Antibiotic Alternatives?

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THE ANSWER IS ...

It Depends!
What are the options?

Cold turkey
Manage so as not to need them
Turn back the clock
Research finds the answer
Rebel and say “hell no”
I used to peddle lots of antibiotics, in all sorts of combinations, for all sorts of uses.
What is an Antibiotic?

According to the Merriam-Webster Dictionary: *a substance produced by or a semisynthetic substance derived from a microorganism and able in dilute solution to inhibit or kill another microorganism.*

In other words…. antibiotics can be naturally occurring substances!
In animal agriculture, the antibiotic story did not begin until the 1940’s.
Penicillin as a Treatment for Strep Ag Mastitis

• First use reported in 1943
• NYS Governor Thomas E. Dewey established the first state control and research program for bovine mastitis in 1946 after the Cornell Veterinary College helped his own dairy herd deal with a serious mastitis problem
The organization of medicine is not a new concept, however:

- Records indicate systematized medicine as early as 1500 BC in Egypt.
- The Greeks by 500 BC were focused on a holistic approach to health and promoted hygiene and nutrition in combating disease, moving away from spiritual causes.
- The Romans patterned their practices after the Greeks.
Natural cures go way back

- The Greeks and Romans used plant based extracts, poultices, ointments and potions.
- Until the 1930’s, both human and animal medicine was based largely on naturally derived compounds.
- All medical training at one time included study of a centuries old body of information known as the *materia medica*.
Isn’t that what those organic people do?
Expectations from “Natural” or “Alternative” Treatments

“Natural treatments should be viewed as part of an overall treatment plan – not simply stand-alone treatments. They can be stand-alone treatments, but never count on it.”

Hue Karreman, VMD, Penn Dutch Cow Care

Is this any different than practical, conventional strategies to maintain health and treat disease?
Pharmaceuticals vs. Natural Products

• Man-made drugs require extensive testing for effectiveness and safety before approval.
• Refinement of the active ingredients assures reliable dose control and low risk.
• Botanicals/herbals, most sold as nutritional aids, have not been put through the modern drug approval process.
The Pre-Antibiotic Gold Standard

- Pierre Fish, DVM was dean of the Cornell Vet College when the last edition of this book was printed in 1930.
- Today it remains an important reference of dosing information for “alternative” medicine use.
Today’s Medicine

• It is estimated that 5 billion + people rely on traditional plant-based medicine as their primary health care around the world.

• Approximately 40% of pharmaceuticals now in use in the USA have plants as the original source material either harvested as such or synthetically reproduced.
  – Anti-cancer, antibiotics, wormers, topical dressings, analgesics, anti-inflammatories
Natural Product Concerns

• Possible adverse reactions
• Many compounds with unknown effects
• Potential adulterations in manufacture
• Standardization of purity and dosage not mandated in the US
• Limited number of double blind studies
• Drug interactions not well understood
• Some as dangerous as any modern drug
So, what was there in medicine before antibiotics?

• Botanical compounds (85%)
  – Tinctures (alcohol) & Extracts (water)
  – Essential oils
  – Whole or part plant preparations

• Mineral medicinals (10%)
  – Arsenic, mercury, lead, silver, iodine

• Animal products (5%)
Botanicals with best antimicrobial activity

• **Aloe vera** - Gram+ except *Staph aureus* (a)

• **Lemongrass oil, oregano oil, bay oil** – good against *E. coli, S. typhimurium, Klebsiella sp., S. aureus* (b)

• **Garlic** (allicin) - wide range of Gram(-) and Gram(+) bacteria (c)

(a)  J. of Animal & Veterinary Advances 2009 Vol 8 (1)
(b)  J. of Applied Microbiology 1999 June;86(6)
(c)  J. of Microbes & Infection 1999 Feb;1(2)
Other “spice” antimicrobials with less potency

- Thyme
- Clove
- Cinnamon
Mineral Antimicrobials

- **Silver** – “the most important antimicrobial agent available before the introduction of antibiotics” (J. of Surgical Infection 2009); not effective taken internally as a colloidal
- **Iodine** – broad spectrum antiseptic
- **Lead** – topical uses, toxic, old motor oil
- **Mercury** – effective, toxic, parenteral use as well as topical, no longer used
The difference between a medicine and a poison is often the dose.
The Underpinnings of Health

Health Status

Pathogen Exposure

Environment Stress

Resistance Nutrition
Fighting infection requires an actively participating immune system even with the most powerful bacteriocidal or otherwise.
Immuno-modulators

Amplimune® formerly Immunoboost®

ZelNate®

Vitamin C
Can your water be hurting cattle health?

• High levels of sulfur compounds and iron in particular can either bind with minerals in the feed or physiologically interfere with immune function

• Softened water or chelated and organic forms of minerals can be helpful
Can Antibiotics Act as Immune Stimulants?

• It this the reason why growth promoting (sub-therapeutic) levels of antibiotics work?

• “It has become apparent that certain antibiotics do have potent immuno-modulating actions”

Korzeniowski, OM; Infectious Disease Clinics of North America 1989
Vaccines

• Not all diseases can be vaccinated for
• Debilitated, underfed, stressed, parasitized animals do not respond well to vaccines
• Vaccine failures can occur due to product handling, injection site, heat stress, no booster
• Part of an overall program of health
Serum Products

- Antibodies derived from whole blood
- Very commonly used years ago
- Immediate action despite immune compromised condition
- Commonly used in organic production
- Dybelon®, Quatracon®, BovaSerum®
Probiotics

• Most commonly Lactobacillus and Bifidobacterium – think yogurt
• Sarcomyces yeast – think beer
• Must be live
• Must be of sufficient number of organisms
• Mechanism of action not well understood
• An aid, not a cure
Coming to a theater near you?
Keeping Gut Bugs Happy!

Microbial Endocrinology

• Bacteria respond to and produce the same neurochemicals that mammals do such as adrenaline and growth hormone.

• This means the host and the gut bugs both can influence and be influenced by each others reaction to their environments!

• The basis for probiotic effect on gut health?

Mark Lyte, PhD, microbiologist, Iowa State Veterinary College
More Help From Bacteria?

Genome-mining

• Both environmental and commensal bacteria have been found to produce antimicrobial molecules.

• New exploratory tools and methods have revealed many more of these in recent years.

• These molecules are not found in laboratory cultures.
How do we sort out all of the information that is out there to make wise decisions?
Scientific vs. evidence based medicine – an age old battle

• SBM = randomized controlled trials with a reasonably high prior probability that the treatment will work

• EBM = considers as scientific evidence any results from a clinical trial whether confounding factors are accounted for or without assessing prior probability
• Has science based medicine come under popular suspicion because of government overreach, Big Pharm profits and a desire to return to more natural means?

• Is evidence based medicine gaining ground because it sounds good based on our everyday life experiences and our tolerance of trial and error methods?
Thank You!

Any Questions?