


Antibiotics: The Cost

Public perception, trust and hospital-acquired infections. What are the alternatives?



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White House Issues Plan to Fight Drug-Resistant Bacteria
Coordinated federal and state effort against superbugs would seek to curb use at farms, hospitals

By Thomas M. Burton and Tennifer Tracy | Updated March 27, 2015 7:32 p.m. ET

WASHINGTON—The White House on Friday issued the most extensive plan ever to fight drug-resistant bacteria, or superbugs, seeking to curb antibiotic use at farms and hospitals—and promote discovery of lethal bugs and antibiotics to kill them.

The plan, formally known as the National Action Plan for Combating Antibiotic-Resistant Bacteria, sets goals to reduce by 50% to 60% illnesses caused by some of the most lethal microbes known to man by 2020.




Bacterial Flora Management:

The Seed, Feed and Weed Approach



Coccidiosis Control:

Vaccination or Non-antibiotic Chemoprophylaxis



Gut Flora vs House Flora

- Upper intestinal integrity determines short term performance this growout

- The composition of the Microbiota determines long term performance! next 3 growouts

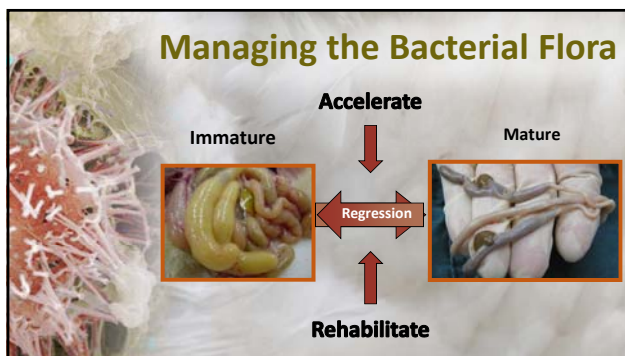
Managing the Bacterial Flora

Accelerate

Immature → **Accelerate** → Mature

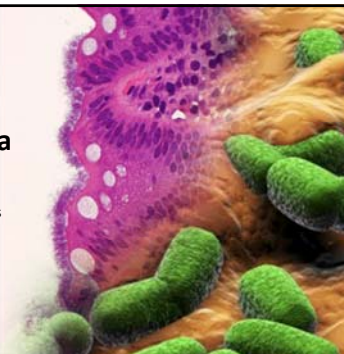
← **Regression** →

Rehabilitate



Rehabilitating and Accelerating the Evolution of the Intestinal Microbiota


- **Seed**
 - the gut with favorable organisms
- **Feed**
 - the favorable organisms
- **Weed**
 - out the unfavorable organisms



Accelerating the Evolution of the Intestinal Microbiota


Seed the Gut with Favorable Flora

- Control parent flock flora
- Apply probiotic (Probiotic or CE)
- Manage house flora



Probiotics / Competitive Exclusion


- CE = mature caecal flora
- Probiotic = primary flora
 - Defined cultures
 - Host adapted residents = Lactobacillus / Enterococcus
 - Transients – Bacillus species = “non-antibiotic antibiotics”



Manage the House Flora

Gut flora evolution – reused litter

Primary Flora Climax Flora



Day old 1 week

Manage the House Flora

Gut flora evolution – reused litter

Primary Flora



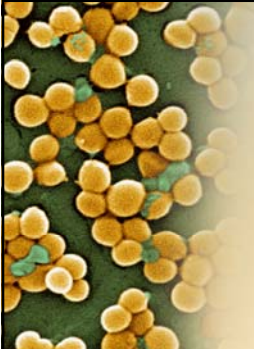
Day old 1 week

Rehabilitating or Accelerating the Evolution of the Intestinal Microbiota

Feed the Favorable Flora and starve the Unfavorable Flora


- Acid
- Enzyme





Acids

- Antibacterial activity
 - Bacteriostatic vs bacteriocidal
 - Strong vs weak acid
- Strategic vs continuous acidification
 - 0-7 days of age, during stress, after antibiotic administration
- Method of administration
 - Feed vs Water
- Absorption
- SCFA produced by bacterial fermentation
 - Acetic / Propionic / Butyric



Rehabilitating or Accelerating the Evolution of the Intestinal Microbiota

Weed out the Unfavorable Flora

- Selective exclusion
 - Antimicrobials
 - Essential oils
 - Attachment blockers (type 1 fimbriae)
- Competitive exclusion
 - Community management

AGP

Good Digestion and Absorption Poor caecal Health





Essential Oils


- Complex mixtures of secondary plant metabolites
 - low-boiling-phenylpropenes and terpenes
- Obtained by distillation
- EOs or their components have been shown to be:
 - Antibacterial (slightly more Gram-positive than Gram-negative)
 - Antiprotozoal
 - Antimycotic (Jayashree and Subramanyam, 1999; Mori et al., 2003)
 - Antiviral (Bishop, 1995)
 - Anthelmintic (Pandey et al., 2002; Pessoa et al., 2002)
 - Insecticidal (Kastantopoulou et al., 1992; Karpouzias et al., 1998)
 - Antitoxicogenic (Utter and Smit, 2001; Juglar et al., 2002)
 - Antioxidant (Kempiah and Srinivasan, 2002; Botsoglou et al., 2004)
 - Hypolipidemic (Srinivasan, 2004)
 - Digestive stimulant (Fistel and Srinivasan, 2004)
 - Odor inhibiting and control ammonia (Naveh, 2002)

Brenesa and Roura 2010

Type 1 Fimbriae Blockers/Antagonists

Yeast cell wall derivatives

1. Mannanoligosaccharides
MOS = First generation
2. Second generation type 1 fimbriae blockers
3. Third generation type 1 fimbriae blockers



Finally overcoming the obstacles

168 CHAM 2012, 16, 168-174 LAURENTE: ANANES AND HONDEI, SCS Fall Meeting 2011
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In vivo Evaluation of FimH Antagonists – A Novel Class of Antimicrobials for the Treatment of Urinary Tract Infection

Daniela Abgettspon¹ and Beate Ernst
MSC-Merckm Foundation Award for best oral presentation

Abstract: The discovery of antimicrobials as β -lactam antibiotics or aminoglycosides revolutionized the treatment of infectious diseases. However, the extensive use rapidly created the problem of resistant pathogens, which are increasingly difficult to treat. FimH antagonists are a new class of antimicrobials, which target the bacterial adhesion to urothelial cells, a crucial first step in the establishment of urinary tract infections. Because of their different mode of action, FimH antagonists neither kill nor inhibit the growth of bacteria, they should have a reduced potential to generate resistant strains. This mini review outlines the main problems associated with increasing development of antimicrobial resistance. Furthermore, it summarizes the currently available *in vivo* studies in mice for the treatment of urinary tract infections conducted with FimH antagonists.

Keywords: FimH antagonists - α -D-Mannopyranoside - Type 1 pil - Urinary tract infection (UTI) - Uropathogenic Escherichia coli (UPEC)

Summary

- Servicing the food industry
 - SAFE, wholesome and satisfying
 - Consumer PERCEPTION is everything
- Managing Microbiota
 - Bacterial Flora
 - Accelerate evolution of intestinal microbiota
 - Rehabilitate microbiota after disturbance
 - Seed = Probiotic
 - Feed = Acids and Enzymes
 - Weed = Antibiotic, Essential oils, Type 1 fibrin blockers, Competitive exclusion
 - Coccidiosis
 - Vaccination
 - Chemicals
 - Natustat

