

# Getting the Most out of a Vaccine Program

Prepared exclusively for the  
Range Beef Cow Symposium XIX  
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Charles L. Stoltenow, DVM, Diplomate ACVPM

Associate Professor, Extension Veterinarian

Animal and Range Sciences, North Dakota State University

“If pro is opposite of con,  
then what is the opposite of progress?

Congress??”

Men’s Restroom  
House of Representatives  
Washington, D.C.

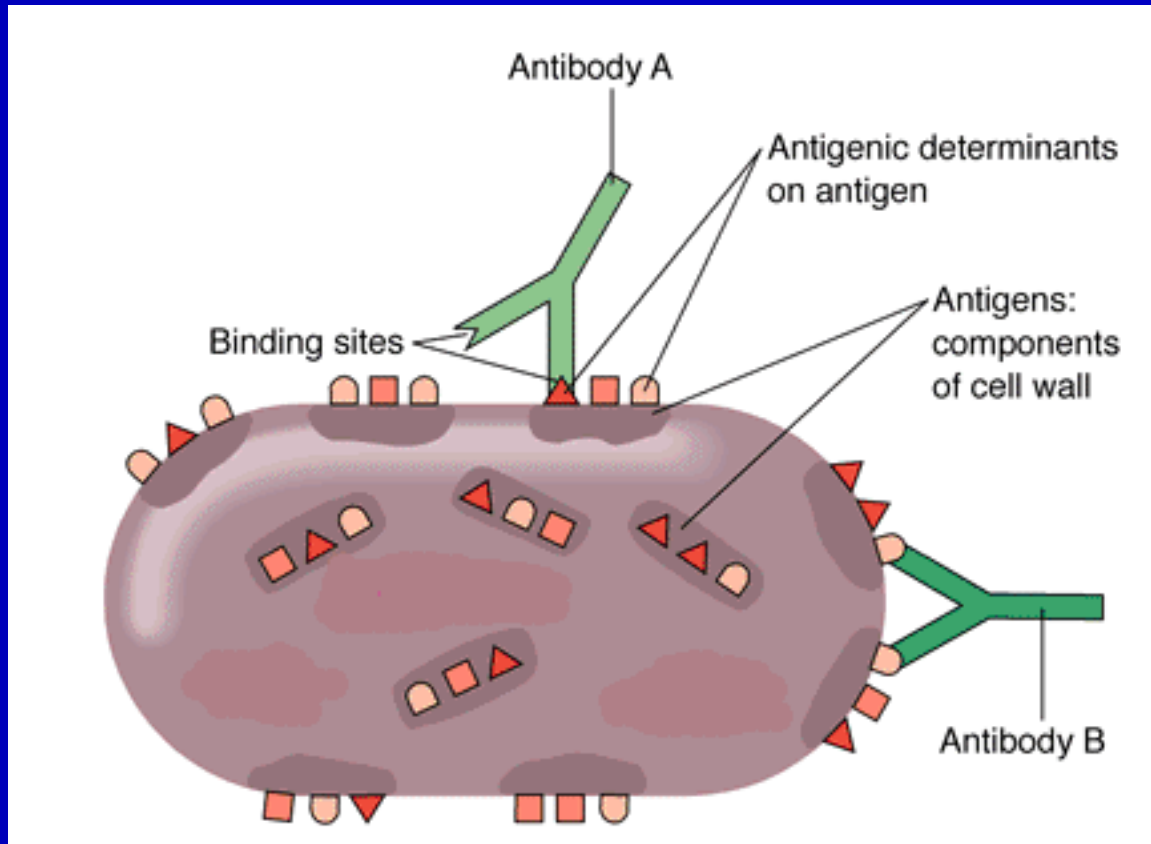
All of my health programs  
start with nutrition.

*-Tim Richards, DVM, Kamuela, HI*

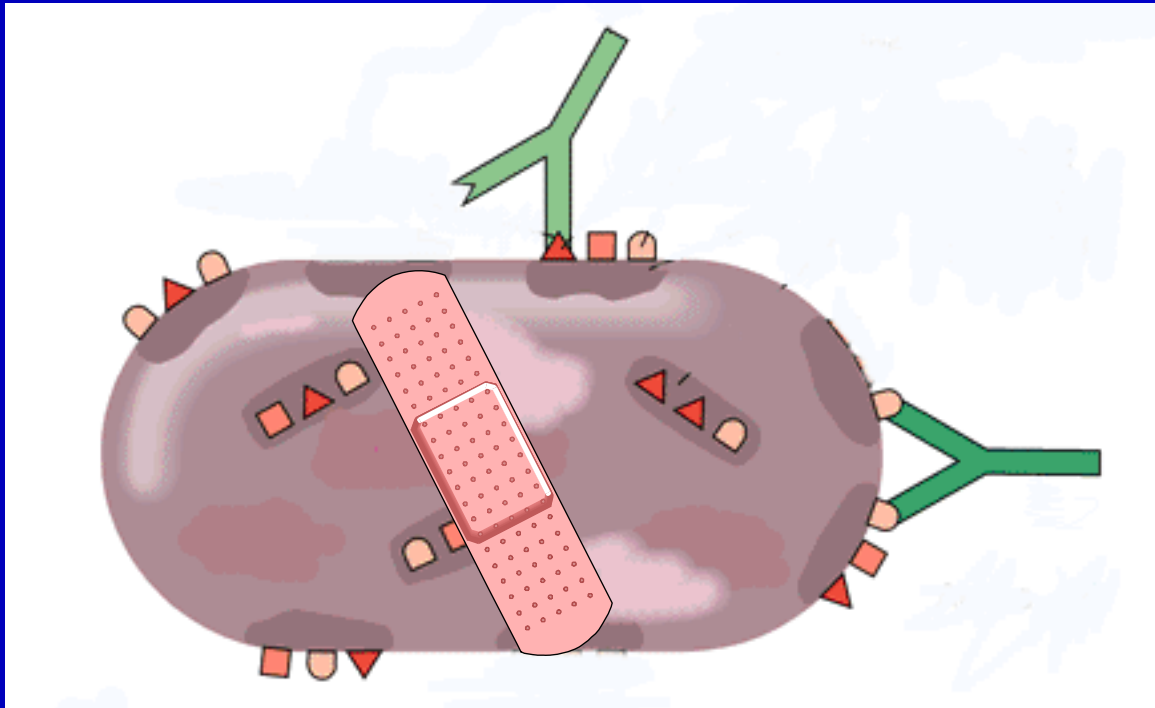
# Vaccinations

## Risk Management

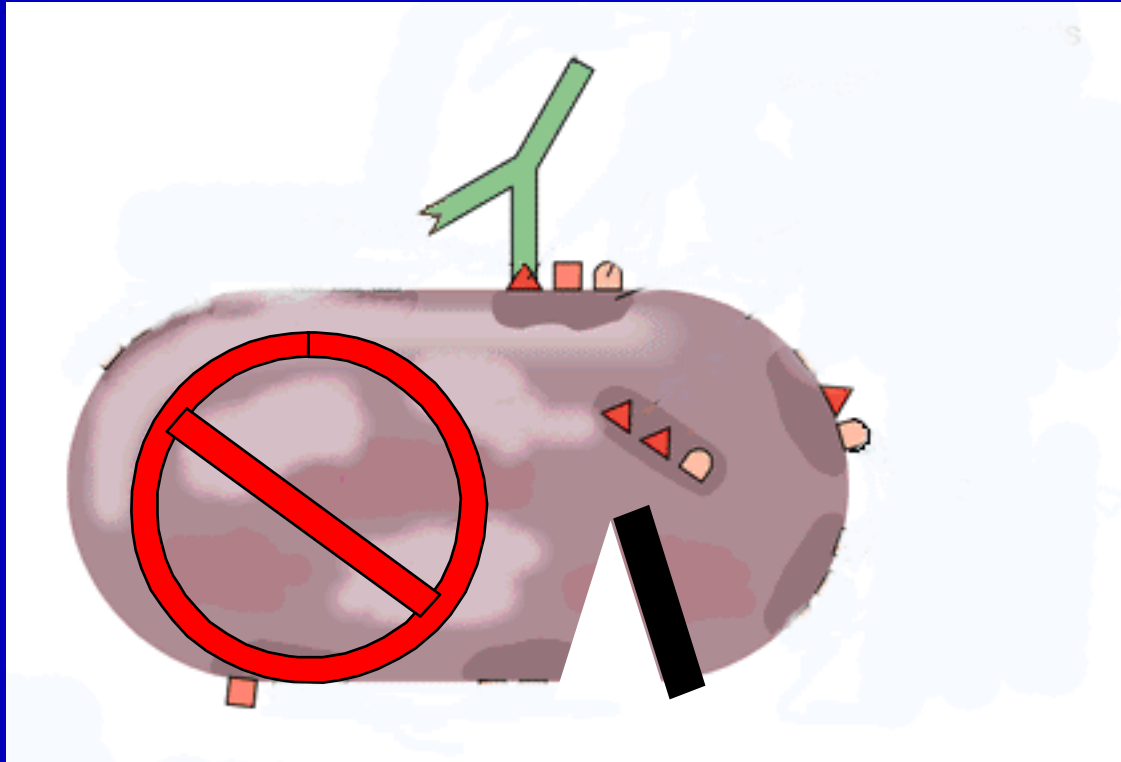
# Wild-type Virus



# Modified-Live Virus



# Killed Virus



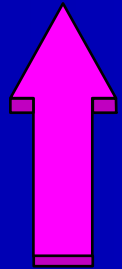
# Type of Vaccine

- Modified Live
  - Strong immune response
  - Fewer doses required
  - Interferon production
  - Cell mediated immunity
  - Resemble pathogenic form more closely
- Killed
  - More stable in storage
  - Unlikely to cause disease due to residual virulence or reversion of virulence

# The Future of Vaccines

- Recombinant Vaccines
  - “All dressed up with nowhere to go!”
- DNA Vaccines
  - “The enemy is among us!”

# Challenge vs. Resistance

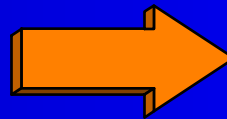


**Amount of  
Antibody  
Present in  
Serum**

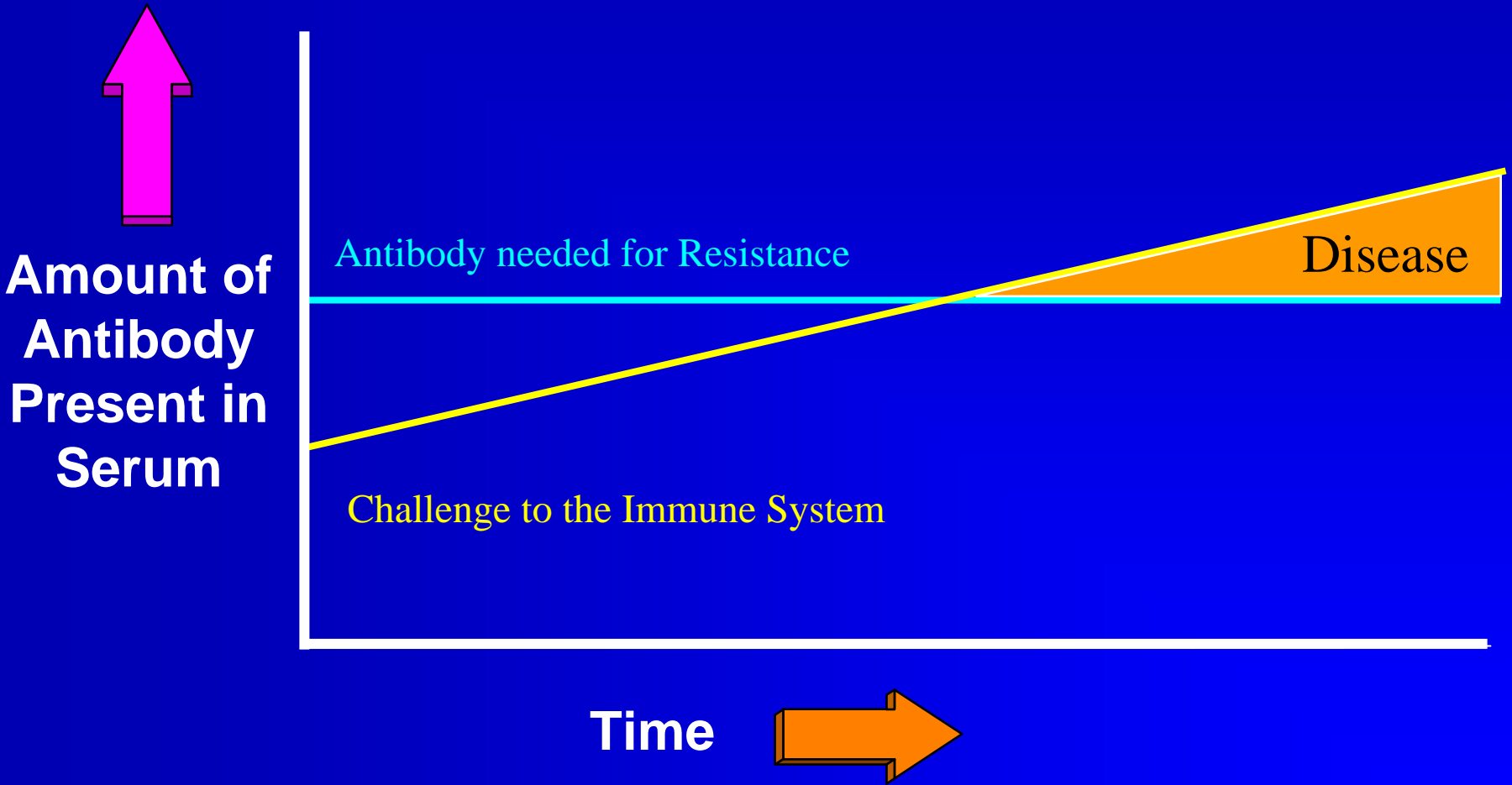
Antibody needed for Resistance

Challenge to the Immune System

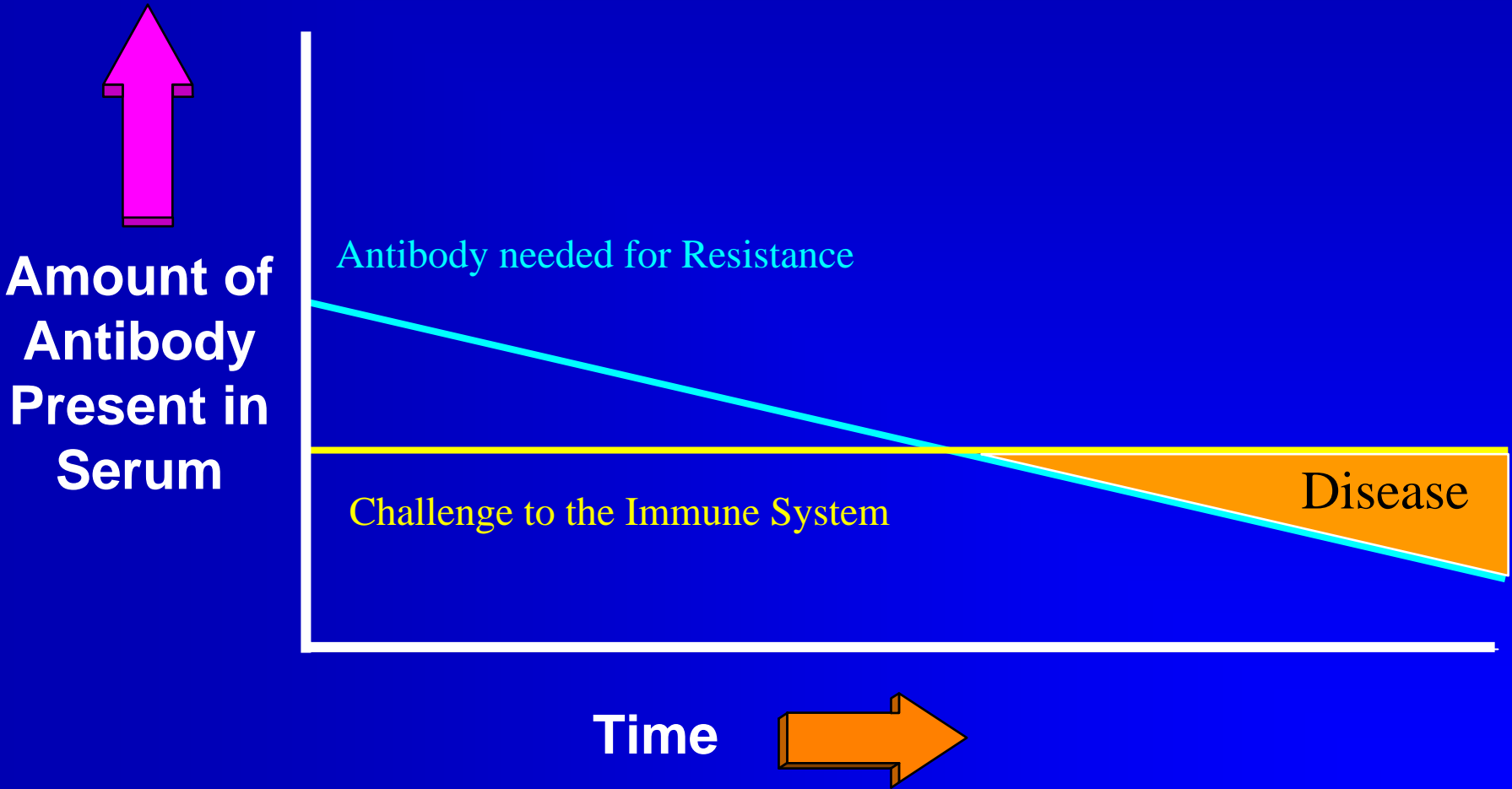
**Time**



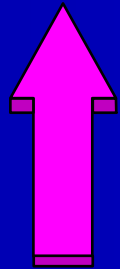
# Challenge vs. Resistance



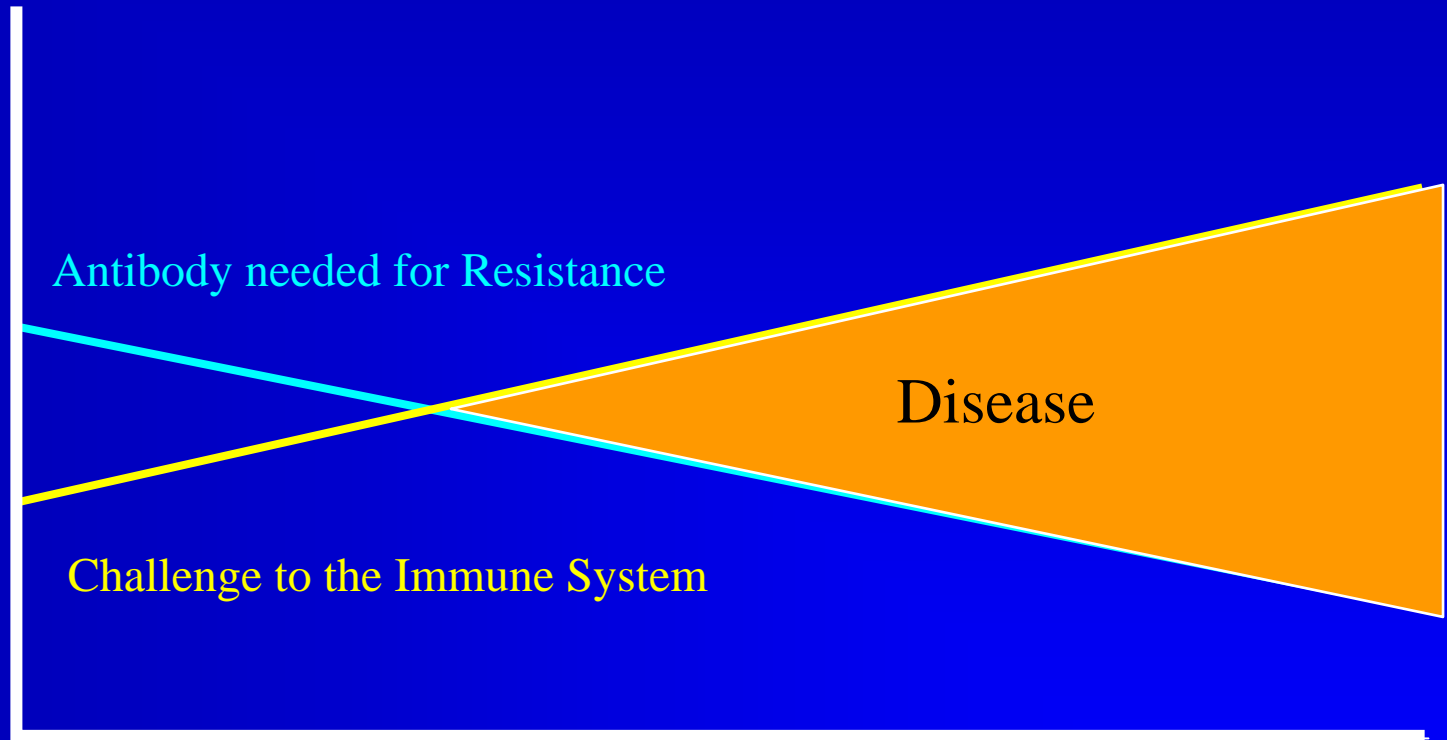
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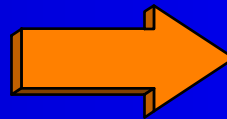
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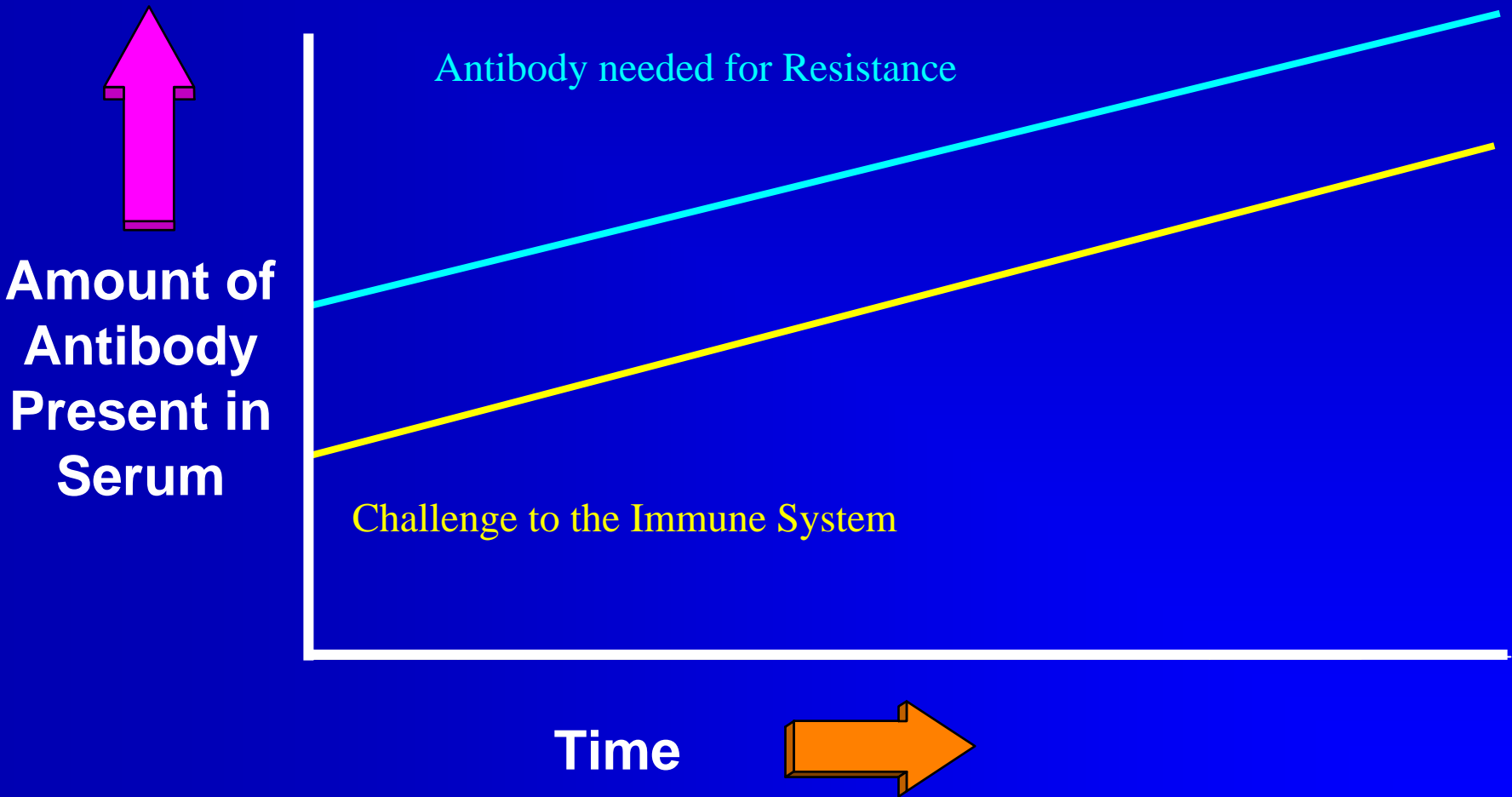
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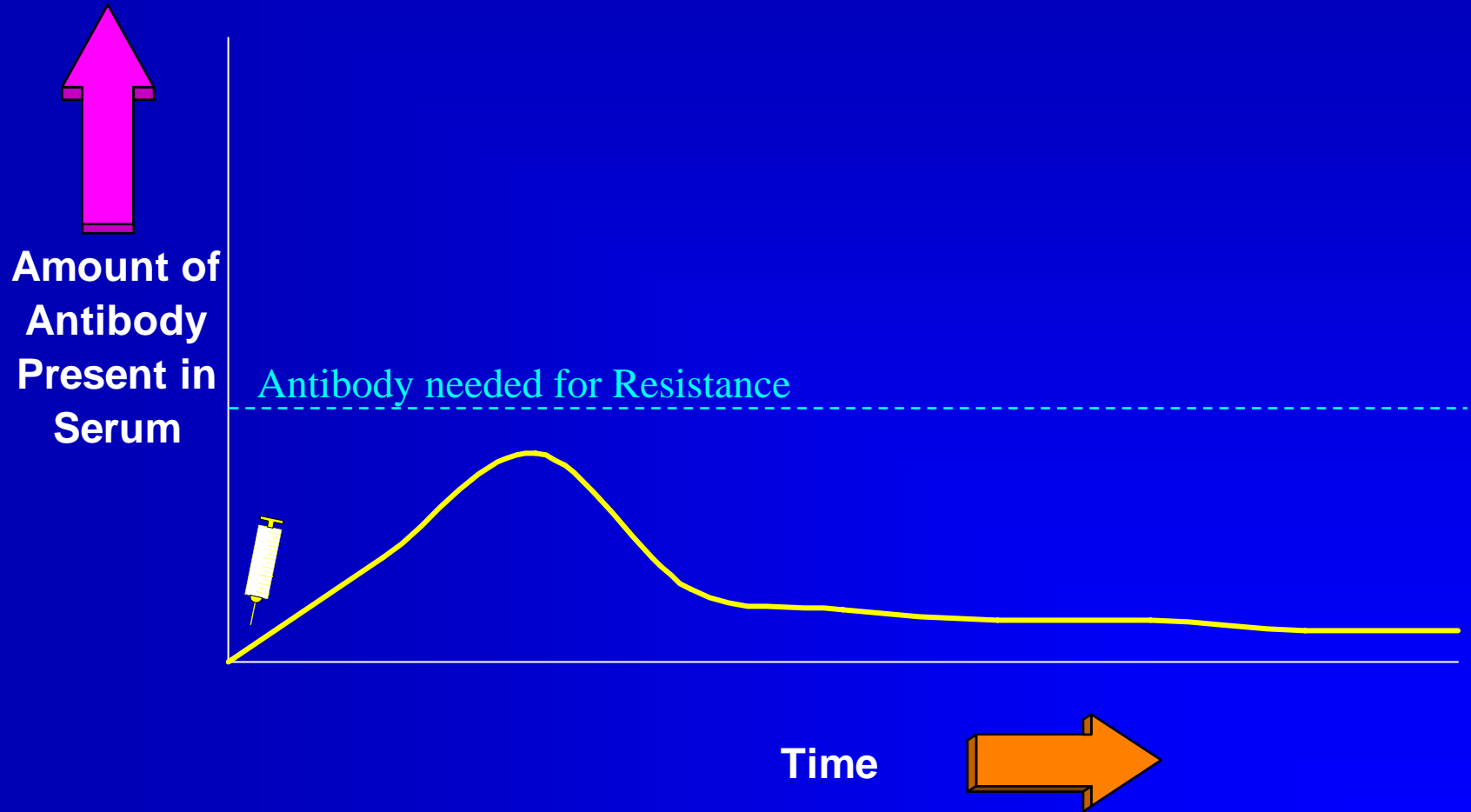
Time



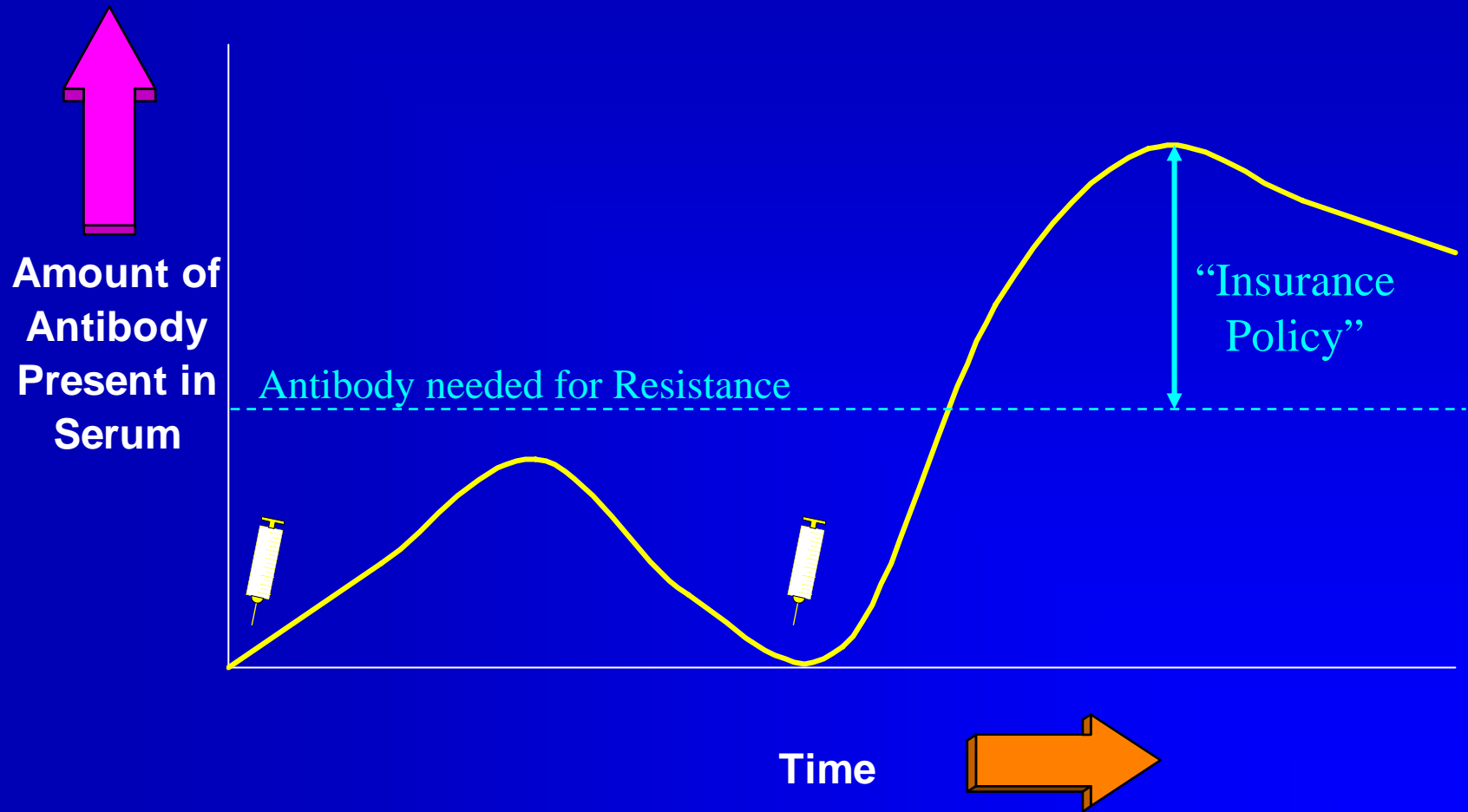
# Challenge vs. Resistance



# Response to One Dose of Vaccine



# Response to Two Doses of Vaccine



# Vaccine Failure

- Animal already incubating the disease
- Passive transfer interference
- Wrong vaccine for condition
- Vaccine administered incorrectly
- Vaccine temperature abused
- Vaccine outdated
- Animal can not mount appropriate response

# Animal Cannot Mount Response to Vaccine

- Pre-existing condition
- Inappropriate age of animal
- Number of doses
- Stressed condition
  - Increased cortisol
  - Decreased immunity
  - Sub-optimal nutrition

# Vaccines for Adults Beef Cows

- Highly Recommended
  - Infectious bovine rhinotracheitis (IBR) vaccines
  - Bovine virus diarrhea (BVD) vaccines
  - *Leptospira pomona* bacterins
  - Campylobacteriosis bacterins
- May be useful
  - *Tritrichomonas foetus* vaccine
  - Rotavirus-coronavirus vaccine
  - *Escherichia coli* bacterins
  - Anthrax spore vaccine

# Vaccines for Adults Beef Bulls

- Highly Recommended
  - Infectious bovine rhinotracheitis (IBR) vaccines
  - Bovine virus diarrhea (BVD) vaccines
  - Campylobacteriosis bacterins
- May be useful
  - *Tritrichomonas foetus* vaccine
  - Anthrax spore vaccine
  - Rabies vaccine

# Vaccines for Beef Calves

- Highly Recommended
  - Infectious bovine rhinotracheitis (IBR) vaccines
  - Bovine virus diarrhea (BVD) vaccines
  - Bovine respiratory syncytial virus (BRSV) vaccine
  - Parainfluenza type 3 (PI3) vaccine
  - *Leptospira pomona* bacterins
  - Brucellosis vaccine\*
- May be useful
  - *Mannheimia haemolytica* (pasturella) bacterin
  - *Histophilus somni* (haemophilus) bacterin
  - Clostridial bacterins
  - Anthrax spore vaccine

# Vaccines for Stocker Cattle

- Highly Recommended
  - Infectious bovine rhinotracheitis (IBR)
  - Bovine virus diarrhea (BVD) vaccines
  - Bovine respiratory syncytial virus (BRSV)
  - Parainfluenza type 3 (PI3)
  - *Leptospira pomona* bacterins
  - *Mannheimia haemolytica* (pasturella) bacterin
- May be useful
  - *Histophilus somni* (haemophilus) bacterin
  - Clostridial bacterins
  - Anthrax spore vaccine

# Vaccines for Replacement Heifers

- Highly Recommended
  - Infectious bovine rhinotracheitis (IBR) vaccines
  - Bovine virus diarrhea (BVD) vaccines
  - *Leptospira pomona* bacterins
  - Campylobacteriosis bacterins
- May be useful
  - Brucellosis vaccine
  - *Tritrichomonas foetus* vaccine
  - Rotavirus-coronavirus vaccine
  - *Eschericia coli* bacterins
  - *Mannheimia haemolytica* (pasturella) bacterin
  - *Histophilus somni* (haemophilus) bacterin
  - Clostridial bacterins
  - Anthrax spore vaccine

# Vaccines for Feedlot Cattle

- Highly Recommended
  - Infectious bovine rhinotracheitis (IBR)
  - Bovine virus diarrhea (BVD) Bovine respiratory syncytial virus (BRSV)
  - Parainfluenza type 3 (PI3) vaccine
  - *Leptospira pomona* bacterins
  - *Mannheimia haemolytica* (pasturella) bacterin
- May be useful
  - *Histophilus somni* (haemophilus) bacterin
  - Clostridial bacterins
  - Anthrax spore vaccine

# Clostridial Diseases

- *Cl. chauvoei* (blackleg)
- *Cl. septicum* (malignant edema)
- *Cl. haemolyticum* (red water)
- *Cl. novyi* (Black's disease)
- *Cl. sordellii* (sore head)
- *Cl. perfringens* C&D (and B)  
(over eating)

# Infectious Bovine Rhinotracheitis

- Fever
- Lethargic - standing/lying in the corner
- Coughing
- Nasal discharge
- Open mouth breathing
- Hyperemic muzzle (red nose)

# Bovine Viral Diarrhea

- Immunosuppressive
- Associated with *Mannheimia haemolytica*

# Infections With BVDV

- Transient Infection (TI)
  - Most common outcome from infection
  - Usually clear quickly, but can linger in a herd
- Persistent Infection (PI)
  - Infection occurs in pregnant cow
  - From 45-125 days of gestation
  - Fetus is immuno-tolerant to the virus so the animal will not clear the virus

# Consequences of a PI

- Presence of PI in cattle feedyards adversely affects health and performance of pen-mates and cattle in nearby pens
  - 0.3% prevalence of PI in feedlot cattle
  - 2.6% of chronically ill and dead are PI
  - 15.9% of BRD attributed to PI exposure
- Beef cow herds with one or more PI calves present before breeding had a 5% lower subsequent pregnancy rate.

# Parainfluenza Type 3

- Fever
- Cough
- Nasal discharge (snotty nose)
- Ocular discharge (runny eyes)
- Increased respiration
- Predisposes animal to subsequent infection

# Bovine Respiratory Syncytial Virus

- Fever (104-108<sup>0</sup> F)
- Depressed
- Off feed
- Increased respiration
- Hypersalivation (drooling)
- Nasal discharge (snotty nose)
- Lacrimal discharge (runny eyes)

# Mannheimia and Pasteurella

- *Mannheimia haemolytica*
- *Pasteurella multocida*
- Severity of signs more pronounced
  - Nasal discharge (snotty nose)
  - Dyspnea (difficult breathing)
  - High fever
  - Depressed (head and ears held low)
  - Toxemia

# *Mannheimia hemolytica* in Market Stressed Cattle After Natural Infection

*Current Microbiology 1988*

- Risk of Stress and Commingling
  - *Mannheimia hemolytica* produces substances in stressed cattle allowing the organism to be more pathogenic
  - Neuraminidase produced in market stressed cattle after a natural *Mannheimia hemolytica* infection
  - Neuraminidases play a role in adhesion of organisms to host epithelial cells.

# Metaphylaxis

- Treating animals with antibiotics at labeled rates before animal becomes ill
- Short term treatment
- Used in “HIGH RISK” cattle
- Micotil®, Nulfor®, Excede®, Draxxin®, and Tetradure®

# Effect of timing of Tilmicosin metaphylaxis on control of bovine respiratory disease and performance in feeder cattle

Item	Control	Preshipment	Postshipment
No Animals/Pen	100/10	100/10	100/10
BRD Morbidity	<b>54</b>	<b>29</b>	<b>15</b>
Days to 1 <sup>st</sup> BRD	3.5	10.3	15.3
Treat Succ. %	41/54 (75.9)	24/29 (82.8)	12/15 (80.0)
Treat Fail. %	13/54 (24.1)	5/29 (17.2)	3/15 (20.0)
BRD Mortality	2	0	0
Initial Weight	437.4	448.1	440.2
28 Day Weight	525.8	537.1	534.0
Weight Gain	88.5	89.0	93.9
ADG	<b>3.16</b>	<b>3.18</b>	<b>3.35</b>
DMI	11.4	12.3	12.4
Feed/Gain	3.70	3.98	3.93

# Treating Disease

- Recognize sick animals
- Make the correct diagnosis
- Use the correct therapy
- Give the animals time to get well
- Get rid of the unproductive animals
- Learn from experience

# Recognizing Disease

- Appetite depression (not in the feed bunk)
- Increase in body temperature
- Generalized depression
- Stiff gait
- Cough
- Watery eyes, runny nose

# Treatment Protocols

## NDSU Beef Cattle Treatment Schedule Fargo, ND

Diagnosis	Treatment	Dosage	Route	Withdrawal
<b>Respiratory System:</b>				
<b>Respiratory, Acute</b>				
First Treatment	Micotil® (R)	1.5cc/cwt	S.Q.	28 days
Second Treatment (48 hours, if necessary)	Micotil® (R)	1.5cc/cwt	S.Q.	42 days
Third Treatment (96 hours, if necessary)	Biomycin 200® Tylan® Predef 2X® (R)	6cc/cwt one time 5cc/cwt one time 5cc/head one time	S.Q. I.M. I.M.	42days
Heavy Cattle > 900 lbs	Naxcel (R)	1cc/cwt/cwt for 3 days	I.M.	1 day

The above products are being utilized the treatment schedules. Directions for their use and withdrawal times have been reviewed and are posted.

Manager: \_\_\_\_\_

Prescribed by: \_\_\_\_\_ ND License No. \_\_\_\_\_

Date: \_\_\_\_\_ ® Registered Trademark: (R) Prescription drug

Charles L. Stoltenow, DVM • North Dakota State University • Veterinary Diagnostic Lab • Fargo, ND 58105 • (701) 231-7522

# What does a sick animal cost?

- Feedlot

– Sick animal	\$90/animal
• Medical costs	\$30
• Decreased efficiency	\$60

\*Texas A&M Ranch to Rail Program

# Morbidity Rates by Source

## *Agri-Practice, 1992*

- Auction 36%
- Ranch 14%
- Pre-conditioned 2.8%

# Effect of Month of Year on rate of BRD in Calves

*Ribble, et al CJVR, 1995*

- 58,885 calves
- September thru December 1985-1988
- Calves entering feedlot during November
  - 2-8 times higher than September or December

# Effect of Morbidity on USDA Quality Grade\* Distribution

	Number of Treatments		
	None	One	More than 1
Prime	1.62	0.90	0.90
High Choice	21.68	19.10	14.56
Low Choice	51.00	44.65	42.11
Select	23.55	30.42	33.15
Standard	2.15	4.93	9.29
Total	100%	100%	100%

# Wise Words for the Future?

- “As in a court of law, the worst written records will always supercede the best recollection.”

-Dr. Charlie



# APATHY

IF WE DON'T TAKE CARE OF THE CUSTOMER,  
MAYBE THEY'LL STOP BUGGING US.