

The Immune System and Recovery from Sickness in Cattle

Gordon W. Brumbaugh, DVM, PhD
DACVIM, DACVCP, ELS
Pfizer Animal Health

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The Immune System and Recovery from Sickness in Cattle

- I. The immune system is responsible for recovery from sickness
- II. Antimicrobial medication only assists the immune system to recover from bacterial infections
- III. There are means to reduce incidence of disease and to enhance the likelihood of recovery.

Effect of Morbidity in Feedlot Steers

Number of treatments/head	0	1	2+
DOF	192	197	209
ADG, lb/d	3.19	3.06	2.77
Total cost of gain, \$/cwt	57.20	64.92	79.90
Carcass Value \$/cwt	113.95	108.51	98.97
Net Income	\$14.01	- \$69.63	- \$253.70

Wagner JW, Mathis CP, Loest CA, Sawyer JE, McCollum FT. Impact of feedlot morbidity on performance, carcass characteristics and profitability of New Mexico ranch to rail steers, in *Proceedings*. Cattle Growers' Short Course Proceedings & Livestock Research Briefs 2006;72-73.

Effects of BRD on the productivity of dairy heifers

- < 3 moa:
 - Mortality increased
 - by nearly 20% (range 16–24%)
 - 2.5 times more likely to die after 90 days of age
 - Body weight reduced
 - by 10 kg (range 2–18 kg) at 3 months
 - by to 29 kg (range 23–36 kg) at 14 months
 - Delayed first calving age
 - by half a month (range 0.1–0.9 months)
 - Reduced first lactation milk production
 - by about 2% (150 kg, range 40–250 kg).
- ≥ 3 moa:
 - Reduced body weight at 14 months by approximately 30 kg (range 11–54 kg).
 - Overall effects less severe, and only occasionally as detrimental as those associated with early pneumonia.

Waltner-Toews D, Martin SW, Meek AH. Can J Vet Res.1986, 50: 314-317.

van der Fels-Klerx HJ, Saatkamp HW, Verhoeff J, Dijkhuizen AA. Livestock Production Science 2002; 75:157-166.

Calfhood Scours

- 2.5 times more likely to be sold than other calves
- Heifers treated for scours were 2.9 times more likely to calve after 30 months of age than other heifers.

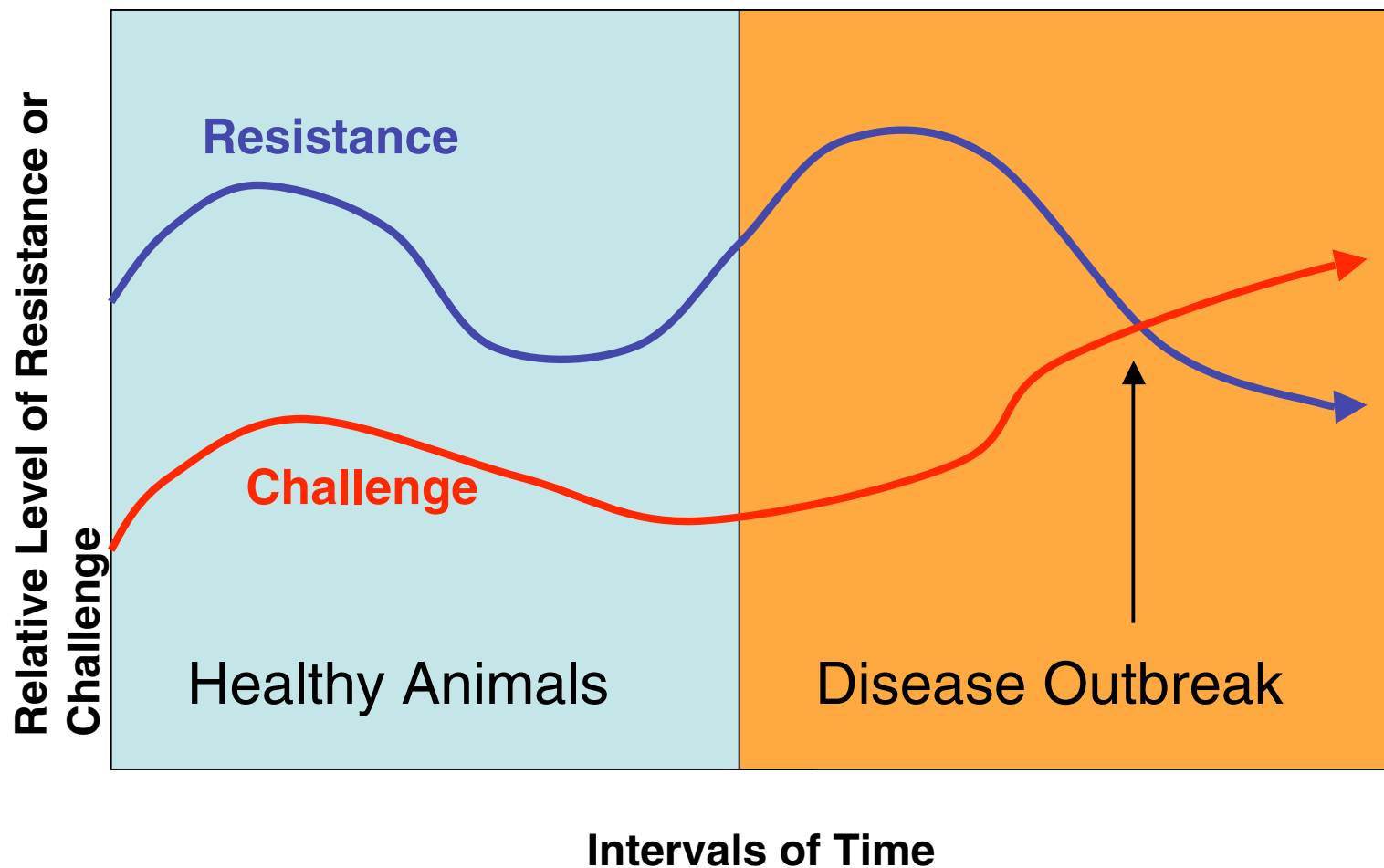
I. The immune system is responsible for recovery from sickness

A. Active protection/prevention: well-known

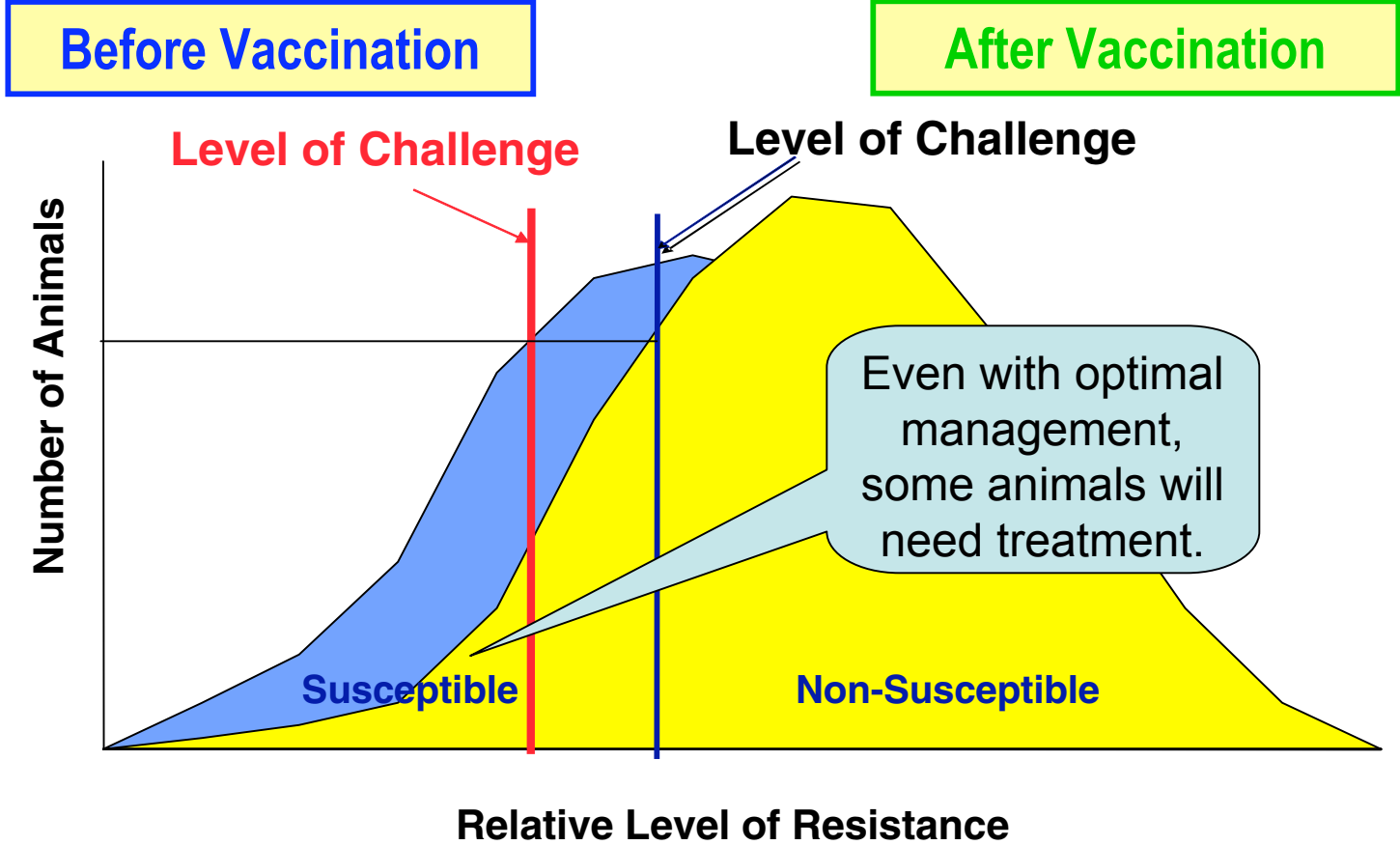
B. Sickness is due to breach of protection

- Even the optimally prepared immune system can be overwhelmed.

Levels of infectious challenge and of the animal's resistance to disease in a herd are not static, but vary with time.



Dynamics of Herd Immunity



I. The immune system is responsible for recovery from sickness

C. Cure/recovery is responsibility primarily of the immune system; 4 steps

- Restrain/restrict infectious agent
- Clean-up
- Replace/repair
- Return function

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In which does the antimicrobial medication participate?

II. Antimicrobial medication only assists the immune system to recover from bacterial infections

...so that the animal can reach its genetic and nutritional potential.

Cure/recovery is responsibility, primarily, of the immune system

III. Means to reduce incidence of disease and to enhance the likelihood of recovery. Help the immune system!

A. Reduce exposure to infectious agents – Biosecurity

1. Cleanliness; hygiene
2. Test in-coming animals
3. Restrict co-mingling (open-range; herds on same ranch)

III. Means to reduce incidence of disease and to enhance the likelihood of recovery. Help the immune system!

B. Re-enforce immunity

1. Genotypic – Selection of brood-stock
2. Phenotypic – Feeding and/or avoidance behavior
3. Colostrum – Pre-calving management; storage (K^+ sorbate), quality, quantity, 1st stimulation of the mouth
4. Biologics - Strategic

American Angus Association

\$ Value Indexes

- **Multi-trait selection indexes**, expressed in dollars per head, that are an estimate (expected average difference) of how future progeny of each sire are expected to perform, on average, compared to progeny of other sires in the database if the sires were randomly mated to cows and if calves were exposed to the same environment.

- **Weaned Calf Value (\$W)**

- **Feedlot Value (\$F)**

- **Grid Value (\$G)**

- **Quality Grade (\$QG)**

- **Yield Grade (\$YG)**

ROI may not occur equally in each segment of the production chain.

- **Beef Value (\$B)**

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Does this approach
have application with
animal health and
animal health products?

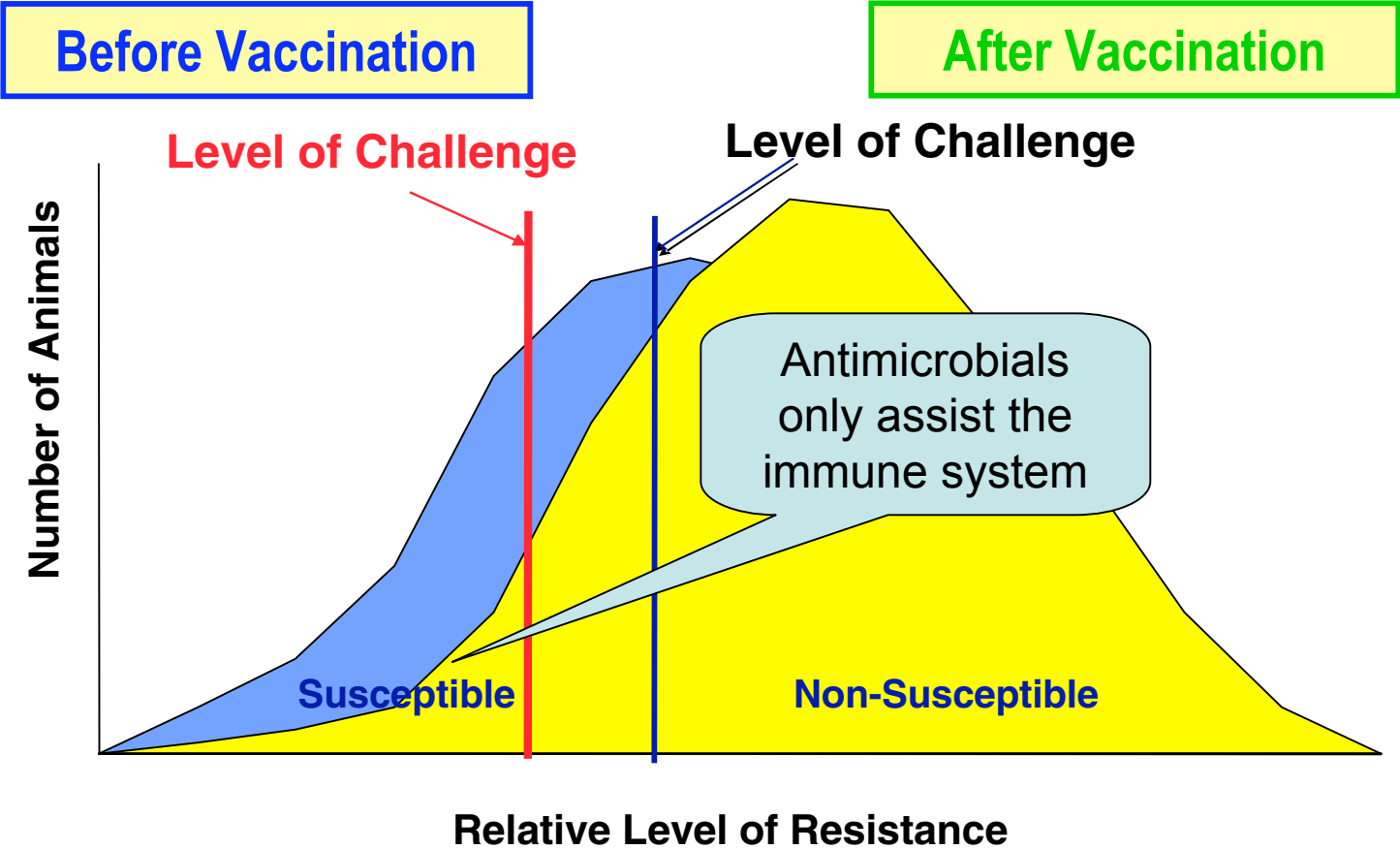
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Dynamics of Herd Immunity



We can't keep doin' this for another 50 years!
We've got to help the immune system.

- ROI may not occur equally in each segment of the production chain. We're in this together.
- Near-term goals – Tactical (days)
 - Management – 1st-treatment success
 - ID early in course of disease
 - Treat appropriately (“evidence-based formularies”)
 - Success/failure data can help increase chances of success & develop appropriate expectations
 - Economic assessment

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We've got to help the immune system.(con't)

- ROI may not occur equally in each segment of the production chain. We're in this together.
- Long-term goals – Strategic (wks., mos., yrs.)
 - Management – Less disease & 1st-treatment success
 - Genetic markers; selection of brood-stock
 - Phenotypic expression; selection & management
 - Appropriate nutrition; changing (?)
 - Health-care products; “evidence”-based
 - Expectations; realistic

Behavior, temperament and beef cattle performance

Evaluate variation in feeding behavior and temperament of beef cattle sired by Angus, Charolais, or Hybrid bulls and their associations with performance, efficiency, and carcass merit.

Results:

Behavior traits may contribute to the variation in efficiency of beef cattle and there are potential correlated responses for selection to improve efficiency.

Feeding behavior and temperament may need to be included in the definition of beef cattle breeding goals, and approaches such as the culling of unmanageable cattle and the introduction of correct handling facilities or early life provision of appropriate experiences to improve handling will be useful.

Metaphylaxis therapy interacts with temperament to influence performance of growing beef steers

Effect of metaphylaxis on growth, feeding behavior traits and intake of preconditioned, transported (550 km) Santa Gertrudis steers (initial BW 265 ± 24 kg; n = 119) during a 28-d receiving period.

- Only one steer was clinically morbid during this trial.
- Results:
 - metaphylaxis resulted in positive effects on ADG, DMI and feeding behavior during the receiving period for steers with high EV (excitable temperaments)
 - metaphylaxis had less utility for steers with low EV (calm temperaments)

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Thank you!