Fighting AMR by optimizing Gastrointestinal Functionality

A HOLISTIC APPROACH

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ANTIMICROBIAL RESISTANCE

It was on a short-cut through the hospital kitchens that Albert was first approached by a member of the Antibiotic Resistance.
**PRESENTATION OUTLINE**

Introduction
- Sustainability
- Industry challenges

The Issue
- Antimicrobial Resistance (AMR)

GASTROINTESTINAL functionality

The Holistic approach
- Experiences from the field

Conclusions
INTRODUCTION

SUSTAINABILITY

INDUSTRY CHALLENGES
THE IMPACT ON HUMAN HEALTH AND ANIMAL WELFARE AND ENVIRONMENT IS UNDER SCRUTINY

Animal protein footprint
Increasing focus on AMR
Animal welfare
Meat consumption
ANIMAL PRODUCTION HAS TO HAPPEN WITHIN PLANETARY BOUNDARIES

- GHG emissions
- Sustainable use of raw materials
- Natural resource protection
- Land use and water use
- Biodiversity loss
- Soil depletion & degradation
- Improving animal welfare
- Reducing the use of antibiotics
- Reducing food loss and waste
- Farmer / socio economic factors

Source: Steffen et al., 2015
CHALLENGES IN THE POULTRY INDUSTRY

- Removal of AGPs
- Incidence of intestinal problems
- Stocking density
- Intensification

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INTESTINAL CHALLENGES

- Malabsorption
- Necrotic Enteritis & coccidiosis
- Salmonella & Campylobacter
- Bone mineralization (skeletal health)
CONSUMER-DRIVEN PRESSURE

US sales of antibiotics for farm animals fall for first time since 2009: FDA

By Aerin Einstein-Curtis
08-Dec-2017 - Last updated on 08-Dec-2017 at 09:25 GMT

What do we Want?

- REDUCE ANTIBIOTICS
- USE RAW MATERIALS WITH NON-NUTRITIONAL FIBERS

Scientific Report

Adopted: 26 January 2017
Doc. 2017/4694

The European Union summary report on antimicrobial resistance in zoonotic and indicator bacteria from humans, animals and food in 2015

European Food Safety Authority
European Centre for Disease Prevention and Control

Antibiotic free chicken production: Tyson Foods shifts up a gear

By Aerin Einstein-Curtis
08-Dec-2017 - Last updated on 08-Dec-2017 at 09:25 GMT

September 21st 2016

U.N. Passes Resolution to Combat Antibiotic-Resistence Crisis

"It's the health crisis of our generation," Consumer Reports' CEO Martin Talbot told delegates.

Tyson Foods is set to switch its retail line of company-branded chicken products to birds raised without any antibiotics.

Significant unmet need for new solutions
TACKLING ANTI-MICROBIAL RESISTANCE

ANTIBIOTICS SAVE MILLIONS OF LIVES A YEAR BY CURING BACTERIAL INFECTIONS – THEY ANCHOR MODERN HEALTHCARE

NOW WE HAVE TO SAVE THEM
ANTIMICROBIAL RESISTANCE (AMR)
THE GREATEST HEALTH THREAT FACING HUMANITY

According to the NCDC India, almost every minute a child ‘under five’ dies from pneumonia in India alone.

“Antimicrobial resistance poses a fundamental, long-term threat to human health, sustainable food production and development. [...] It is a very present reality - in all parts of the world, in developing and developed countries; in rural and urban areas [...]”

Ban Ki-moon, UN Secretary-General

Livestock production is the largest antibiotic user (70% of world’s total)

Prescription use of antibiotics in human medicine to be reduced

Antibiotic pollution via manufacturing to be reduced

Overuse & misuse in agriculture

Pollution from pharmaceutical production

Overuse & misuse in medicine

Resistant bacteria

Source: 1 AMR Review, 2016
EFSA has concluded that use of certain antibiotics in animals and humans leads to resistance.

EU banned the AGP use of antibiotics in 2006 and prophylactic use in 2018.

USA is moving towards a voluntarily re-labelling of antibiotics to reduce their use as growth promoters.

Pressure is on emerging markets to reduce or even ban AGP use in livestock production like the EU and US.

Expectation is tighter regulations against AGPs and to first go antibiotic-light (like the EU) with minimal performance disruption at farm level.

Source: Rabobank, 2017, Reducing antibiotics in livestock farming: short-term pain, but long-term gain
REGULATORY ENVIRONMENT ON ANTIBIOTIC USE

North America
- Since Jan 2017: Use of medically important antibiotics for growth promotion or improved efficiency eliminated
- Transition from over-the-counter (O-T-C) availability of medically important antibiotics to veterinary oversight
- Ionophores, bacitracins, bambermycins not considered medically important

Latin America
- AGPs are authorized (excepting - Colistin banned in Brazil in Nov 2016)
- All coccidiostats (ionophores and chemicals) allowed and no plan of banning or restricting their use in near future
- Growing development of AB free production

Europe
- AGPs are banned since 2006 in EU
- Anticoccidials are still allowed (including ionophores) for poultry
- Since 2010: antibiotic reduction plan for animal production with Monitoring of antibiotic usage
- Antibiotic treatments under veterinary supervision are allowed, but under scrutiny
- Most neighboring countries to the EU apply similar laws
- Countries exporting to EU have similar laws
- Forthcoming new legislation on low zinc and copper diets

China
- Colistin banned in November 2016
- Launched national action plan on AMR
- Ban planned on the other AGPs and anticoccidials
- Growing interest in AGP free production

APAC
- Indonesia: ban of AGPs January 2018
- Bangladesh: AGP are banned but implementation is poor
- Other countries: continuous development of AGP free production (Thailand, South Korea, Taiwan, ...)

Significant acceleration of regulatory restrictions for the use of antibiotics leading to a growing opportunity space for Eubiotics and gut health solutions !!!
GASTROINTESTINAL FUNCTIONALITY

‘a steady state where the microbiome and the intestinal tract (host) exist in symbiotic equilibrium and where the welfare and performance of the animal is not constrained by intestinal dysfunction’
Gastrointestinal Functionality is the single most important factor impacting producers’ profitability and license to produce.
GASTROINTESTINAL FUNCTIONALITY

WHAT IS NEEDED

Maximise value from feed

Robust immune system

Nutrient digestibility

Management practices

Is there something new out there?
How can we maintain health, welfare and performance?

**Nutrition**

- Coarse grain grinding
- Limiting feed changes
- Electrolyte balance
- Vitamins
- Feed enzymes
- Novel and unique feed additives

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THE HOLISTIC APPROACH
TO REDUCE THE INCIDENCE OF AMR FROM ANIMAL PRODUCTION A COORDINATED ACTION IS NEEDED

- **Regulations**: ban sub-therapeutic use
- **Tax**: increased cost of use minimizes use
- **Surveillance**: increase at country level
- **Improved sanitary controls, diagnostics, husbandry & nutrition**
- **Greater use and development of vaccines**
- **Multi-sector approach**: animal, human, API production
- **Alternative solutions**: feed additive innovation & education
UNTIL RECENTLY, THE ‘HEALTH SOLUTIONS’ CATEGORY PROVIDED THE ‘SILVER BULLET’ FOR GASTROINTESTINAL FUNCTIONALITY

The current industry approach conceals fundamental gaps in basic management practices and nutrition.
The holistic approach considering all aspects of nutrition, health and management is of utmost importance to optimize gastrointestinal functionality.
FEED FOR GAIN: A ONE HEALTH APPROACH

NEED COORDINATED ACTION WITH HUMAN MEDICINE
**DANISH SWINE INDUSTRY IS A GOOD EXAMPLE OF CHANGE**

- **DK swine industry removed AGP by 2000**
- **The industry grew 47% in volume (85% of meat exported)**
- **But there were farm closure and consolidation. Those farms with good management remained.**
- **Initially the change was costly to farmers:**
  - Lower weight at end of growth period;
  - Greater heterogeneity in weight;
  - Performance down
  - Higher incidence of diarrhea
- **Now more than compensated through**
  - Sanitary controls
  - Husbandry
  - Nutrition (EUBIOTICS)
- **Danish Crown recently announced to go fully antibiotic free.**

DK swine industry historical animal performance

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1 Based on mg purchased for every kg of animal biomass produced (excludes ionophores)
DSM HAS MARKET PROVEN SOLUTIONS TO HELP REDUCE ANTIBIOTIC USE IN ANIMAL PRODUCTION

Treatment

- For treatment of disease in sick animals

Prophylaxis

- For the prevention of disease in healthy animals

Growth promotion

- For increased feed efficiency and weight gain in healthy animals

Continued veterinarian intervention with the responsible administration of antibiotics. Animal welfare considerations.

Application of OVN + eubiotics solutions. Stabilization & improved gastrointestinal functionality. Economic impact: minimal cost neutral

Application of OVN + enzyme + eubiotics solutions. Economic impact: minimal cost neutral

OVN = Optimum Vitamin Nutrition. This is a basic nutritional requirement to any growth or health solution and ensures a more robust animal with a greater capacity to handle variable farming conditions.

DSM operates within these boundaries.
DAIRY COWS HAVE SEVERAL SEVERE ISSUES...
THE TYPICAL ANSWERS ARE FEED INGREDIENTS OR DRUGS

1. Hypocalcaemia
   Prevention: Anionic salts (feed ingredient)

2. Milk yield, feed efficiency, ketosis
   Prevention/treatment: Ionophores (drug)

3. Acidosis
   Prevention: Buffers (feed ingredient)

4. Fertility problems
   Treatment: Hormones (drug)

5. Mastitis and lameness
   Treatment: Antibiotics (drug)
WE HAVE A DIFFERENT APPROACH

1. **Optimum blood calcium levels:** 25-OH-D3 for skeletal development & health

2. **Nutrient utilization:** Essential oils x Biotin x amylase for high milk efficiency, acidosis and ketosis prevention

3. **Fertility:** β-Carotene (fertility vitamin)

4. **Mastitis and lameness:** Vitamin E and Biotin

This adds up to improved **longevity**, more milk production and **NO ANTIBIOTICS or DRUGS**.
CONCLUSIONS
DSM recognizes that AMR is an issue of global concern.

DSM will proactively collaborate with WHO, FAO and OIE on the One Health initiative.

DSM supports the responsible use of antibiotics to ensure the health and welfare of animals.

DSM advocates the replacement of AGPs and reduction in the prophylactic use of antibiotics.

DSM will continue to apply its leading scientific knowledge to accelerate the transformational change needed to combat AMR.

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