ABF Poultry Production: Is It Sustainable?
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OUTLINE
- Transparency disclosures.
- Refute that the driver of AMR are food animals.
- Introduction.
- Challenges of raising ABF birds.
- Health challenges.
- Enteric disease challenges.
- Systemic disease challenges.
- Other important considerations.
- Conclusions.

TRANSPARENCY DISCLOSURES
- The company I work for sales virginiamycin (Stafac®), a widely used AGP in broiler chickens and turkeys.
- Our company also sales nicarbazin (nicarb®), a widely used anticoccidial of the “chemical” class.
- Our company also has a phytogenic feed additive (Magni-Phi®) indicated as an alternative to AGPs.

AB RESISTANCE IN HUMANS IS A SERIOUS PROBLEM BUT IT IS NOT DRIVEN BY AB USE IN FOOD-PRODUCING ANIMALS

Prescription of Antibiotics by Physicians is the Main Cause of Antibiotic Resistance in Humans

Unnecessary Prescription of Antibiotics by Physicians in the U.S.

J.T. Magee, et al., BMJ 319: 1239-1240
**AGP Contribution to AR?**

Contribution to bacterial resistance in humans:

<table>
<thead>
<tr>
<th>%</th>
<th>AGP contribution</th>
<th>Human antibiotic contribution</th>
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<tbody>
<tr>
<td>0%</td>
<td>100%</td>
<td></td>
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Heidelberg Appeal Nederland (HAN)

**Comparison of Annual Antibiotic Consumption (U.S.A.)**


**FOCUS ON FOOD ANIMALS**

Resistant following the ban of Enrofloxacin - Campylobacter jejuni

NARMS, 2009.

Percentages of antimicrobial resistance in Campylobacter jejuni

NARMS, 2010

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**Introduction**

Modern medical and veterinary practice relies on the widespread availability of effective antibiotics to prevent and treat infections in humans and animals. Resistance to all antimicrobials, including antivirals and antifungals, is increasing. We recognize antimicrobial resistance as a broader issue than bacterial antibiotic resistance, but the scope of this Strategy is limited largely to the latter because of the rapid development of resistance to widely used antibiotics. Antibiotics have a variety of uses including treating and preventing infections and reducing the risk of potentially life threatening complications in surgery, chemotherapy and transplantation. Unless we act now we will see a rise in untreatable infections. Increasing scientific evidence suggests that the clinical issues with antimicrobial resistance that we face in human medicine are primarily the result of antibiotic use in people, rather than the use of antibiotics in animals. Nevertheless, use of antibiotics in animals (which includes fish, birds, bees and reptiles) is an important factor contributing to the wider pool of resistance which may have long term consequences.

Bacteria constantly evolve to maintain their viability in the face of the antibiotics used.
Banning AGPs Has Not Produced an Improvement in MRSA

Figure 6.8. Number of MRSA cases, with a three-years moving average, Denmark.

GLOOM & DOOM?

Antibiotic resistance is ancient

Antibiotic resistance is a normal phenomenon that predates the modern selective pressure of clinical antibiotics.
A new antibiotic kills pathogens without detectable resistance

Liese L. Ling, Tamra Schindler, Anna I. Petrak, Anna L. Strzempa, Hua Deng, Brian P. Cutler, Anna Mueller, K. Elke Schindler, Joel D. Hughes, Sara Spotts, Michael review, Lara Esposito, Victoria A. Mclean, Dwayne S. Gehl, Oswin E. Hebl, Ashley J. Stormer, William F. Miller, Anthony G. Wolf, Ashley M. Salli, Charleen A. Diercks

Antibiotic resistance is spreading faster than the introduction of these compounds into clinical practice, causing a public health crisis. Most antibiotics were produced by screening for self-aggregation, but this limited approach of antibiotic discovery was insufficient. Systems approaches to produce antibiotics have been unable to recapture the potential of the initial pool of 100,000 compounds. This paper describes the development of a highly advanced and efficient high-throughput system to screen for and identify specific growth inhibitions. We have now identified a new antibiotic that is active against drug resistant bacteria, and which may be used to combat specific antibiotic resistance. This represents a significant improvement in the treatment of antibiotic-resistant infections.

But nevertheless...
CONSUMER PREFERENCE

- Based more or entirely on perception rather than scientific facts (and sometimes on misleading advertisements).
- Most consumers do not seem to realize that all meat, milk and eggs is ABF.
- Recent report by “Academics Review” states that “the 25 years of fast growth by the organic food industry has been achieved through fear and deception”.
- More transparency in labeling needed:
  - Organic seal says nothing about food safety.
  - Many consumers mistakenly associate it with “healthier”, “safer” or “more nutritious” food.

MISLEADING ADS?

- Organic seal says nothing about food safety.
- Many consumers mistakenly associate it with “healthier”, “safer” or “more nutritious” food.

CHALLENGES OF RAISING ABF BIRDS

- Definition and production (ABF, RWA, no ABs, organic, split or 100%, separate processing plants, etc.)
- Management (stocking density, down-time, clean-out, temperature, biosecurity, stress reduction, breed, etc.)
- Health challenges (enteric and systemic diseases).
- Animal welfare challenges (when and how to treat, not delaying treatment, option to divert to conventional program, etc.)

HEALTH CHALLENGES

- Enteric diseases.
- Systemic diseases.
ENTERIC DISEASES

- Undoubtedly the main challenges of ABF birds are related to gut health.
- More specifically, the prevention and control of coccidiosis and N.E.
- Both diseases are linked as coccidial lesions (vaccine or field challenge-induced) are a well known predisposing factor for N.E.
- Without AGPs and ionophore anticoccidials (anticox) the control of C. perfringens will be more difficult.
- The subclinical form of both diseases now recognized as the most prevalent form.

COCCI DIOSIS

- Not having ionophores will create serious problems controlling coccidiosis.
- Coccidiosis control will have to rely exclusively on synthetic, so called “chemical” anticox, live coccidiosis vaccines or rotations between the two.
- Chemical anticox tend to suppress cocci completely and are likely to select for resistance (nicarb is the exception to the rule).
- They cannot be used every year due to resistance development (except for nicarb).

PATHOGENESIS OF N.E.

COCCI DIOSIS

- Resistance to coccidiosis results in breaks that predispose birds to N.E.
- All live cocci vaccines induce immunity by replicating and cycling a number of times through the intestines.
- Along with the replication and cycling required for immunity development, the parasites kill epithelial cells resulting in leakage of plasma proteins and a mucus response that favors the growth of pathogenic strains of C.p.

- This is the main reason live coccidiosis vaccines work better with AGPs.
- In our experience, virginiamycin (Stafac®) at 20 ppm in the feed has produced the best results in preventing N.E. when vaccines are used.
- This may be due to VM’s potent activity against C.p. as demonstrated by the lowest MICs and by less problems with the development of resistance.
### MIC for *Clostridium perfringens* ATCC 3624

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<thead>
<tr>
<th>ANTIBIOTIC</th>
<th>MIC (ppm)</th>
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<tbody>
<tr>
<td>Bacitracin</td>
<td>3.1</td>
</tr>
<tr>
<td>Tylosin</td>
<td>0.78</td>
</tr>
<tr>
<td>Bambermycin</td>
<td>&gt;100</td>
</tr>
<tr>
<td>Lincomycin</td>
<td>1.6</td>
</tr>
<tr>
<td>Virginiamycin</td>
<td>0.02</td>
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### FINAL RESULTS (n = 45)

- **N=40**
- **N=3**
- **N=2**

### ABF PRODUCTION

- Unfortunately, use of ABs like VM is not allowed in ABF production so a variety of feed additives, dietary changes and management adjustments have been made to minimize performance losses and disease outbreaks in ABF systems.

### ABF PRODUCTION STRATEGIES

- Processing of feeds to decrease bacterial loads.
- Lower stocking density.
- Vegetarian diets.
- Maintaining litter dry.
- Sanitation of drinking water.
- More frequent removal of mortality.
- Early use of probiotics.
- Coarser grinding of grain.
- Supplemental feeding of whole grain or grit.

- Meal feeding vs. full feeding.
- Essential oil extracts.
- More digestible ingredients.
- Minimize non-protein N in the diet (formulate based on digestible AA, add synthetic AA).
- Use of ingredients with more soluble fiber.
- Use highly digestible fats and starches.
- Minimize inclusion of wheat, barley and oats.
- Maintain optimal dietary electrolyte balance.
ABF PRODUCTION – U.S. EXPERIENCE

From feedback received from 5 poultry veterinarians experienced in ABF production:

- Similar strategies have been tried and have been found to be fraught with difficulties and high costs.
- In spite of management changes and even when problems have been reduced, the performance of ABF flocks at equal stocking densities is usually below that of flocks raised conventionally (higher production cost).

ABF PRODUCTION – U.S. EXPERIENCE

- A well known and respected poultry veterinarian with many years of experience in ABF production summarized his experiences at a PSA Symposium on Alternatives to Abs.
- Alternatives to ABS ranging from prebiotics and probiotics to E. coli vaccines, oregano and organic acids were field tested in millions of birds.
- The author concluded that none of the alternatives worked like an AB nor were cost effective.
- Concluding remark: “We have yet to identify a product that represents a cost-effective replacement for ABs and have relied largely on management-related procedures to manage a drug-free program”.


SYSTEMIC DISEASES

- Septicemic bacterial infections nearly always caused by E. coli.
- E. coli is a normal inhabitant of the GIT in chickens and turkeys.
- Some strains of E. coli are primary pathogens, however, the majority are opportunistic pathogens (stress, immuno-suppression and immuno-depression).
- Lesions of systemic E. coli infection consist of fibrino-purulent poly-serositis.

OTHER IMPORTANT CONSIDERATIONS

- A veterinarian cannot endorse an ABF program unless provisions are made to ensure that treatment is not withheld from sick flocks.
- Another philosophical problem may emerge when one is asked to support a system that is less efficient over benefits that cannot be scientifically documented but rather perceived as such by consumers that have been influenced at times by misleading advertisements.
**OTHER CHALLENGES OF ABF PRODUCTION**

- Under similar stocking density there will be a loss in performance (ADG, yield and FCR).
- Many companies try to compensate by increasing square footage/bird, i.e. 0.9 ft²/bird instead of 0.75 ft²/bird.
- In order to maintain the same live weight output, a company would have to:
  - Feed more tons of feed
  - Build more farms and poultry houses
  - Keep birds in the field longer

**PRACTICAL SIGNIFICANCE**

Based on a 0.3 lb/bird improvement in BW and a 5 point improvement in FCR seen in a published study*, an operation producing 5 million turkey hens/year for meat production, would see the following additional benefits from including virginiamycin at 20 ppm in their diets:

- 1,474,000 additional lbs. of live weight.
- 1,990 less tons of feed produced and delivered.


**OTHER CHALLENGES OF ABF PRODUCTION**

- By feeding more tons of feed:
  - More feed ingredients have to be produced or bought.
  - The feed mill has to produce and deliver more tons of feed.
  - Use more drinking water for the birds.
  - Dispose of more excreta and nutrients into the environment.

**THE COST OF CHICKEN IN FRANCE**

**OTHER CHALLENGES OF ABF PRODUCTION**

- Because ABF production is less efficient:
  - The cost of producing a pound of chicken or turkey is higher.
  - Food preference trends in one country can have adverse consequences in other countries.
  - A less efficient production system requires more cropland for the production of more ingredients.
  - Taking more cropland and natural resources from the environment to maintain the same meat output is not desirable in a world expected to add 64 MM people each year from 2015 - 2020.

- Producing more animal waste to maintain the same meat output generates more pollution of the environment and a larger carbon footprint.
- Contrary to consumer perception, ABF production is less sustainable.
- Taking more ingredients for the manufacturing of feed creates additional demand for ingredients and a rise in feed ingredient prices that impact both ABF and conventional production.
- Makes animal protein less accessible to those who need it most.
CONCLUSIONS

- In terms of residues all meat is ABF.
- In terms of food safety, no scientifically documented benefits of ABF meat vs. conventional meat. Properly cooked poultry meat contains no viable bacteria and dead bacteria cannot transmit A.R. to people.
- ABF production is less efficient and its higher consumption of feed, water and production of waste results in a larger carbon footprint (less sustainable).
- It is likely to result in significant health challenges and adverse consequences on animal welfare.

CONCLUSIONS

- If a company decides to produce ABF poultry, numerous changes to its feeding, management and health programs would have to be made.
- Even successful companies will face higher costs of production that will have to be passed on to the consumers.

THANK YOU FOR YOUR ATTENTION

Any questions?????