Raised Without Antibiotics – Analyzing the Impact to Biologic and Economic Performance

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Presentation Outline

• Antibiotic Background
• Raised Without Antibiotics (RWA) Opportunity
• RWA Performance Impacts
• Production Changes to Minimize RWA Performance Impacts
• RWA Decision Making Tools
• RWA Lessons Learned
Scottish biologist & pharmacologist Alexander Fleming discovered Penicillin on Sep 28, 1928

The **Miracle maker**

He discovered **Penicillin** from a discarded, contaminated Petri dish used to grow the staphylococci germ.

Fleming was knighted by King George VI in 1944.

He found it in St Mary’s Hospital in London.

Shared the Nobel Prize for Medicine in 1945 with Howard Florey and Ernst Boris Chain for the discovery.

Three Swedish magazines ranked penicillin as the most important discovery of the millennium.

“When I woke up just after dawn...I certainly didn’t plan to revolutionise all medicine by discovering the world’s first antibiotic, or bacteria killer.” - Fleming
Antibiotic Background

• Modern meat animal production has been built around the available use of antibiotics
  – Reductions in mortality
  – Improving animal well-being
  – Improving caloric conversion
  – Improving growth
Antibiotic Background

• The entire meat production supply chain has benefited from the use of Antibiotics
  – Animal Producer Efficiency
  – Herd Expansion = Increased Grain Demand
  – Decreased Carcass Contamination
  – Improved Food Safety
Antibiotic Concerns... Is it a Fad?

McDonald’s Global Vision for Antibiotic Stewardship in Food Animals (“VAS”)

“Preserving Antibiotic effectiveness in the future through ethical practices today”

Seven criteria have been outlined to guide our work and will serve as goals for System Suppliers:

I. Antibiotics can only be used in conjunction with a veterinary developed animal health care program.

II. Source raw material (meat) from Food Animals (beef, chicken, pork, dairy cows and laying hens) that are not treated with HPCIA.

III. Antibiotics identified as High Priority Critically Important, Critically Important, Highly Important and Important for human medicine and currently approved for veterinary use, should not be used as first line treatment, and only be used after susceptibility testing of the diseased animals has shown other classes of Antibiotics to be ineffective as determined by the attending veterinarian.

IV. Source raw material (meat) (beef, chicken, pork, dairy cows and laying hens) from Food Animals that are not treated with Antibiotics used solely for Growth Promotion.

V. Routine Prevention use of Antibiotics is not permitted. For clarity, however, System Suppliers may continue to use ionophores subject to applicable laws and regulations.

| Highest Priority | Cephalosporins (3rd, 4th and 5th generation) |
|                 | Glycopeptides                                 |
|                 | Macrolides and ketolides                     |
|                 | Polymyxins                                    |
|                 | Quinolones                                    |

Antibiotic Concerns... Is it a Fad?

Asian Development Bank, 2016
Our Reality

• We must reduce our antibiotic usage
  – Measurement has started
  – Prevention claims are already under attack
  – Veterinarians are expected to champion improvements
Our Opportunity

Commodity

• Lower Cost
• Lower Revenue
• Throughput Optimized

Niche

• Higher Cost
• Higher Revenue
• Throughput Consequences
RWA Performance Impacts

• Evidence Based Medicine
  – Controlled Research >>> Expert Opinion

• Published papers available
  – These cost estimates are specific to the genotypes, nutrition programs, and processes in place at that time
  – Adjust estimates and use sensitivity tables where appropriate
RWA Performance Impacts

• Main et al\(^1\) documented a $4.40/CWT COP Increase
  – Monthly range of $1.61-$7.67/CWT
• COP increase driven by Nursery Performance:
  – ADG
  – FCR
  – Mortality
• Consistent differences in finishing performance were not observed between RWA and conventional pigs
• Differences in piglet performance during lactation were not estimated

Table 1. Performance differential of antibiotic-free as compared to conventional pigs.\(^a,b,c\)

<table>
<thead>
<tr>
<th>Month Weaned</th>
<th>Nursery</th>
<th>Finishing</th>
<th>Total (^d)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>ADG, lb/d</td>
<td>F:G</td>
<td>Mort, %</td>
</tr>
<tr>
<td>June</td>
<td>0.06</td>
<td>(0.08)</td>
<td>(0.7)</td>
</tr>
<tr>
<td>July</td>
<td>0.10</td>
<td>0.07</td>
<td>(1.1)</td>
</tr>
<tr>
<td>Aug.</td>
<td>(0.02)</td>
<td>(0.15)</td>
<td>(2.6)</td>
</tr>
<tr>
<td>Sept.</td>
<td>(0.07)</td>
<td>(0.11)</td>
<td>(2.2)</td>
</tr>
<tr>
<td>Oct.</td>
<td>(0.16)</td>
<td>(0.55)</td>
<td>(2.7)</td>
</tr>
<tr>
<td>Nov.</td>
<td>(0.10)</td>
<td>(0.25)</td>
<td>(5.9)</td>
</tr>
<tr>
<td>Dec.</td>
<td>(0.12)</td>
<td>(0.38)</td>
<td>(7.2)</td>
</tr>
<tr>
<td>Jan.</td>
<td>(0.27)</td>
<td>(0.60)</td>
<td>(7.8)</td>
</tr>
<tr>
<td>Feb.</td>
<td>(0.17)</td>
<td>(0.32)</td>
<td>(6.0)</td>
</tr>
<tr>
<td>Mar.</td>
<td>(0.06)</td>
<td>(0.28)</td>
<td>(3.8)</td>
</tr>
<tr>
<td>Apr.</td>
<td>(0.01)</td>
<td>(0.19)</td>
<td>(3.2)</td>
</tr>
<tr>
<td>May</td>
<td>(0.01)</td>
<td>(0.30)</td>
<td>(2.6)</td>
</tr>
<tr>
<td>June</td>
<td>0.03</td>
<td>0.34</td>
<td>(3.0)</td>
</tr>
<tr>
<td>July</td>
<td>0.05</td>
<td>0.17</td>
<td>(3.2)</td>
</tr>
<tr>
<td>Aug.</td>
<td>0.11</td>
<td>(0.06)</td>
<td>(3.5)</td>
</tr>
<tr>
<td>Overall</td>
<td>(0.05)</td>
<td>(0.19)</td>
<td>(4.7)</td>
</tr>
</tbody>
</table>

\(^a\)Performance differential data shown as: Better or (Worse)

\(^b\)Two antibiotic-free pig flows with 108,000 feeder pigs and 5 other conventionally reared pig flows from the same production pyramid with 611,000 feeder pigs were used in this comparative data summary.

\(^c\)Finishing feed conversion was omitted due to differing dietary energy levels

\(^d\)Cost differences observed on all ABF pigs sold (qualifying and nonqualifying).

RWA Performance Impacts

• Wolter et al\(^2\) reports Birth to Harvest COP increases of 14-21% based on internal system models
• Primary biologic performance impacts provided through internal wean-to-finish (WTF) trial comparing conventionally raised vs RWA pig performance
• WTF biologic performance was statistically different for ADG, ADFI, FCR, Morbidity and Mortality
• Similar to Main et al the most costly producer impacts were due to mortality

Antibiotic Study Overview

• Randomized complete block design
• Treatments:
  – Control
  – No antibiotics from weaning to harvest
• A total of 32 pens per treatment were used with 30 pigs in each pen
• Diagnostics confirmed exposure to Influenza A Virus (IAV) and M. Hyopneumoniae

## Antibiotic Study Results

<table>
<thead>
<tr>
<th>Item</th>
<th>Control</th>
<th>No Antibiotics</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of pens</td>
<td>32</td>
<td>32</td>
<td>-</td>
</tr>
<tr>
<td>Number of pigs</td>
<td>960</td>
<td>960</td>
<td>-</td>
</tr>
<tr>
<td>Body weight, lb</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Start</td>
<td>14.1</td>
<td>14.1</td>
<td>&gt;0.1</td>
</tr>
<tr>
<td>End</td>
<td>281.3</td>
<td>283</td>
<td>&gt;0.1</td>
</tr>
<tr>
<td>Within-pen CV, %</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Start</td>
<td>19.3</td>
<td>19.6</td>
<td>&gt;0.1</td>
</tr>
<tr>
<td>End</td>
<td>9.8</td>
<td>10.2</td>
<td>&gt;0.1</td>
</tr>
<tr>
<td>Average daily gain, lb</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Live</td>
<td>1.75(^a)</td>
<td>1.68(^b)</td>
<td>&lt;0.05</td>
</tr>
<tr>
<td>Carcass</td>
<td>1.28(^a)</td>
<td>1.22(^c)</td>
<td>&lt;0.05</td>
</tr>
<tr>
<td>Average daily feed intake, lb</td>
<td>4.16(^a)</td>
<td>4.09(^b)</td>
<td>&lt;0.05</td>
</tr>
<tr>
<td>Gain:feed, lb:lb</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Live</td>
<td>0.421(^a)</td>
<td>0.412(^b)</td>
<td>&lt;0.05</td>
</tr>
<tr>
<td>Carcass</td>
<td>0.307(^a)</td>
<td>0.299(^b)</td>
<td>&lt;0.05</td>
</tr>
<tr>
<td>Morbidity and mortality, %</td>
<td>6.5(^b)</td>
<td>14.1(^a)</td>
<td>&lt;0.05</td>
</tr>
</tbody>
</table>

\(^a,b\)Means with difference superscripts are different (\(P<0.05\)).

Production Changes to Minimize RWA COP Impact

• Health
  – Biosecurity
  – Disease Elimination
  – Sanitation
  – Vaccination

• Management
  – AIAO
  – Batch Production
  – Small Pens, Medicator Plumbing
  – Terminal Sire Selection
Production Changes to Minimize RWA COP Impact

• Biosecurity
  – Your current outbreak frequency determines opportunity for improvement
  – Define your list of Risk Factors
  – Assign Biosecurity Principle to Use
    • Hygiene/Sanitation
    • Segregation
    • Exclusion
Production Changes to Minimize RWA COP Impact

- **Disease Elimination**
  - PRRSv & PEDv
  - *M. hyopneumoniae* & APP
  - Dysentery
  - Toxigenic E. coli

- **Do Not Underestimate the Impact of Disease Resistant Genotypes**
  - Example – PRRS Resistant Pig
Production Changes to Minimize RWA COP Impact

• Building Sanitation
  – Clean & Dry
  – Review site specific decontamination when changing source health status
  – Water Lines – Biofilm Removal

• Transportation Sanitation
  – Clean & Dry
  – 3rd Party Inspections
  – Increased Attention to Market Hog Transport
Production Changes to Minimize RWA COP Impact

• Vaccination
  – Base Vaccination Program: PCV, M hyo, Ileitis, Ery
  – Changing economics allow further use of autogenous vaccination schemes
    • Strep suis
    • Haemophilus parasuis
    • Actinobacillus suis
    • Influenza A Virus (IAV)
Production Changes to Minimize RWA COP Impact

• Batch Production
  – Shorter fill time
  – Improved WTF Mortality
  – Facilitates disease elimination programs
Production Changes to Minimize RWA COP Impact

• Pen Design
  – Small Pens Preferred
    • Sorting off treated, non-qualifying pigs
    • Easier ID of sick pigs in general population
  – Pen Level Water Medication Capability
    • Particularly for designated non-qualifying pens
Production Changes to Minimize RWA COP Impact

• Optimizing Terminal Sire
  – “Commodity” driven Sire Index should be reviewed with emphasis on Mortality
  – Opportunity for collaboration with your Genetic program provider
    • Mortality/Morbidity
    • Meat Quality
    • “Unique” Eating Experience
Range in mortality across sire lines = 2.95%
Within-Line Sire Differences in Total Progeny Mortality, %

Range in total combined mortality across sire lines = 24.69%

## Decision Making Tools – Partial Budget

<table>
<thead>
<tr>
<th>Partial Budget: Define the change analyzed</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Benefits</td>
<td>Costs</td>
</tr>
<tr>
<td><strong>Additional Revenues</strong></td>
<td><strong>Additional Costs</strong></td>
</tr>
<tr>
<td>What will be the new or added revenues?</td>
<td>What will be the new or added costs?</td>
</tr>
<tr>
<td><strong>Costs Reduced</strong></td>
<td><strong>Revenues Reduced</strong></td>
</tr>
<tr>
<td>What costs will be reduced or eliminated?</td>
<td>What revenues will be reduced or lost?</td>
</tr>
<tr>
<td><strong>Total Benefits</strong></td>
<td><strong>Total Costs</strong></td>
</tr>
<tr>
<td><strong>Net Benefit</strong></td>
<td></td>
</tr>
</tbody>
</table>
Benefits – Additional Revenues

• Use packer information on historical prices for the RWA program to project a price/CWT
• Estimate a percentage of pigs qualified
• Consider all RWA program stipulations
  – Vegetarian Fed?
  – Organic?
  – Housing Design?
Benefits – Reduced Costs

• Medication Expenses
  – Feed Medication
  – Water Medication
  – Injectable Medication
• Current treatment records can serve as a guideline for estimating impact
• Consider Finishing Feed Costs – Less Pigs to Feed
• Consider Feed Mill change over impact
Costs – Additional Costs

• Expect additional feed costs per lb produced
  – Decreased ADG
  – Increased FCR

• Consider all RWA program stipulations
  – Vegetarian Fed?
  – Organic?
  – Housing Design?

• Consider impact to market hog transport cost
Costs – Decreased Revenues

- Reduction in Pigs sold
  - Increased Mortality
- If Non-RWA qualified pigs will be sold to a different packer, adjust revenue expectations accordingly
RWA Chicken
RWA Chicken Lessons Learned

**NAE Industry Production vs. Sales**

- **Produced**: 35.3%
- **Mortality**: 4.8%
- **Sold as NAE**: 4.4%

Source: Elanco

Progressive Farming, Family Style.
Conclusions

• Antibiotic Concerns are Not a Fad
  – RWA Programs will Sustain
  – RWA Demand will be Saturated

• RWA Programs Offer Producers an Opportunity for Increased Revenues
  – May or May Not be Increased Profit
  – Consider the Cost of Capital, You need a greater ROI to Justify Increased COP
Thank You!

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