

Transitioning from conventional to antibiotic free broiler production – challenges and strategies from a nutritionist's perspective

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antimicrobial resistance
antibiotic resistance
infections global
researchers report world research colistin antibiotic use
superbugs study
treatment drugs medical food
new U.S.
human medicine problem animals doctors
antibiotic resistant
bacteria resistant

No Antibiotics or Raised Without Antibiotics ?

- Australia – ionophores allowed but no AGPs.
- France – no ionophores and no AGPs but can treat with antibiotics via the water twice during the flock for animal wellbeing.
- USA – organic poultry is allowed *in ovo* antibiotic use but no ionophores or AGPs.
- USA – no *in ovo* antibiotics and no ionophores or AGPs. Chemical coccidiostats allowed. (our No Antibiotic Ever – NAE)
- Canada – no *in ovo* antibiotics, no ionophores or chemical coccidiostats and no AGPs.

No Antibiotics Ever (NAE)

- USDA (United States Department of Agriculture) requiring certification of claims if putting claims on the label (Process Verified Programs – PVP).
- Several different certifying agents for PVP.
 - American Marketing Service of USDA
 - Global Animal Production (GAP)
 - Non-GMO Verified
- Customers generally driving production models for NAE.

USA Terms (Tyson Terms)

- NAE + (No Antibiotics (including ionophores) Ever plus ... veg fed, cage free, non GMO...)
- NAE (No Antibiotics (including ionophores) Ever) – can use animal proteins
- NAIHM (No Antibiotics Important in Human Medicine) – ionophores allowed as well as animal only antibiotics
- CRAU (Certified Responsible Antibiotic Use) – ionophores allowed and can treat with antibiotics when necessary but not more than two consecutive flocks

Good News regarding NAE Production

- It is possible to raise commercial broilers in a No Antibiotic Ever (NAE) production system.

Bad News regarding NAE Production

- The world appears to be heading that way...quickly!
- There are no silver bullets.
- We will not be as efficient.
- Controlling coccidiosis and clostridial diseases will be harder (and key).
- I have NO GOOD ANSWERS!

NAE Experiences

- Higher mortality
 - 7 day mortality (typically > 0.25% higher) 1.25% vs 1.0%
 - Life of flock
- Feed Conversion Ratios increase
- Average Daily Gains likely decrease
- Necrotic enteritis & coccidiosis control is greatest issue
- Higher cost of production (5-15% higher)

USA Production

- December 2019 Agri Stats
 - 147 Complexes (each approximately 1.12 million broilers per week)
 - 712,173,957 broilers
 - Average live weight 6.71 pounds (3.04 kg)
 - 31 Complexes (21% reported cocci vaccine & no AGP) - NAE✓
 - 46 Complexes (31% reported chemical coccidiostat & no AGP) - NAE✓
 - 9 Complexes (6% reported ionophore coccidiostat & no AGP)
 - 61 Complexes (42% reported coccidiostat & AGP use)

NAE Broiler Production in the USA

Breeders & Hatchery

- No change in hatching egg production
- Hatchery removal of antibiotics (Gentamycin) *in ovo*
 - requires cleaner egg pack
 - Nest closures
 - Gather eggs more often
 - Cleaning/replacing egg belts
 - Egg fogging with Peracetic acid
 - Washing and Dipping not a good idea
 - Good egg storage – no egg sweating
 - requires cleaner hatchery
 - Hot water for tray wash (> 140°F or 60°C)
 - Disinfection monitoring
 - Clean area for vaccine preparation
 - Clean water source (pseudomonas can be an issue in “clean water”)

NAE Broiler Production in the USA

Breeders & Hatchery

- Embrex (Mareks vaccine) or *in ovo*
 - Extra cleaning (changing lines, cups, etc.)
 - May have a separate Embrex room – clean room
 - Some skip Embrex during warmer months for a couple of cycles
 - Natural alternatives to gentamycin? (probiotics, enzymes?)
 - Must be compatible with vaccines
 - Must be cost effective (cost must be recovered with reduced mortality or improved performance)
 - Fumigating Hatchers (formaldehyde or hydrogen peroxide)
- Hatchery application of coccidial vaccine
 - Don't allow to freeze
 - Complete coverage of vaccine
 - Allow and promote preening (spray or gel)

NAE Broiler Production in the USA

Broiler Farms

- Placement Density
 - Generally no NAE requirements around placement density
 - National Chicken Council density guidelines
 - Below 4.5 pounds (2.04kg) – 6.5 pounds/square foot (31.7 kg/sq meter)
 - 4.5-5.5 pounds (2.04-2.5kg) – 7.5 pounds/square foot (36.6 kg/sq meter)
 - 5.6-7.5 pounds (2.54-3.4kg) – 8.5 pounds/square foot (41.5 kg/sq meter)
 - More than 7.5 pounds (>3.4kg) – 9.0 pounds/square foot (43.9 kg/sq meter)
 - Some recommend 0.05 square foot (0.0046 sq meter)/bird more space for NAE verses conventional
 - Less birds decreases litter moisture – less moisture, less cocci
 - Less cocci oocyst shedding
 - Does benefit overcome cost?
- Downtime between flocks
 - Longer the better (14 days or greater recommended)

NAE Broiler Production in the USA

Broiler Farms

- Litter (bedding) manipulation
 - Must be totally cleanout before placing first NAE flock
 - Can use built-up litter (recommend cleaning out once per year – depending on disease challenge and litter quality)
 - Litter amendments (alum, sodium bisulfate) may be helpful to reduce ammonia and bacterial challenges
 - Removal of caked/wet litter along with windrowing or composting litter is beneficial between flocks
 - Some recommend top-dressing litter with new litter (could cause aspergillosis)
- Pick best growers for NAE if possible

NAE Broiler Production in the USA

Broiler Farms

- No water application of antibiotics.
- Good water quality and water sanitation is helpful.
- Acidified Copper Sulfate and Hydrogen Peroxide in drinking water during “challenge” times (necrotic window).
 - 600 grams of Copper Sulfate, 500 g sodium bisulfate, 740 milliliters hydrogen peroxide 33% to 19 liters stock solution – meter at 30 milliliters to 3.8 liters of drinking water (during challenge or feed changes)
- Keep mortality picked up.
- Keep broiler on feed (no feed outages).
- Reducing lights length and intensity may be of benefit after getting broilers started.
- Coccidial vaccine – brooding and turn out timing and cocci cycling.

NAE Broiler Production in the USA

Feed Milling

- Must flush the mill if antibiotics are used before making NAE feeds
 - Testing and flush documentation records are required for PVP program
 - Dedicated or flushed NAE feed bins and trucks are required
- High quality ingredients (especially fats and oils)
 - Consider cleaning fat/oil storage
- Larger Particle Sizes
 - Grain – 1000 micron size grind
 - Whole wheat and sorghum (5-25%)
 - Avoid if possible powdery or fine textures-measure % dust by using a #14 sieve (1.41 mm mesh) and goal should be less than 30% (10% possible)
 - Special attention to crumble or starter feeds
- Review pelleting temperatures – data is indicating high pelleting temperatures ($> 74^{\circ}\text{C}$ or 165°F) reduce digestibility of amino acids.

NAE Broiler Production in the USA

Nutritional Strategies

- Use higher digestible ingredients, especially in first 28 days.
- Formulate on a digestible amino acid basis.
- Some have recommended reducing amino acid density to reduce necrotic enteritis – may negatively impact growth rate and FCR but improve livability. Don't over feed protein.
- Utilize enzymes – especially phytase
 - Bacterial derived phytase vs fungal derived
 - Higher levels of phytase
 - Reduces gut viscosity - xylanase
- Minimize drastic feed changes especially during critical times (peak coccidial challenges).

NAE Broiler Production in the USA

Nutritional Strategies

- Animal Proteins?
 - Allows for less soybean meal (lowers potassium).
 - May be a source of clostridium.
 - Monitor digestibility (IDEA, pepsin digestibility, etc.)
- Adjust sodium and electrolyte levels to maintain litter quality.
 - Sodium bicarbonate or S-Carb or Sodium Bisulfate.
 - Chloride levels – may put a maximum of 20% higher than sodium.
 - May consider lowering sodium level if using high phytase levels (or give phytase a sodium value).

NAE Broiler Production in the USA

Nutritional Strategies

- Ingredients to consider for gut health.
 - L-Threonine (place minimums on valine, isoleucine and arginine)
 - L-Valine and L-Arginine are now becoming available for use.
 - Higher copper levels (125 – 200 ppm) – copper sulfate, TBCC, copper carbonate.
 - Probiotics (*Bacillus subtilis* and *Bacillus licheniformis*) – have been shown to decrease clostridial challenge.
 - *Yucca schidigera* or *Quillaja* products – have shown some anticoccidial activity. Can use in combination with coccidiostats (chemical and ionophore) and vaccines.
 - Organic acids – Butyric acid and short chain fatty acids to maintain gut health has been reported to improve litter quality.
 - Botanical and phytogenic compounds (Hops, Oregano, etc.) could help control coccidial and clostridial challenge.

NAE Broiler Production in the USA

Nutritional Strategies

- Specialty prestarter diets and high quality soybean by-products have not been a benefit with NAE production.
- Studies have shown that excess calcium promotes necrotic enteritis.
 - Account for calcium in premixes (vitamin, trace mineral), soybean meal (flow agent 0.18-1.18% calcium) and other ingredients.
- Make moderate ingredient changes if possible.
- If allowed, use a coccidiostat (ionophore or chemical) in combination with cocci-vaccine (bioshuttle).
- Some locations are using a cocci-vaccine at day of age (hatchery spray) followed by a second application in the field (water or spray) at 3-10 days to control coccidiosis.

NAE Broiler Production in the USA

Nutritional Strategies

- If using chemical coccidiostat – proper rotation and possible sensitivity testing of coccidiostats may be of benefit to prevent or postpone resistance.
- Multiple products in combination (probiotics, prebiotics, botanicals, organic acids, plant extracts, etc.) may need to be utilized to replace antibiotics.

NAE Summary

- Cost will be higher and performance poorer.
- Coccidiosis and clostridial control will be the biggest concerns when converting to NAE.
- Maintaining gut health and minimizing intestinal disruptions are key.
- New technologies will come forward as more of the industry moves that way.