

Introduction

**Poultry Industry Research
Chair, Dalhousie
Agricultural Campus**

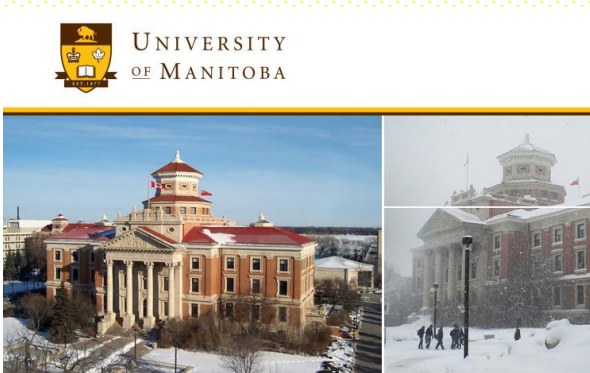
Atlantic Poultry Conference 2018

BACKGROUND



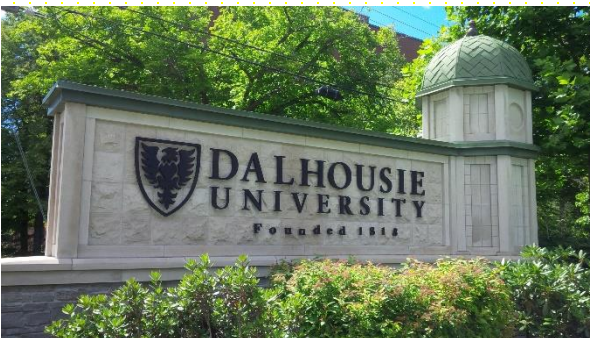
Bachelor of Agriculture – Obafemi Awolowo University, Ile – Ife, Nigeria

- Plant extracts and microbial respiration in manure-amended soils



MSc and PhD – Monogastric Nutritional Biochemistry

- Development of net energy system for Manitoba Pork Industry
- Exogenous enzymes in swine nutrition
- Effect of processing conditions on fiber composition and nutritional value of canola meal



Research Program – Sustainable antibiotic reduction in chicken production

POSITION MANDATE

Sustainable Antibiotic Reduction in Poultry Production

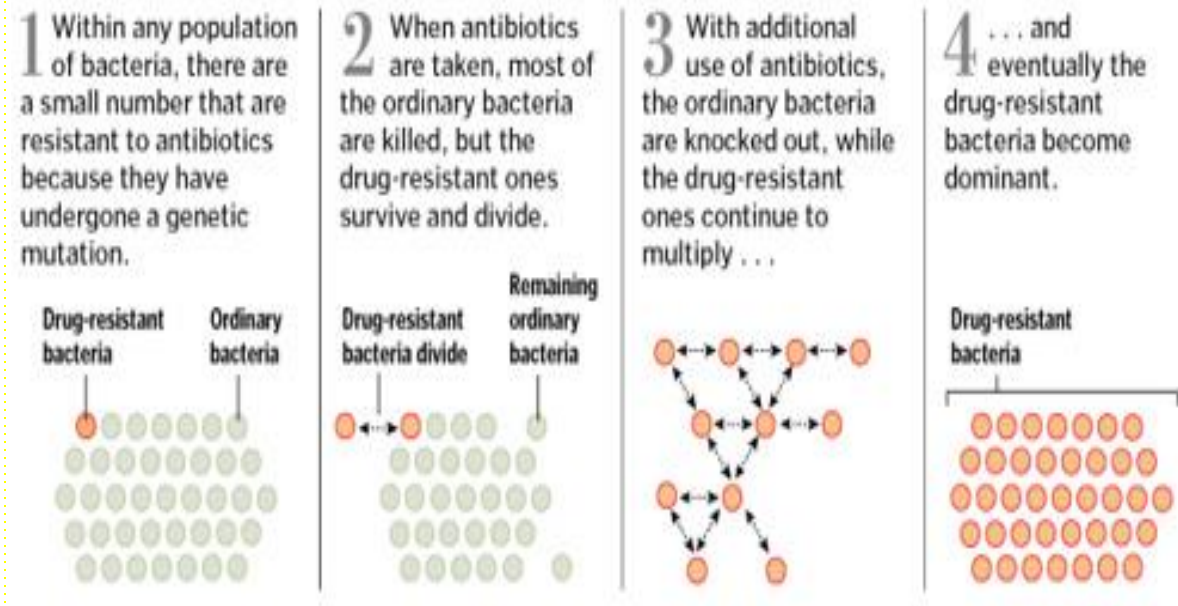
- Antimicrobial resistance (AMR)
 - Natural or acquired defense mechanism of bacteria when threatened by substances that can kill or inactivate them
 - Fundamental threat to global health security
 - It has been estimated that by 2050, annual deaths due to AMR could reach 10 million worldwide

POSSIBLE CAUSES OF AMR

- Over-prescription of antibiotics
- Incomplete dosages
- Incorrect antibiotics for a particular disease
- Prophylactic application
- Use of antibiotics in food producing animals

HOW DOES ANTIBIOTIC RESISTANCE OCCUR?

- Mutation of bacteria gives rise to resistant forms
- Treatment with antibiotics strongly selects for resistant bacteria



https://www.google.ca/search?q=Mutation+of+bacteria+gives+rise+to+resistant+forms+Treatment+with+antibiotics+strongly+selects+for+resistant+bacteria&source=Inms&tbm=isch&sa=X&ved=0ahUKEwj0oPf7t77eAhWFmVkkHWzBD5EQ_AUIDygc&biw=1366&bih=651#imgsrc=OT2WMD565p926M

ANTIBIOTICS USE IN POULTRY PRODUCTION

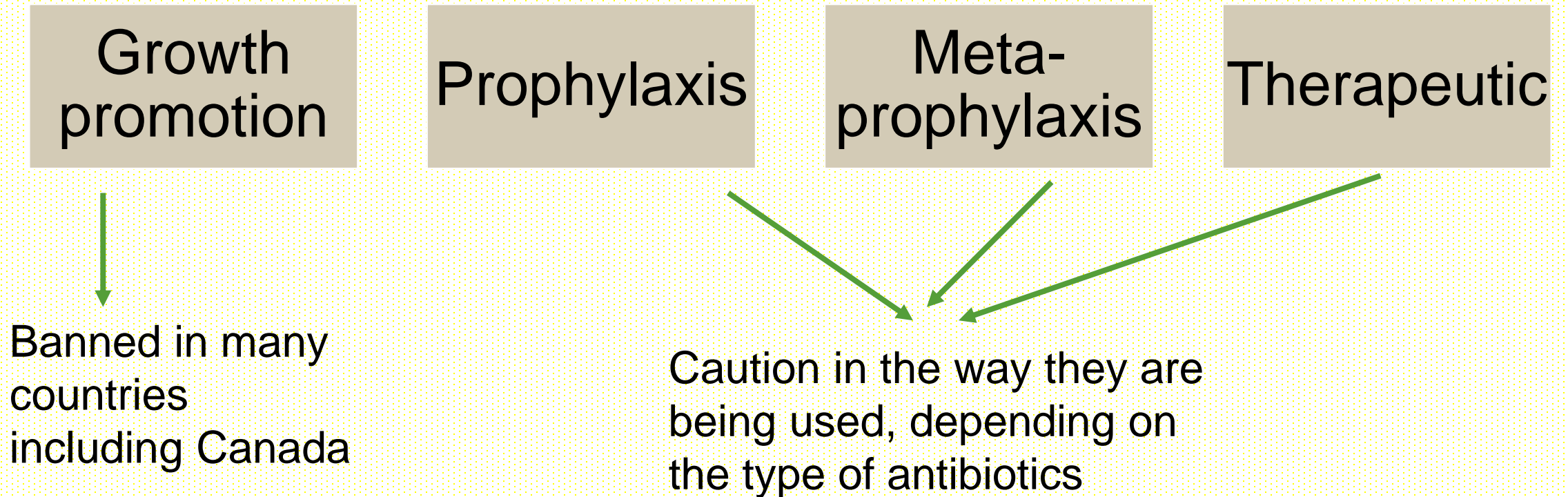
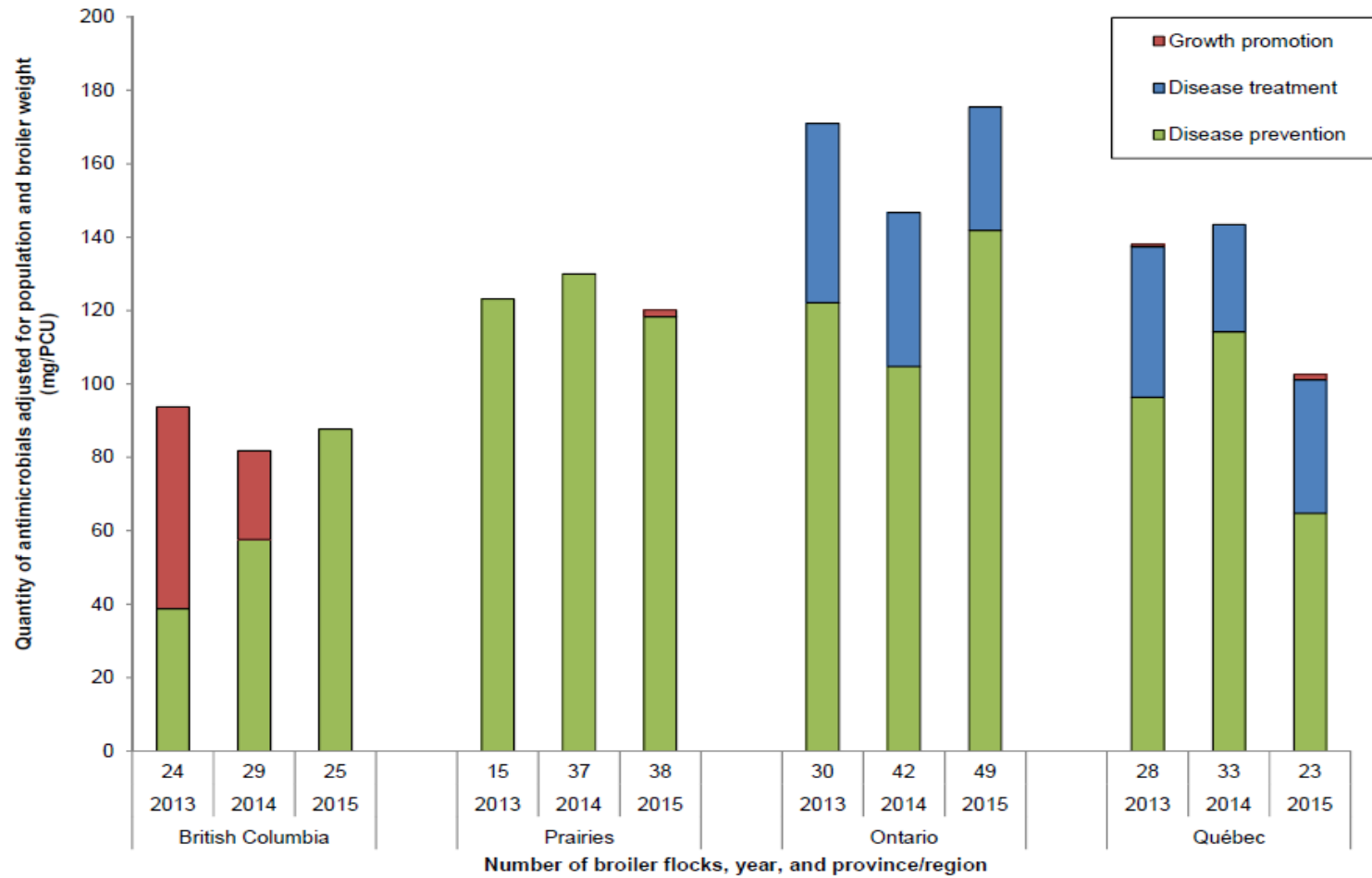


Figure 3. 19 Quantity of antimicrobials used in feed adjusted for population and broiler weight (mg/PCU), by primary reason for use and province/region, 2013–2015



CATEGORIES OF ANTIBIOTICS – IMPORTANCE TO HUMAN HEALTH

Category I – Very high importance

Essential for serious human infections with limited or no alternatives

e.g. Ceftiofur and Enrofloxacin

Category II – High importance

Essential for treating serious human infections and few alternatives available

e.g. Virginiamycin and penicillins

Category III – Medium importance

Important for treating human infections and alternatives are generally available

e.g. Bacitracin and Tetracyclines

Category IV – Low importance - Not used in human medicine

e.g. Bambermycin and Ionophores



Health
Canada

ANTIBIOTICS REDUCTION IN POULTRY PRODUCTION

- In 2014, CFC banned the preventive use of category I antibiotics in poultry
- Recently announced that:
 - Preventive use of category II antibiotics should be eliminated by the end of 2018
 - Preventive use of Category III antibiotics should be eliminated by the end of 2020

Canada



CHALLENGE TO POULTRY FARMERS

- Poultry farmers are faced with the challenge of preventing diseases on their farms.
- Mortality caused by enteric infections remains a big problem in the poultry industry.
- Infectious pathogens such as *Salmonella*, *Escherichia coli*, and *Clostridium* are responsible for reduced growth rates and economic losses for poultry farmers.
- Need for alternative strategies –
 - Nutritional and management strategies to prevent diseases

Van Immerseel et al., 2017



Poultry Industry Research Chair – Dalhousie University

Dietary fiber ingredients and their prebiotic effects

Dietary fiber

- Locally produced grains
- Co-products of bio-ethanol and oil-seed processing e.g. canola meal
- Co-products of grain milling e.g. oat hulls, wheat bran
- Cost-effective and available
- Environmental friendly
- Safe to consume

Non-starch polysaccharides

- Short chain fatty acids in the large intestine
 - Acetate, propionate, and Butyrate
- Exert multiple beneficial effects on mammalian energy metabolism

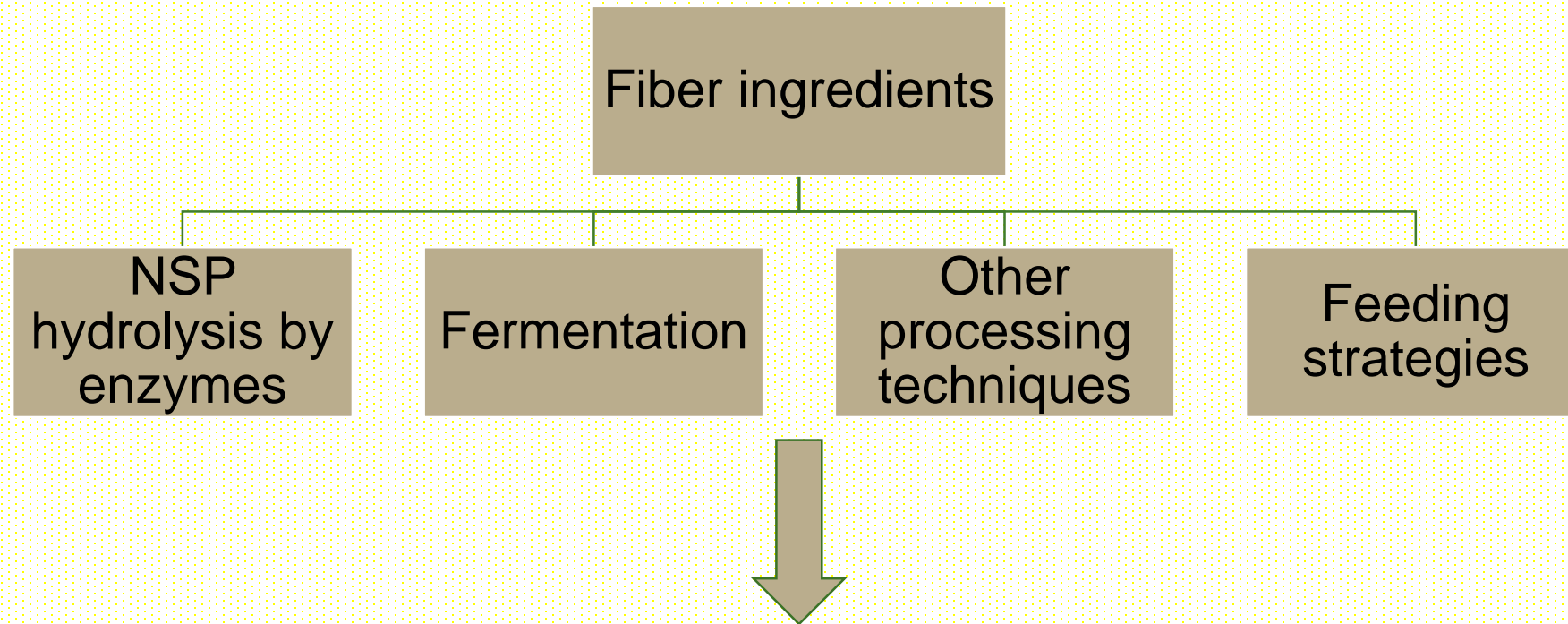
The presence of butyrate

- Stronger epithelial barrier integrity
- More proliferation of epithelial cells
- Reduced inflammation

Den Besten et al., 2013; Onrust et al., 2015; Koh et al., 2016

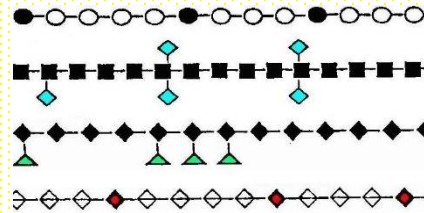
Strategies to enhance the prebiotic effects of fiber ingredients

- Dietary fiber can reduce feed intake and interferes with digestive processes via various pathways



- Reduce interference with digestive processes and modulate immunity and gut microbiome

DIETARY FIBER/NSP HYDROLYSIS



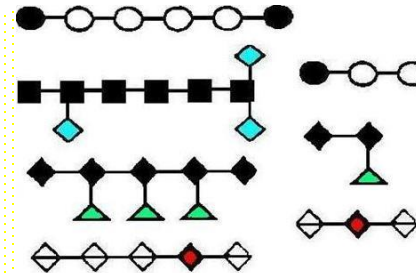
+ Enzyme



NSP hydrolysis products

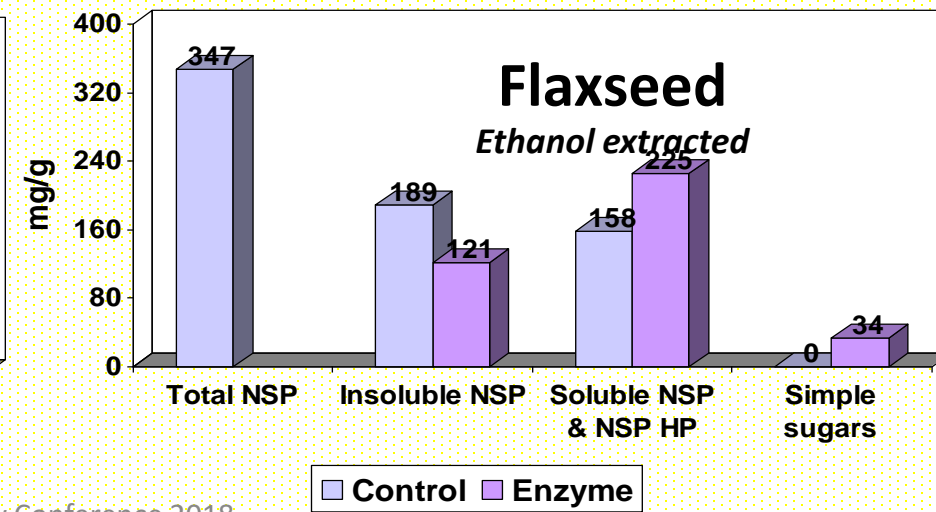
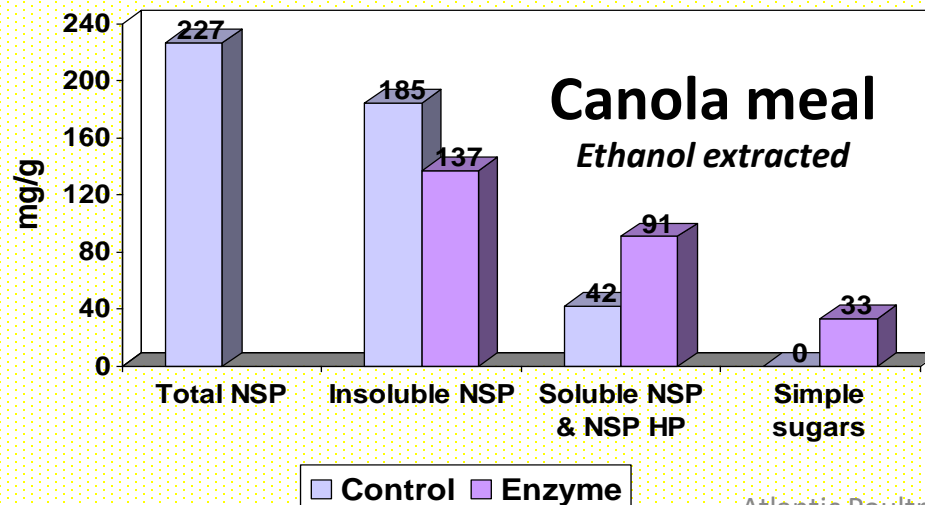
Oligosaccharides

Simple sugars



- 1,4-Glucose
- 1,3-Glucose
- Xylose
- ◇ Arabinose
- ◆ Mannose
- ▲ Galactose
- ◆ Rhamnose
- ◇ Galacturonic acid

NSP hydrolysis products were beneficial in maintaining fluid balance during *E. coli* challenge in piglets.
Kiarie et al., 2008; 2010.



AVAILABLE STUDENT POSITIONS

1 - Part-time Undergraduate
1 - MSc Student

Modifying fiber feeding
for optimal
gastrointestinal health of
broiler chickens

Enhancing the prebiotic
effects of dietary fiber for
broiler chickens

THANK YOU