
Negative	Weak Positive	Positive

Your Interpretation:

Enoch Bergman DVM
Swans Veterinary Services
Box 1514 Esperance WA 6450
Surgery: 08 9071 5777
Mobile: 0427 716 907
www.swansvet.com

29th September 2016



BVDV Laboratory
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B3	15190	POSITIVE	1.11
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C5	15398	POSITIVE	1.60
C6	15311	Negative	0.00

17%

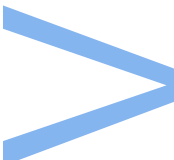
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C3	15400	POSITIVE	1.24
C4	15341	POSITIVE	1.32
C5	15398	POSITIVE	1.60
C6	15311	Negative	0.00

83%

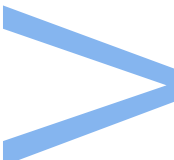
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67%

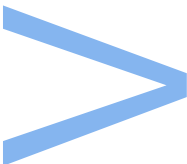
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www.swansvet.com





BVDV Laboratory
BVDV Blood/Serum Testing Results

Address: Lot 83 Sheldon Road, Esperance, WA 6450 Phone: 08 90715777 Email: lab@swansvet.com

Submission Details:

Report date: **17.05.16** Invoice No.: **180036**
Vet details: **Terang Vet Clinic** Client details: **Milky Towers**
6773 Princes Highway
Terang VIC 3264
Collection date: **12.05.16** No. of Samples: **09**

BVDV Antibody Results:

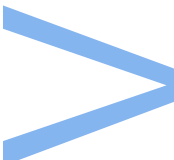
Sample ID	Animal ID	Result	S/P Ratio
Dos Farm			
E1	15176	Negative	0.03
E2	15160	Negative	0.09
E3	15199	Negative	0.24
E4	15161	Negative	0.03
E5	15230	Negative	0.00
E6	15298	Negative	0.05
E7	15217	POSITIVE	1.23
E8	15266	POSITIVE	1.33

Sample interpretation:

<0.3	≥0.3	≥0.65
Negative	Weak Positive	Positive

Your Interpretation:

Enoch Bergman DVM
Swans Veterinary Services
Box 1514 Esperance WA 6450
Surgery: 08 9071 5777
Mobile: 0427 716 907
www.swansvet.com



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BVDV Laboratory
BVDV Blood/Serum Testing Results

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6773 Princes Highway
Terang VIC 3264
Collection date: **06.04.16** No. of Samples: **06**

BVDV Antibody Results:

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Uno Farm			
A1	15111	Negative	0.01
A2	15094	Negative	0.01
A3	15061	POSITIVE	1.20
A4	15079	Negative	0.03
A5	1504	Negative	-0.12
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C3	15400	POSITIVE	1.24
C4	15341	POSITIVE	1.32
C5	15398	POSITIVE	1.60
C6	15311	Negative	0.00

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Negative	Weak Positive	Positive

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E5	15230	Negative	0.00
E6	15298	Negative	0.05
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E8	15266	POSITIVE	1.33

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Surgery: 08 9071 5777
Mobile: 0427 716 907
www.swansvet.com



= 6/12
= 50%





End of the Road?



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Beef

IDEXX

29th September 2016



My Goal:

To See **Every** Group of Australian Replacement Heifers Screened **Annually** for Immunity to BVDV Prior to Mating

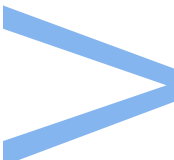


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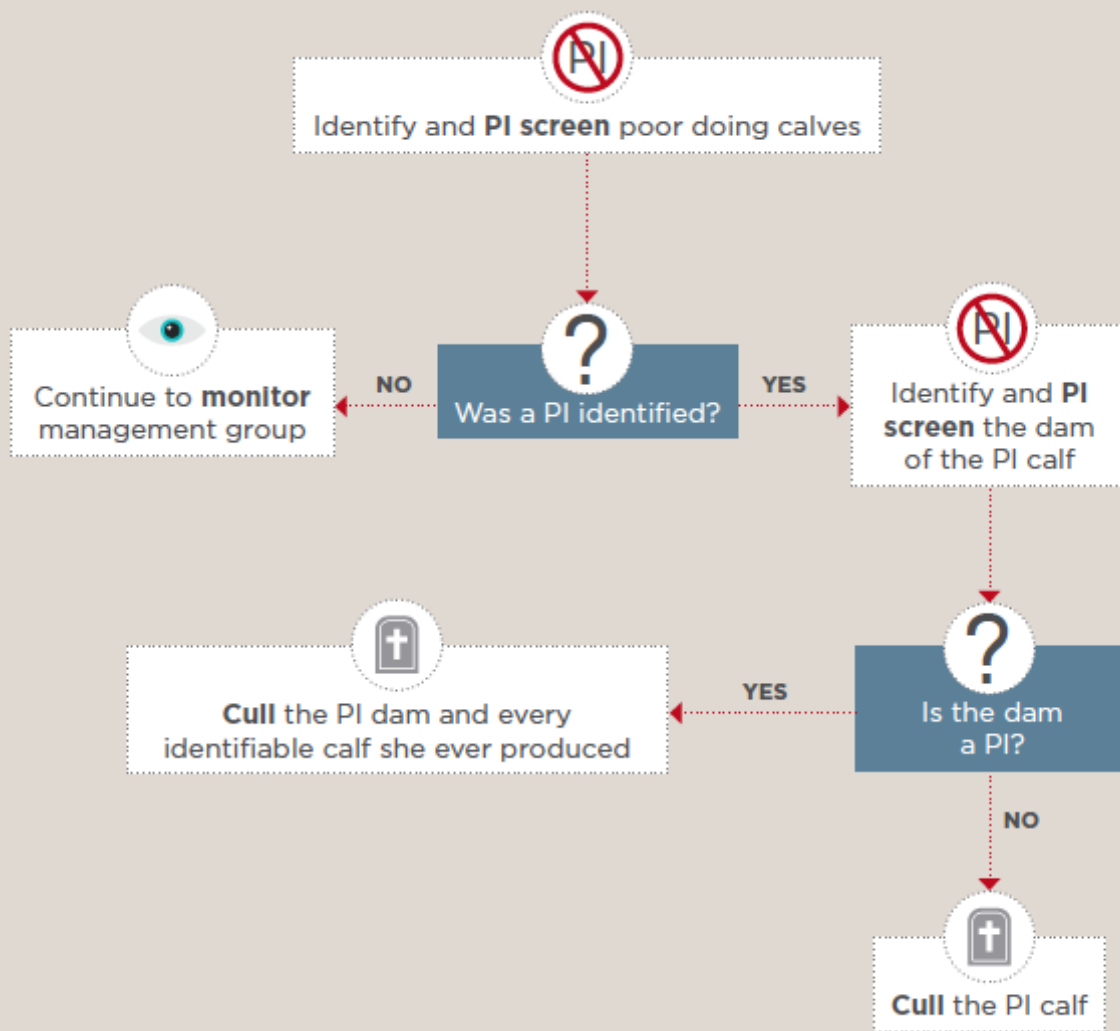
BEEF
CENTRAL


Future
Beef

IDEXX



NON-SYSTEMATIC STRATEGY TO IDENTIFY ADULT PI'S IN STABLE IMMUNE MANAGEMENT GROUPS





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V
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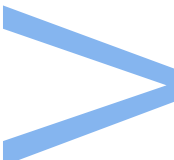
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CENTRAL


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Beef

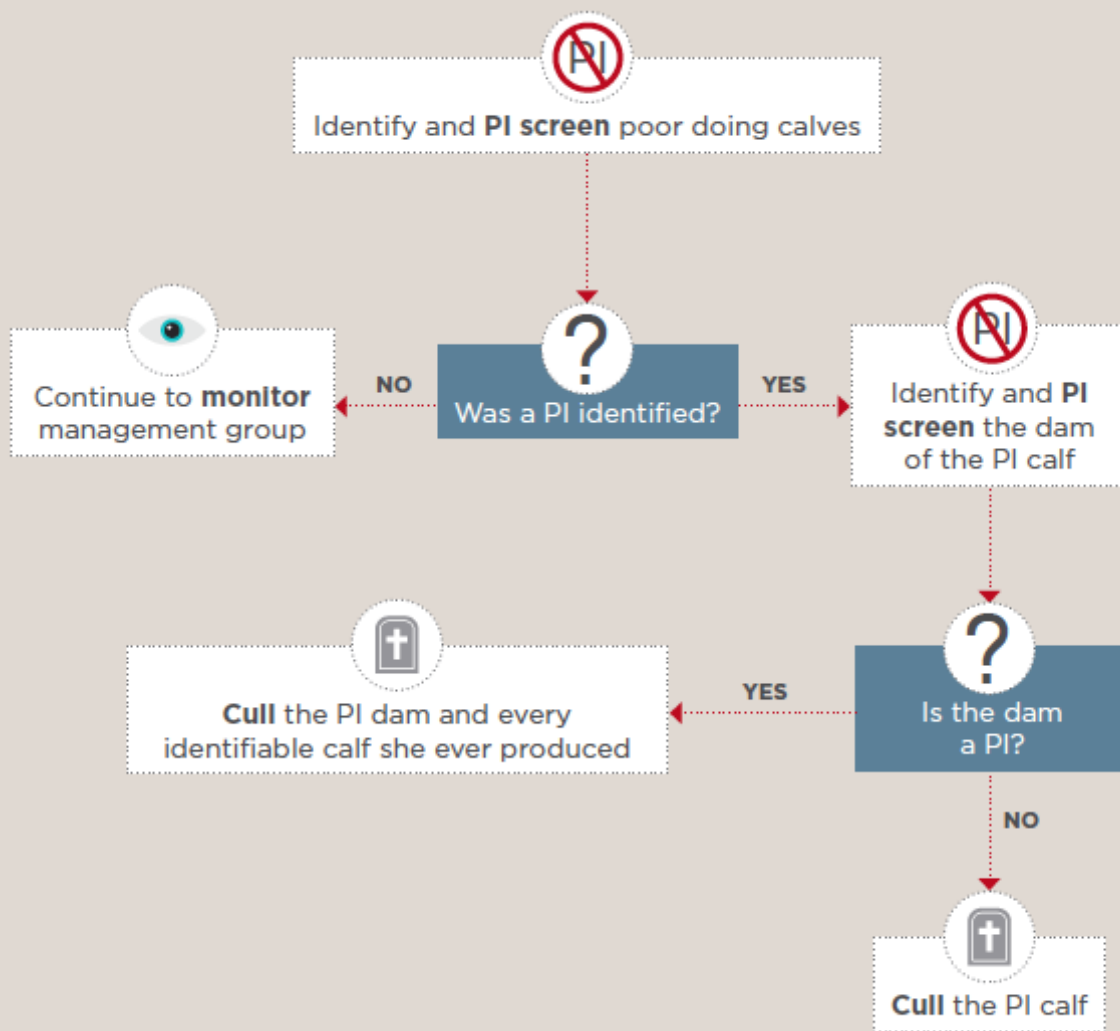
IDEXX

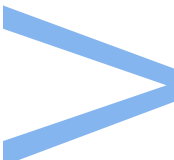


29th September 2016



NON-SYSTEMATIC STRATEGY TO IDENTIFY ADULT PI'S IN STABLE IMMUNE MANAGEMENT GROUPS





SYSTEMATIC STRATEGY TO IDENTIFY ADULT PI'S IN STABLE IMMUNE MANAGEMENT GROUPS



Test blood samples from 5% or at least 6 calves at a minimum of 6 months of age for BVDV antibody (Ab) at weaning prior to commingling with calves from other management groups



Are over 50% positive
for BVDV Ab?

NO

YES



PI screen the entire adult population
of the management group



Was a PI identified?

NO



Continue to **monitor**
management group

YES



Cull the PI dam and every identifiable
calf she ever produced



V
D
V
B

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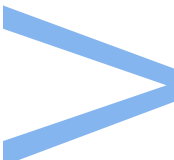
BEEF
CENTRAL


Future
Beef

IDEXX



29th September 2016



SYSTEMATIC STRATEGY TO IDENTIFY ADULT PI'S IN STABLE IMMUNE MANAGEMENT GROUPS



Test blood samples from 5% or at least 6 calves at a minimum of 6 months of age for BVDV antibody (Ab) at weaning prior to commingling with calves from other management groups



Are over 50% positive
for BVDV Ab?

NO

YES



PI screen the entire adult population
of the management group



Was a PI identified?

NO



Continue to **monitor**
management group

YES



Cull the PI dam and every identifiable
calf she ever produced



VD

VB

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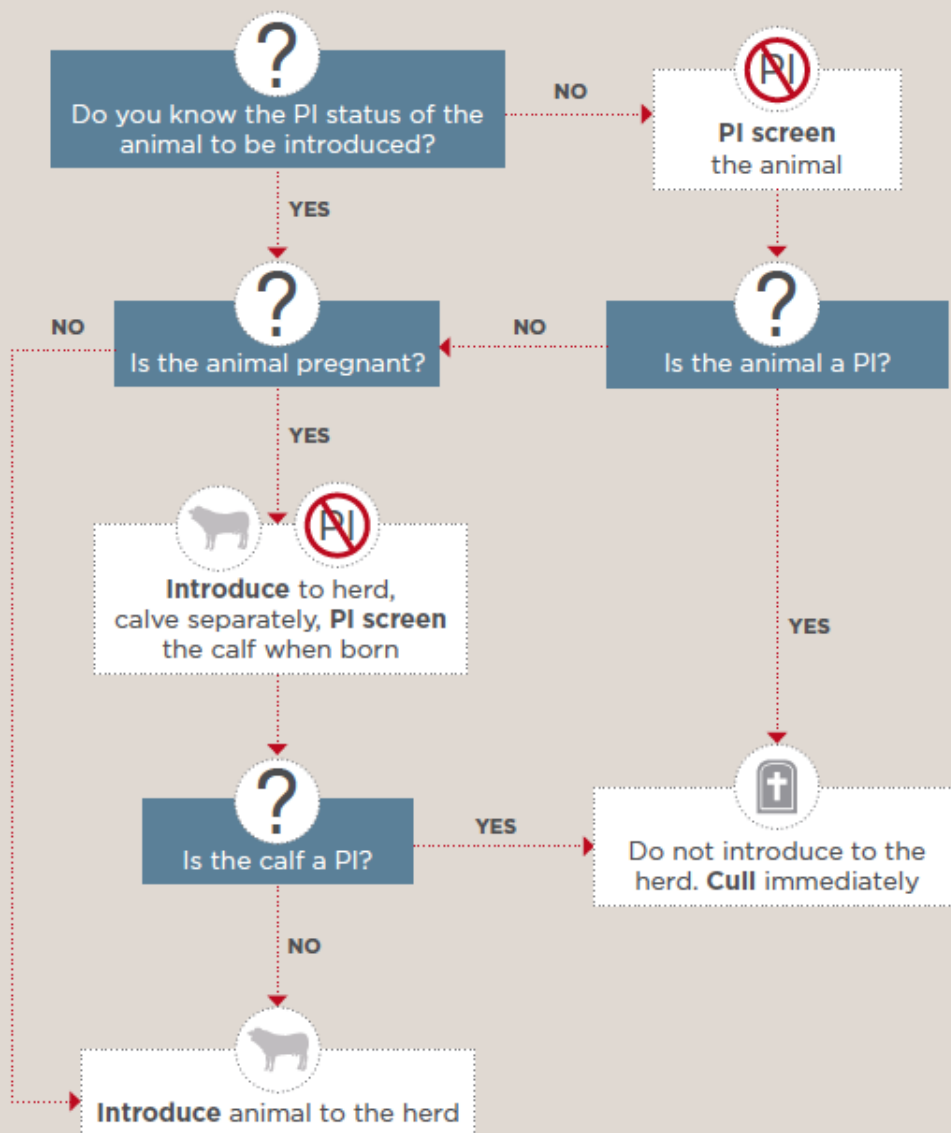
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IDEXX

BIOSECURITY: MANAGING INTRODUCTIONS & REINTRODUCTIONS

Including pregnant animals returning from off farm





V
D

V
B

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YOU LITTLE BASTARD.

YOU'VE KILLED US ALL.



V
D

V
B

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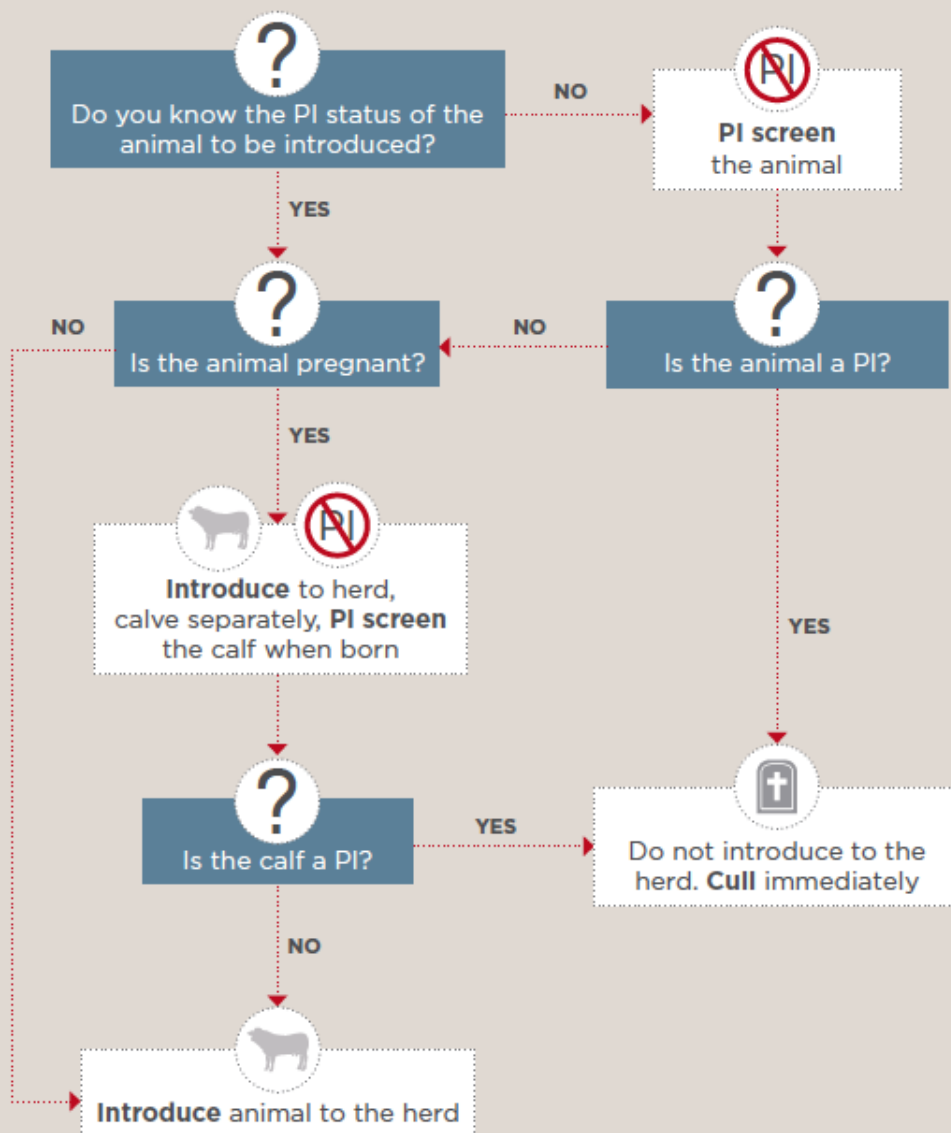
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IDEXX

BIOSECURITY: MANAGING INTRODUCTIONS & REINTRODUCTIONS

Including pregnant animals returning from off farm





What Now?

Stay on the Road!



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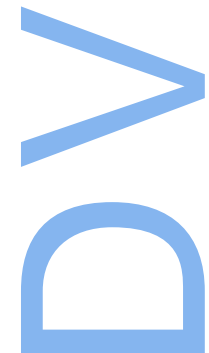

Future
Beef

IDEXX

29th September 2016

Key Points

- **PI Animals are the Enemy**
 - Vector from generation to generation and between production systems.
- **Disrupt the PI Link**
 - Vaccinate at risk females to prevent intrauterine exposure to BVDV.
 - Identify and remove PI animals.
 - Ongoing Simple Biosecurity
- **Systematic Approach**



Thank you for your attention

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-Know your BVDV Status – Call Your Vet



Thank you for your attention

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-Know your BVDV Status – Call Your Vet
-Vaccinate if Appropriate – Pestigard



Thank you for your attention

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- Know your BVDV Status – Call Your Vet**
- Vaccinate if Appropriate - Pestigard**
- Ear Notch Introductions if Appropriate**



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- Know your BVDV Status – Call Your Vet**
- Vaccinate if Appropriate - Pestigard**
- Ear Notch Introductions if Appropriate**
- Ear Notch Calves of Introductions if Appropriate**



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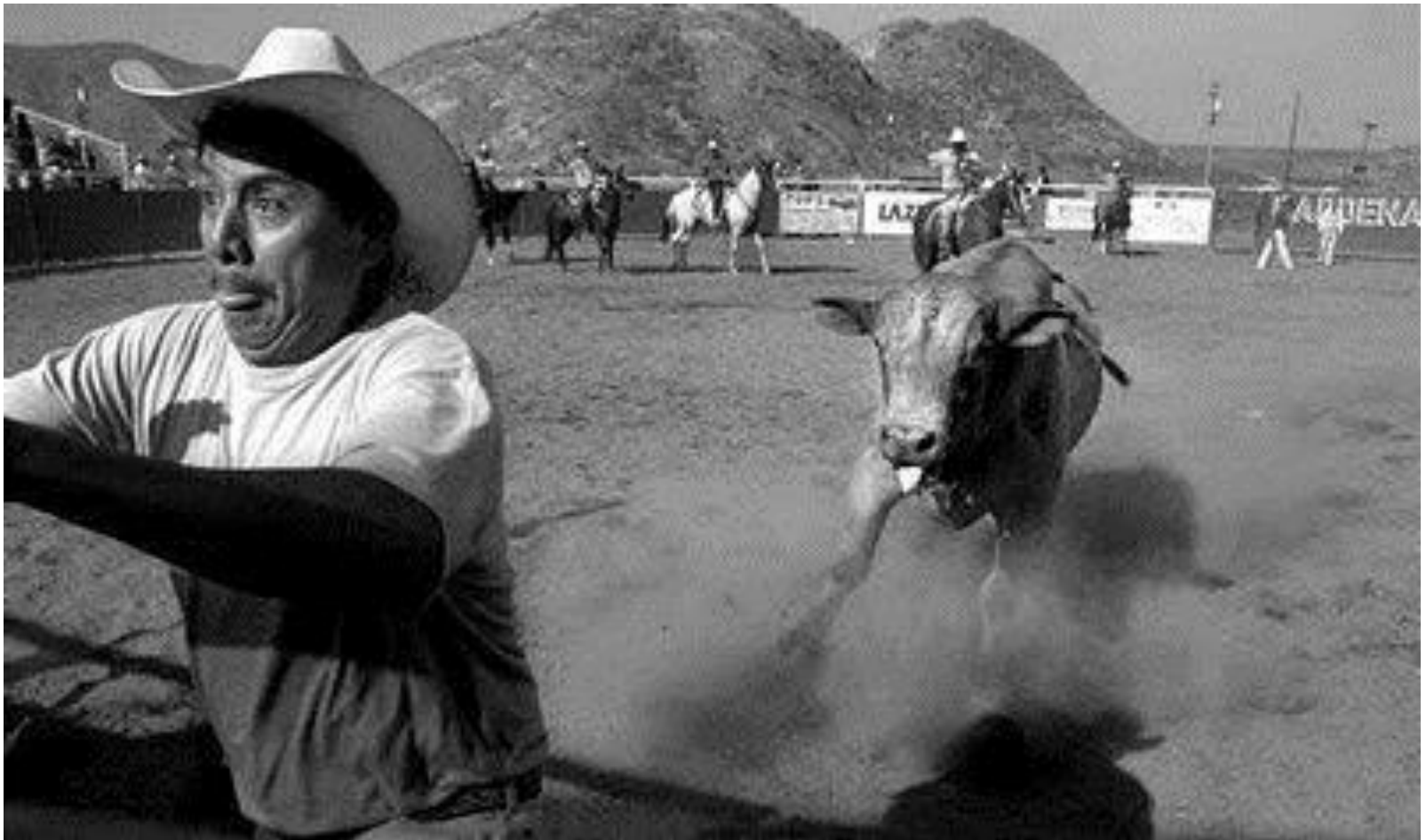
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- Know your BVDV Status – Call Your Vet**
- Vaccinate if Appropriate - Pestigard**
- Ear Notch Introductions if Appropriate**
- Ear Notch Calves of Introductions if Appropriate**
- Maintain Heifer Pre-mating Blood Testing**





Don't Turn Your Back on BVDV!



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Keep Looking!



V
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V
B

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Questions?

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A silhouette of a cow standing in a field at sunset, with a fence and trees in the background.

Thank you for your attention!

Thank you IDEXX, ACV, BVDV TAG, Beef Central, Future Beef, Paul Cusack, Scott Parry, Michael Reichel, Khyle Stewart, and Craig Wood.