

Nutritionist's Challenges - Practical Perspectives & Solutions-

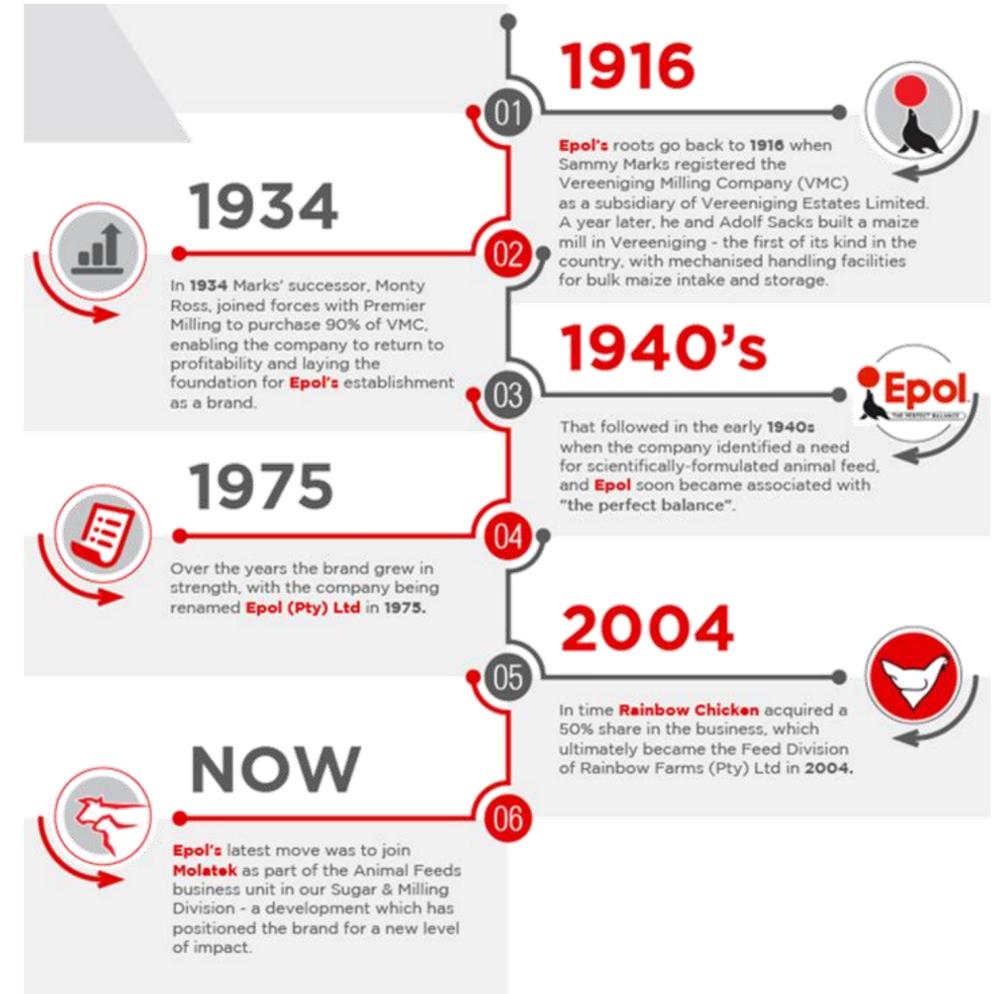
Brett Roosendaal

Technical Executive Animal Feed, RCL Foods, South Africa



**100
YEARS**

**1.4m
tons**

01 1916
Epol's roots go back to 1916 when Sammy Marks registered the Vereeniging Milling Company (VMC) as a subsidiary of Vereeniging Estates Limited. A year later, he and Adolf Sacks built a maize mill in Vereeniging - the first of its kind in the country, with mechanised handling facilities for bulk maize intake and storage.

02 1934
In 1934 Marks' successor, Monty Ross, joined forces with Premier Milling to purchase 90% of VMC, enabling the company to return to profitability and laying the foundation for Epol's establishment as a brand.

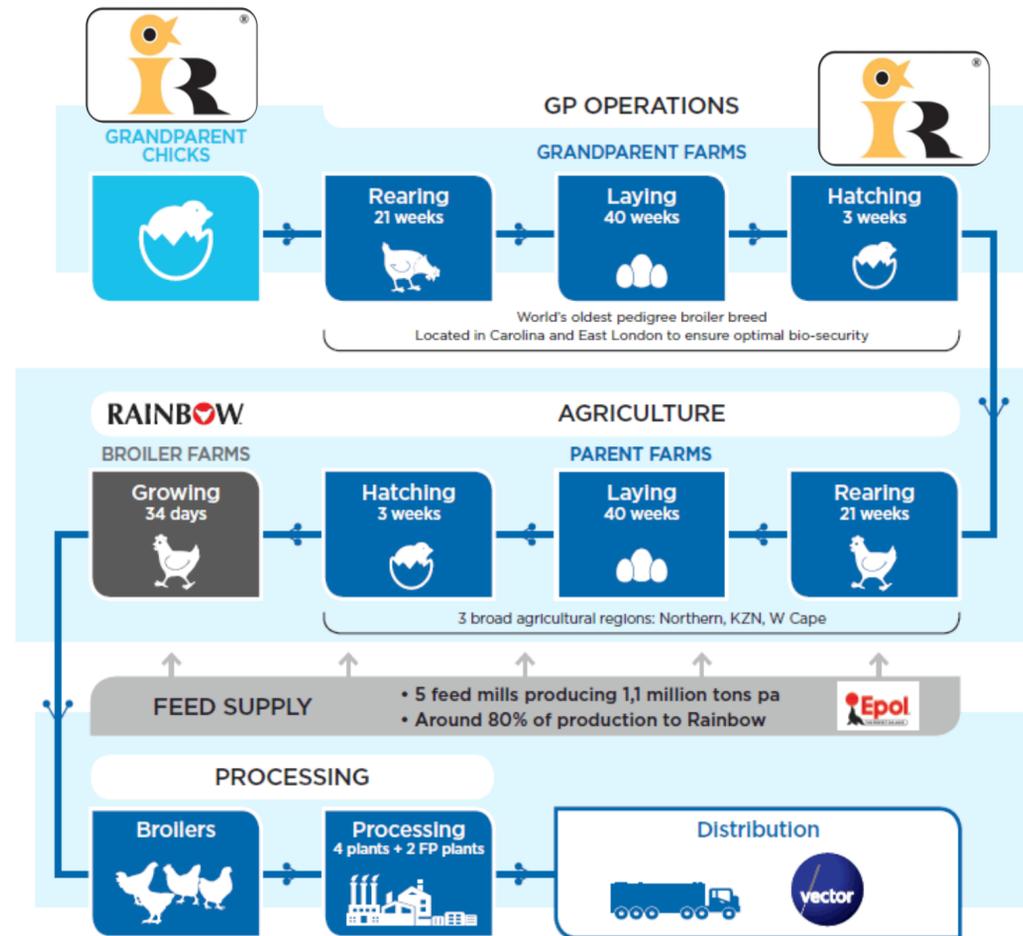
03 1940's
That followed in the early 1940s when the company identified a need for scientifically-formulated animal feed, and Epol soon became associated with "the perfect balance".

04 1975
Over the years the brand grew in strength, with the company being renamed Epol (Pty) Ltd in 1975.

05 2004
In time Rainbow Chicken acquired a 50% share in the business, which ultimately became the Feed Division of Rainbow Farms (Pty) Ltd in 2004.

06 NOW
Epol's latest move was to join Molatek as part of the Animal Feeds business unit in our Sugar & Milling Division - a development which has positioned the brand for a new level of impact.

INTEGRATION



30 MILLION
CHICKENS ON
THE GROUND
AT ANY TIME

CONTENT

- MONEY
- GUT HEALTH
- ANTI-MICROBIAL RESISTANCE
- REARING PROFILES
- ADDITIVE CHOICE



cvb feed evaluation matrix book x CVB Feed Table 2023 | PDF | Flour x Tables of composition and nutriti... x

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CVB Feed Table 2023

The CVB Feed Table 2023 provides updated chemical composition and nutritional values of various feedstuffs for pigs, ruminants, poultry, rabbits, and horses. It includes standardized ileal d... **Full description**

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CVB Feed Table 2023

Chemical composition and nutritional values of feedstuffs

59 pages

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100% (2)
Grower Swine

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https://feedtables.com

English

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DZ

INRAE-CIRAD-AFZ Feed tables

Composition and nutritive values of feeds for cattle, sheep, goats, pigs, poultry, rabbits, horses and salmonids

INRAE cirad

This project is supported by

eurolysine Avril

EAAP European Federation of Animal Science

Feedinamics

With Feedinamics, calculate the feed values of your own ingredients using their chemical composition! [Click here for a demo!](#)

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EVONIK

POWER TO CREATE

Input detected
Feces

Interpretation
All good,
Smelly, but
healthy belly.

nrc feed evaluation matrix book x National Research Council (NRC) x

https://animalnutrition.org/nrc_reports

CHOOSE A DATABASE FEED COMPOSITION MODELING

NATIONAL ANIMAL NUTRITION PROGRAM

FEED COMPOSITION

NUTRITION MODELING

FEED MANAGEMENT

PUBLICATIONS & EVENTS

RESOURCES

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OVERVIEW MATERIALS

NATIONAL RESEARCH COUNCIL (NRC) REPORTS

INDUSTRY ASSOCIATIONS

GLOSSARY

The National Research Council (NRC) generates species-specific reports that serve as the authoritative source of state-of-the-art recommendations for meeting nutrient requirements of agricultural animals, companion animals, and aquacultural species alike. Below are links to the latest NRC reports for the various species, and additional resources for data modeling can be found on the NANP Nutrient Requirement Models page.

About NRC

The National Research Council (NRC) was founded in 1916 with a mission to help improve public policy, understanding, and education in matters of science, technology, and health. As such, the NRC serves as the principal operating agency of the National Academies of Sciences, Engineering, and Medicine (NASEM) [see 'Articles of Organization of the National Research Council']. In 1944, the NRC established the Board on Agriculture and Natural Resources (BANR) within the National Academy of Sciences Division on Earth and Life Studies to form ad hoc expert committees in addressing specific technical questions related to animal nutrition.

sfr feed evaluation matrix book x Advanced Feed Package - Schothorst x National Research Council (NRC) x

https://schothorst.nl/en/our-services/advanced-feed-package/

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SFR
SCHOTHORST FEED RESEARCH

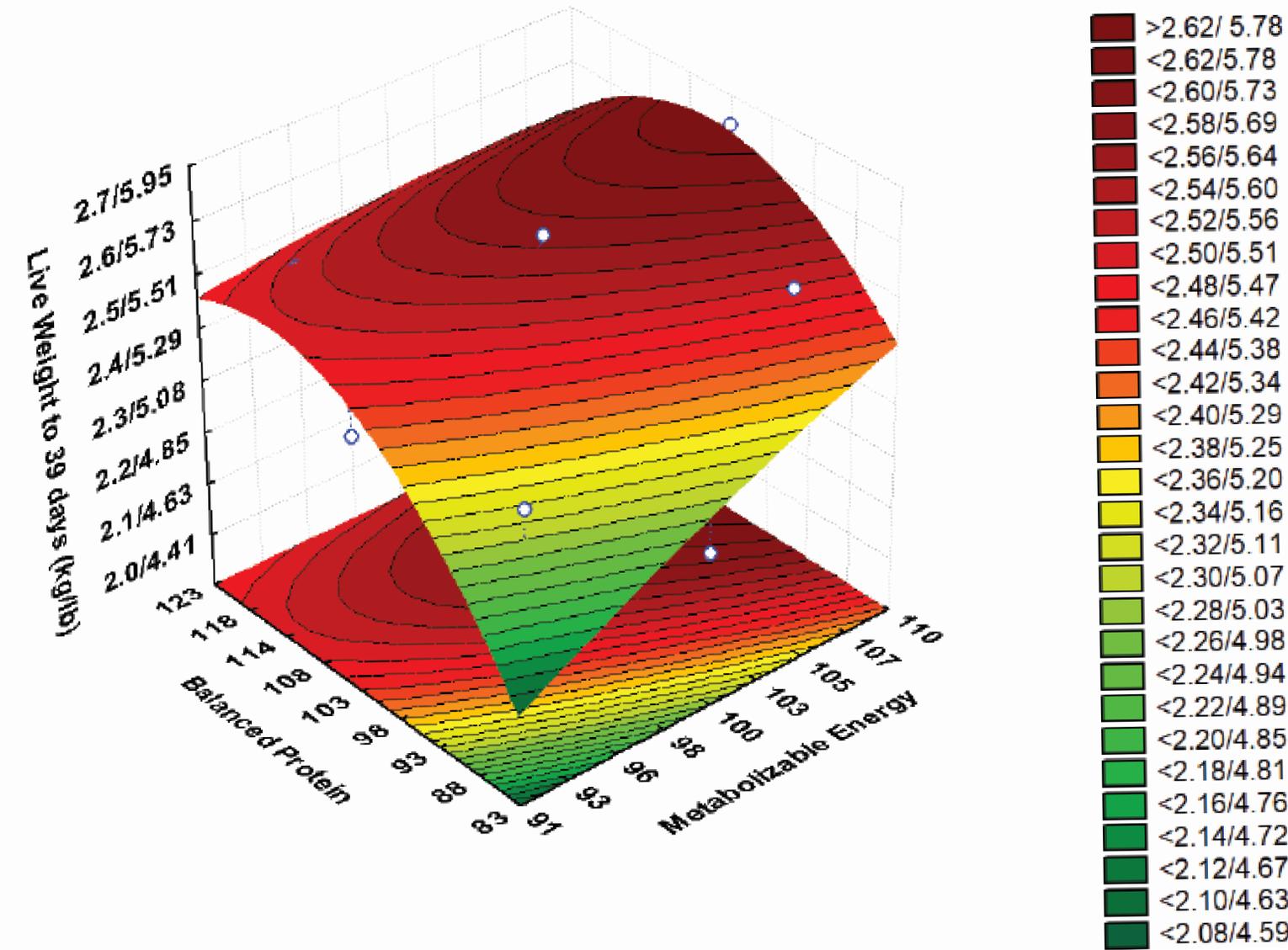
The independent knowledge package for the compound feed industry

Advanced Feed Package

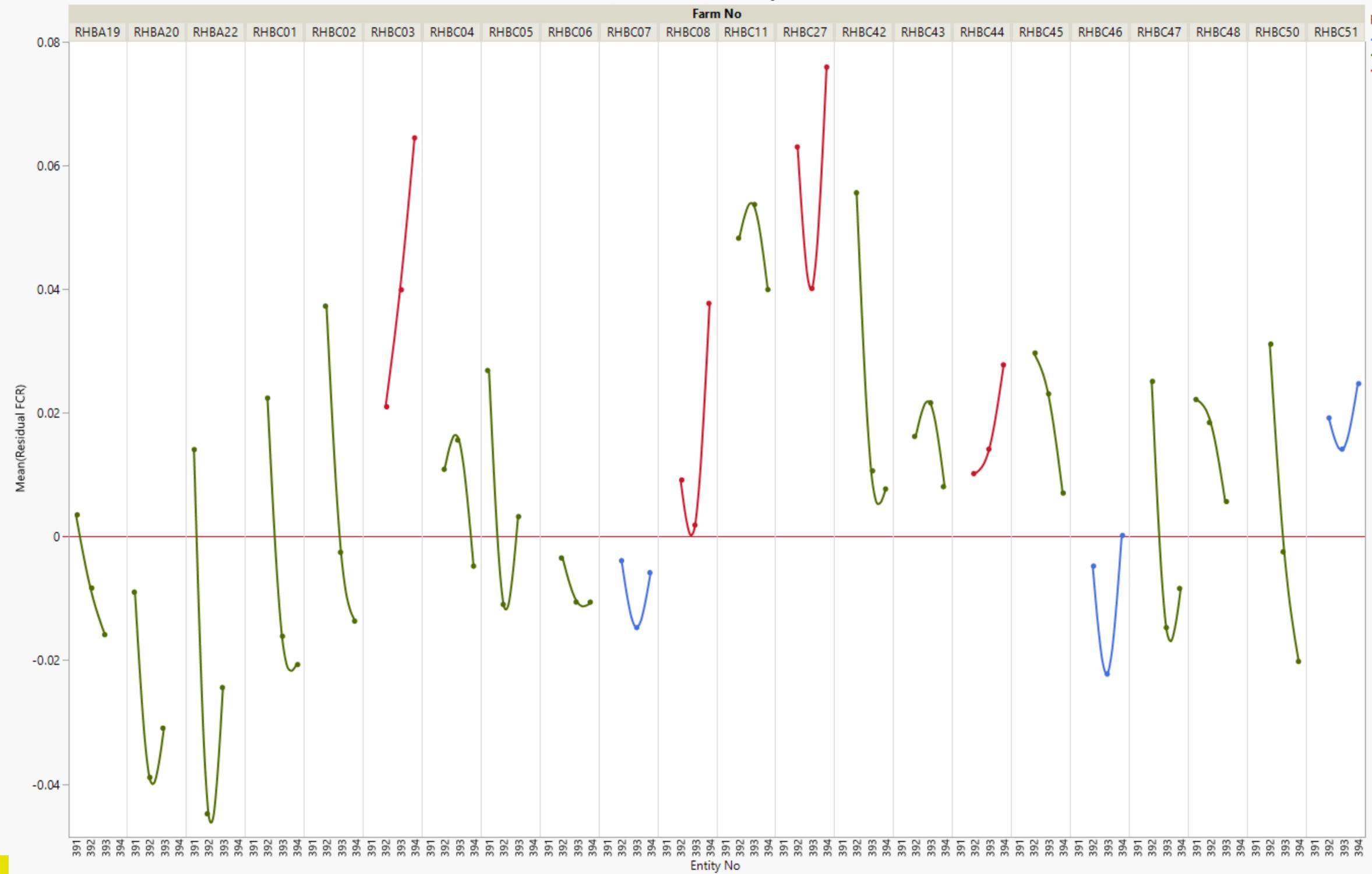
SFR (Schothorst Feed Research) is an independent research company in farm animal nutrition (poultry, pigs and cattle). Core activity: raw material evaluation; determining nutrient values and degradation and digestion coefficients of feed raw materials. These data are delivered in the SFR matrix with corresponding animal specific nutrient requirements. SFR is the sparring partner for nutritionists and consultants. Our consultants assist in proper use and of the database, help to formulate feeds in local field conditions, recommend nutritional solutions for issues at your customers, and provide educational services and training for new colleagues.

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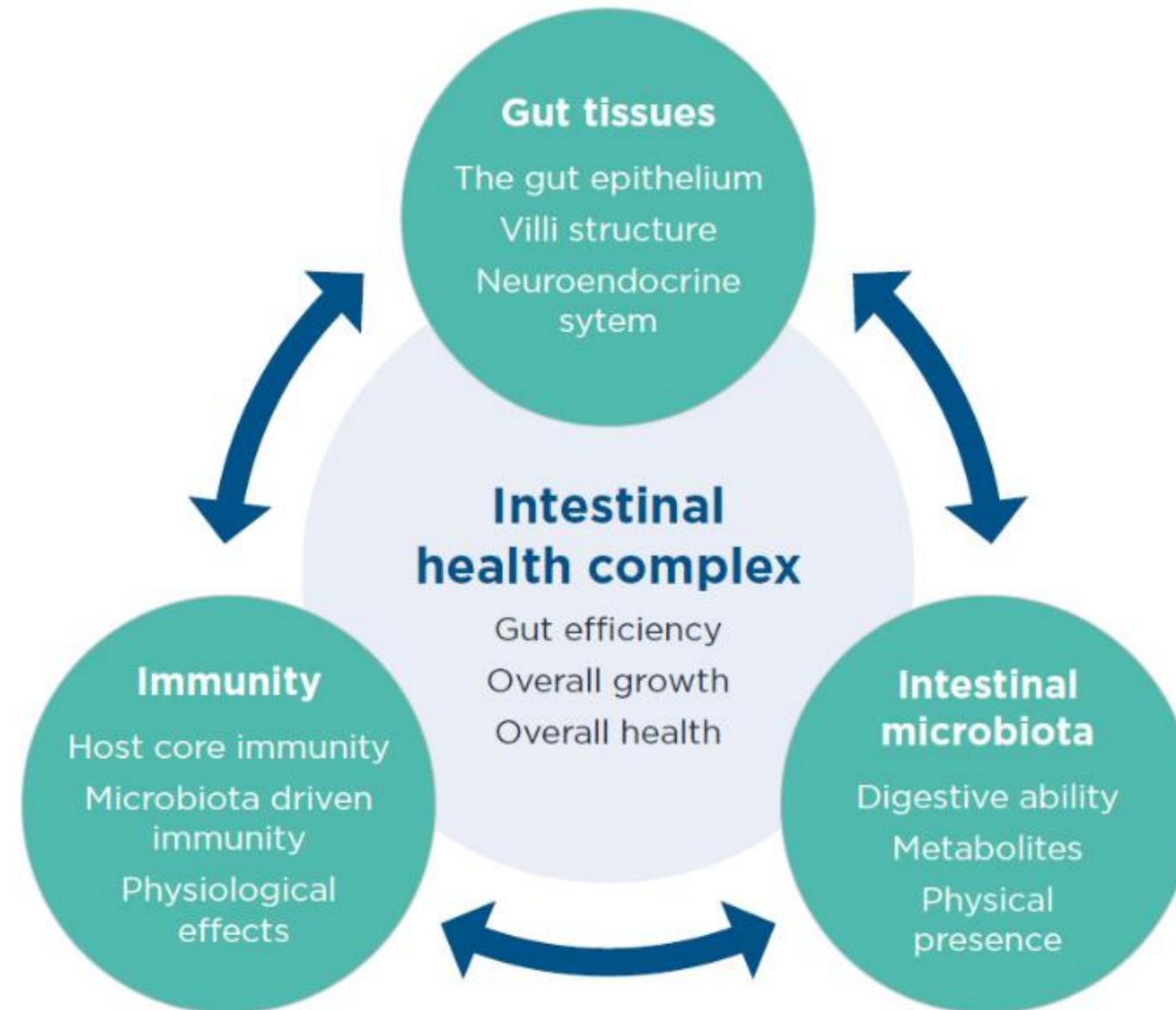
Figure 2. Live weight (g) to 39-day-old broilers fed mash in response to varying levels of dietary ME and BP (expressed as digestible lysine level). The 100% ME and BP treatment group is referencing Aviagen's recommendations.



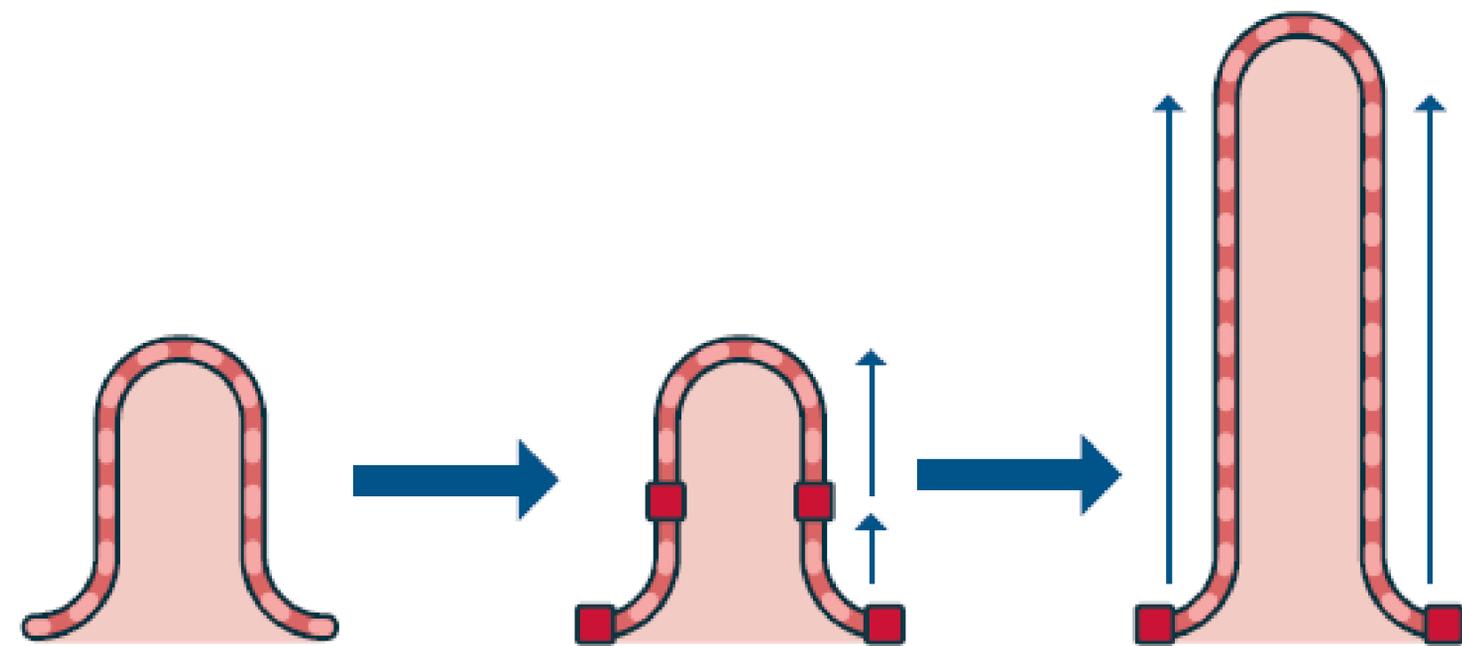
Mean(Residual FCR) vs. Entity No



GUT HEALTH







At hatch

During brooding,
rapidly dividing
cells elongate
the villi

After Brooding
period rate of
growth of the
villi slows



Gut development starts in the egg



Growth is dependant on the presence of food in the gut



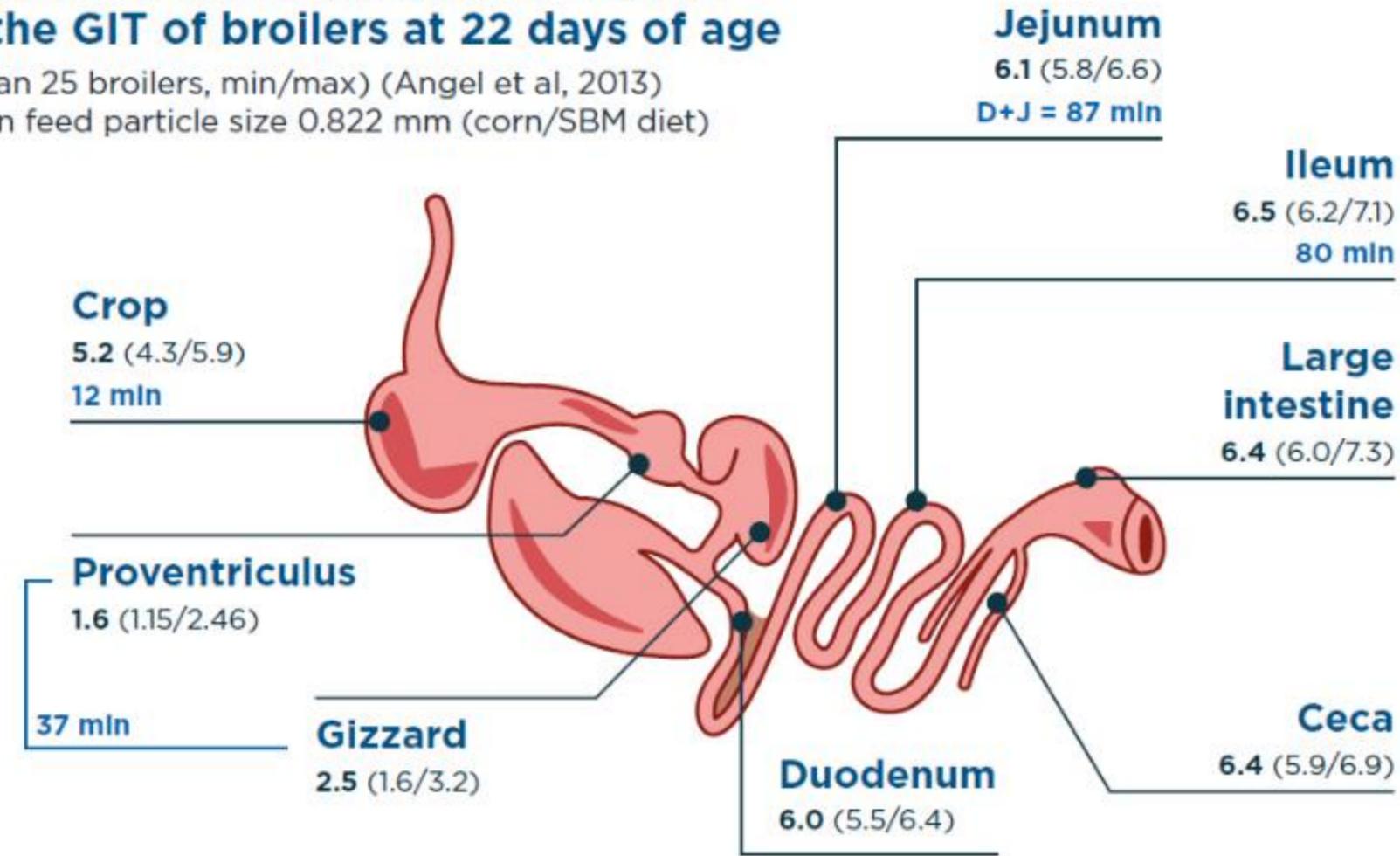
Stimulated by the intestinal bacteria



Growth is inhibited by stress

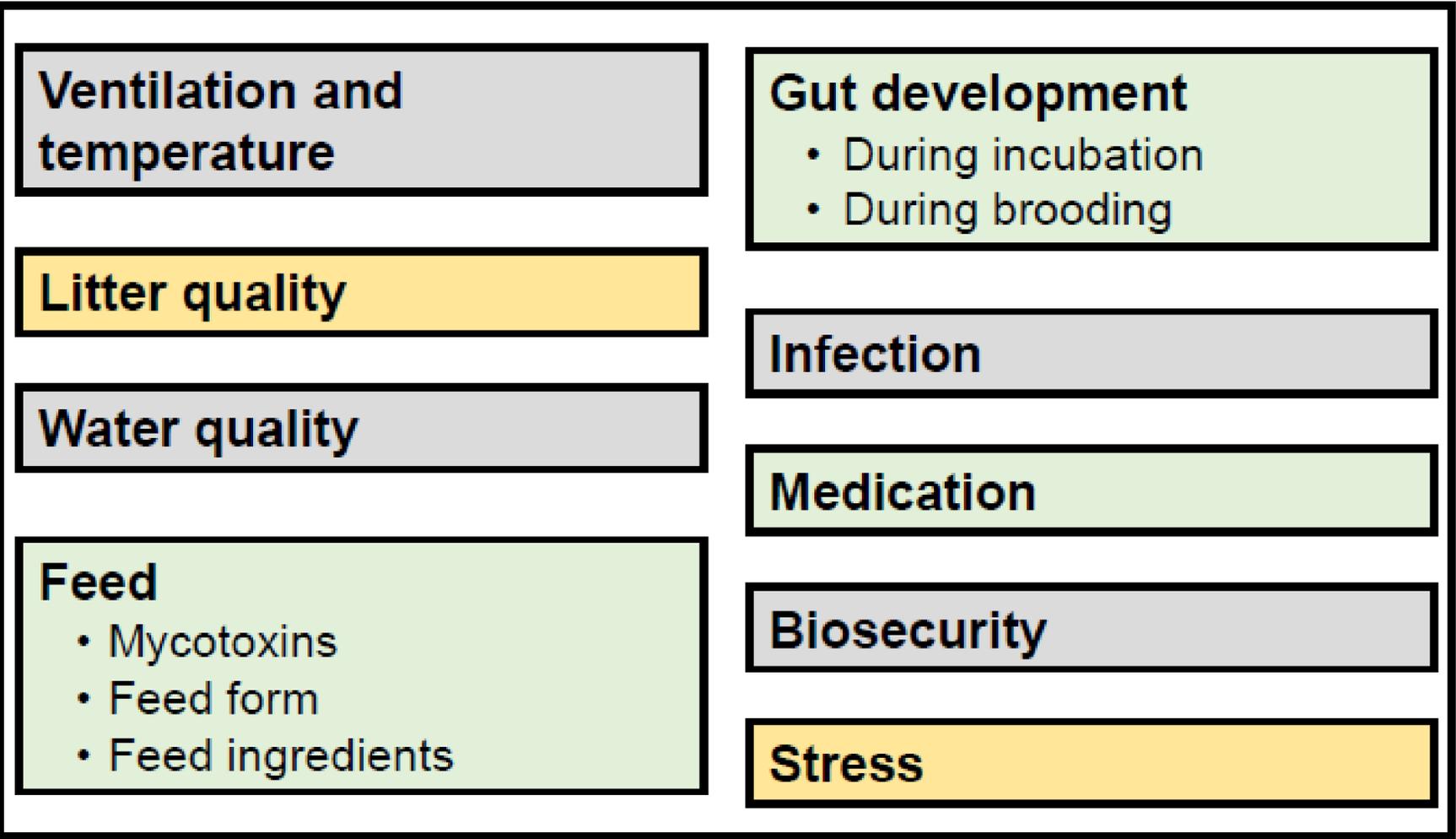
pH and mean retention time digesta in the GIT of broilers at 22 days of age

(mean 25 broilers, min/max) (Angel et al, 2013)
 Mean feed particle size 0.822 mm (corn/SBM diet)

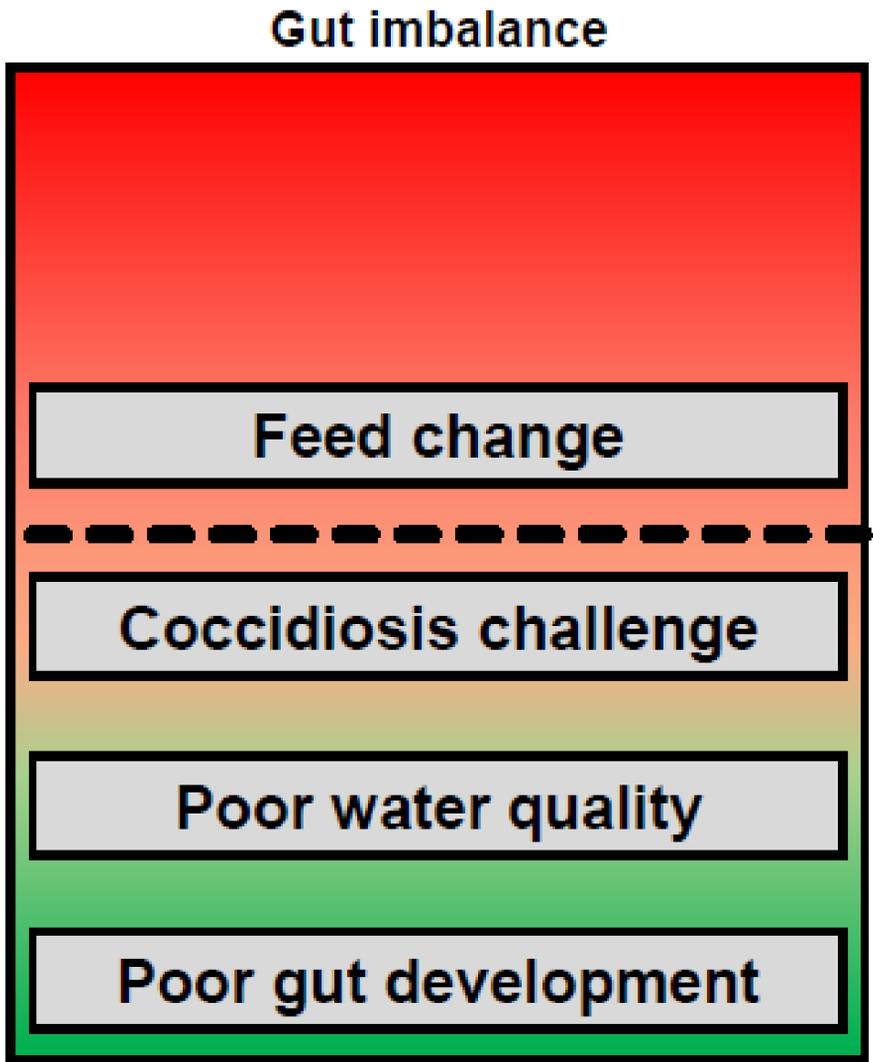


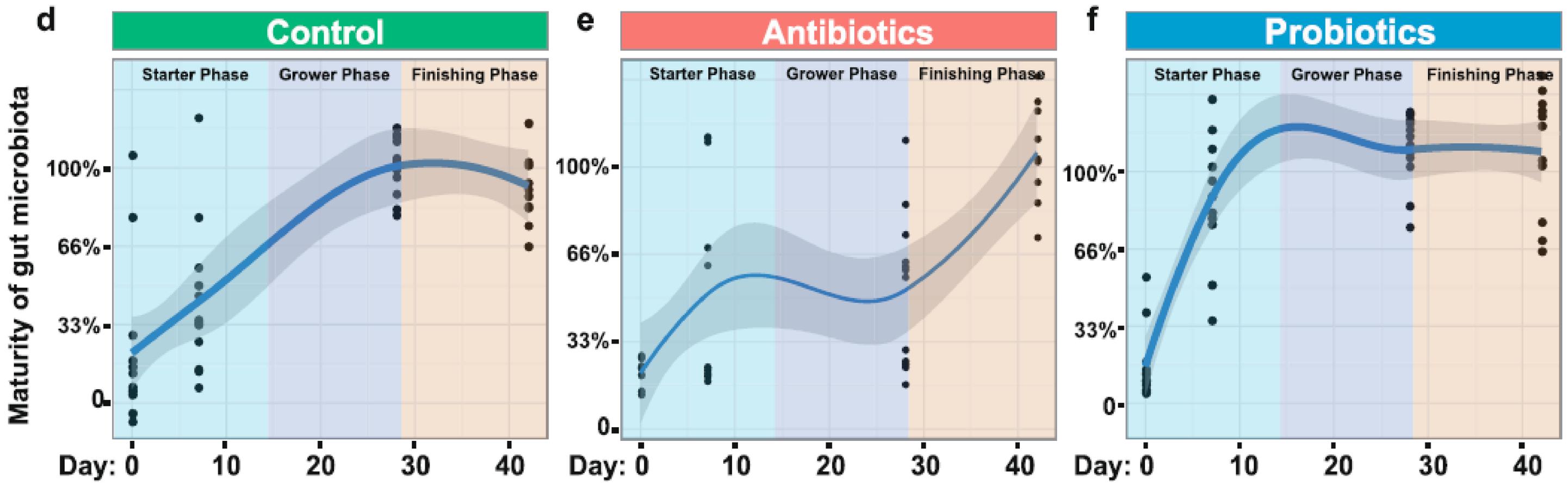
Total residence time as affected by age:

10 d = 3h 15 min	(2:32-3:51)	(SEM09)
22 d = 4h 25 min	(3:10-4:42)	(SEM14)
30 d = 4h 44 min	(3:30-5:52)	(SEM19)
42 d = 5h 10 min	(4:09-6:05)	(SEM25)



These factors are additive





Difference between NE and Bacterial Enteritis

Necrotic enteritis

- Definition: Enteric disease of poultry characterized by patches of necrotic tissue on the intestinal epithelium
- Cause: gram-positive, obligate, anaerobic bacteria *Clostridium perfringens*. Toxins produced by the bacteria cause damage to the small intestine, liver lesions, and mortality.
- Clinical Findings and Lesions:
 - Pathognomonic lesions where mucosa is usually covered with a tan to yellow pseudo membrane.
 - High and acute mortality (not with BE!!)

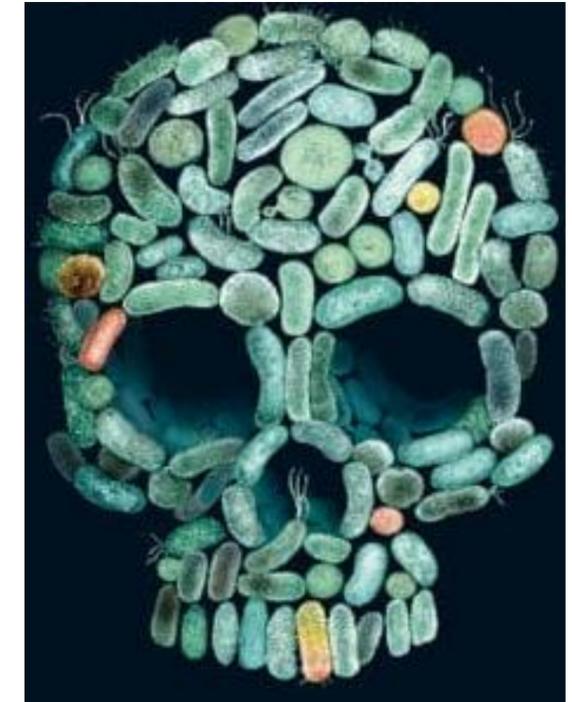


Bacterial Enteritis

- Definition: Presence of a qualitatively and/or quantitatively abnormal microbiota in the intestine linked with inflammation
- Cause /trigger: multifactorial disease, trigger can range from an infectious change to management and everything causes an oversupply of nutrients (NE included)
- Clinical Findings and Lesions: No pathognomonic lesions like in NE
 - Ballooning and inflammation
 - Slime, orange mucus, gas and water in gut content
 - Loss of intestinal tonus.
 - Reduction gut wall thickness
 - Presence of undigested feed



ANTI- MICROBIAL RESISTANCE





WHO List of Medically Important Antimicrobials

A risk management tool for mitigating antimicrobial resistance due to non-human use

Previously known as the WHO Critically Important Antimicrobial List for Human Medicine

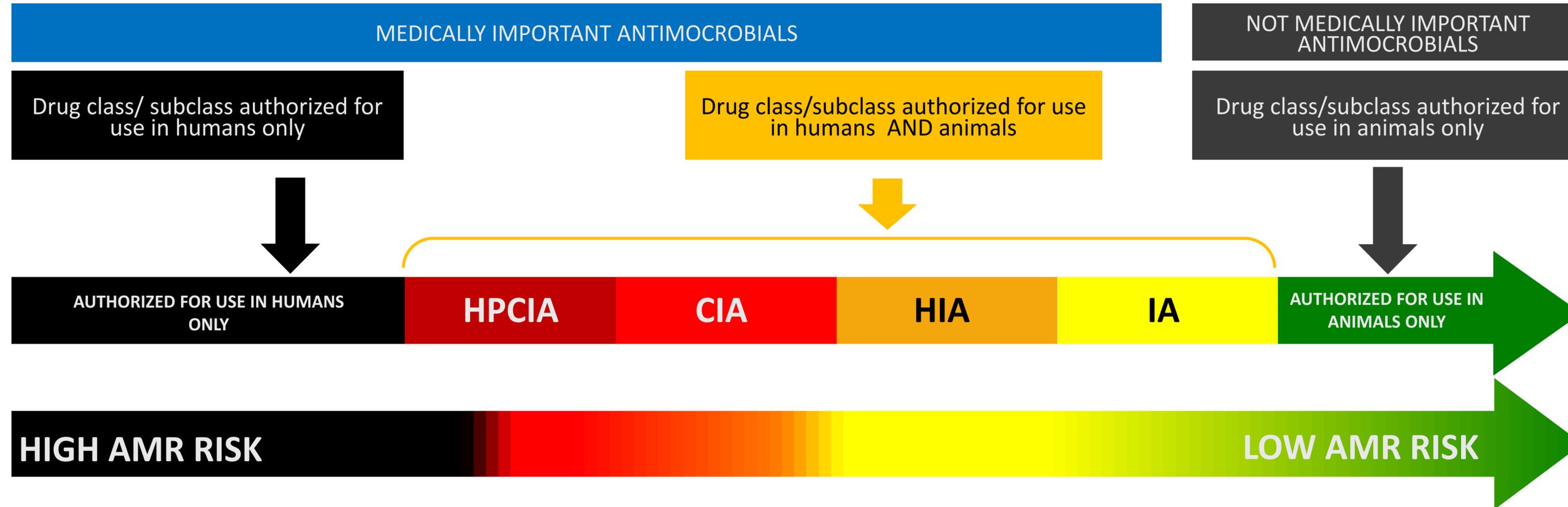


		Medically important antimicrobials				Not medically important
Authorized for use in humans only		Authorized for both humans and animals				Not authorized in humans
Class	Class	Categorization of categorization of antimicrobials antimicrobials				
		HPCIA	CIA	HIA	IA	
Aminoglycosides (plazomicin)	Lipopeptides	Cephalosporins (3rd, 4th generation)	Aminoglycosides	Amphenicols	Aminocyclitols	Aminocoumarins
Aminomethycyclines	Macrolides 18-membered ring (fidaxomicin)	Quinolones	Ansamycins	Cephalosporins (1 st - and 2 nd -generation) and cephamycins	Cyclic polypeptides	Arsenicals
Anti-pseudomonal penicillins (carboxypenicillin and ureidopenicillin)	Monobactams	Polymyxins	Macrolides (14-, 15-, 16-membered ring)	Lincosamides	Heterocyclic compounds	Bicyclomycins
Anti-pseudomonal penicillins with β -lactamase inhibitors	Oxazolidinones	Phosphonic acid derivatives		Nitroimidazoles	Hydroxyquinoline	Orthosomycins
Carbapenems with or without β -lactamase inhibitors	Riminofenazines			Tetracyclines		
Cephalosporins (3rd-, 4th- and 5th-generation with β -lactamase inhibitors)	Sulfones			Penicillins (amidinopenicillins and aminopenicillins)	Pleuromutilins	Phosphoglycolipids
Cephalosporins (5th-generation)	Glycopeptides and lipoglycopeptides			Penicillins (aminopenicillins with β -lactamase inhibitors)	Nitrofurans derivatives	Ionophores (including polyethers)
Cephalosporins (Siderophore)	Pseudomonic acids (mupirocin)			Penicillins (anti-staphylococcal)		Quinoxalines
Fluorocyclines	Phenol derivatives (clofoctol)			Penicillins (narrow spectrum)		Halogenated 8-hydroxyquinolines
Glycylcyclines	8-hydroxy-5-nitroquinoline			Streptogramins		
				Sulfonamides, dihydrofolate reductase inhibitors and combinations		
				Fusidanes		

CIA: critically important antimicrobials; HIA: highly important antimicrobials; HPCIA: highest priority critically important antimicrobials; MIA: medically important antimicrobials.



Groups and categories classification





ANTIBIOTIC REDUCTION TARGETS - Are they working?



Report signals increasing resistance to antibiotics in bacterial infections in humans and need for better data

9 December 2022 | News release | Geneva | Reading time: 3 min (697 words)

A new World Health Organization (WHO) report reveals high levels of resistance in bacteria, causing life-threatening bloodstream infections, as well as increasing resistance to treatment in several bacteria causing common infections in the community based on data reported by 87 countries in 2020.

For the first time, the Global Antimicrobial Resistance and Use Surveillance System (GLASS) report provides analyses for antimicrobial resistance (AMR) rates in the context of national testing coverage, AMR trends since 2017, and data on antimicrobial consumption in humans in 27 countries. Within six years, GLASS achieved participation from 127 countries with 72% of the world's population. The report includes an innovative interactive digital format to facilitate data extraction and graphics.

The report shows high levels (above 50%) of resistance were reported in bacteria frequently causing bloodstream infections in hospitals, such as *Klebsiella pneumoniae* and *Acinetobacter spp.* These life-threatening infections require treatment with last-resort antibiotics, such as carbapenems. However, 8% of bloodstream infections caused by *Klebsiella pneumoniae* were reported as resistant to carbapenems, increasing the risk of death due to unmanageable infections.

Common bacterial infections are becoming increasingly resistant to treatments. Over 60% of *Neisseria gonorrhoea* isolates, a common sexually transmitted disease, have shown resistance to one of the most used oral antibacterials, ciprofloxacin. Over 20% of *E.coli* isolates – the most common pathogen in urinary tract infections – were resistant to both first-line drugs (ampicillin and co-trimoxazole) and second-line treatments

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Email: mediainquiries@who.int

Related

[Global antimicrobial resistance and use surveillance system \(GLASS\) report: 2022](#)

Figure 2: Incidence rate of healthcare-associated (HA) vancomycin resistant *Enterococcus* (VRE) bloodstream infection (BSI), Canada, 2014-2018

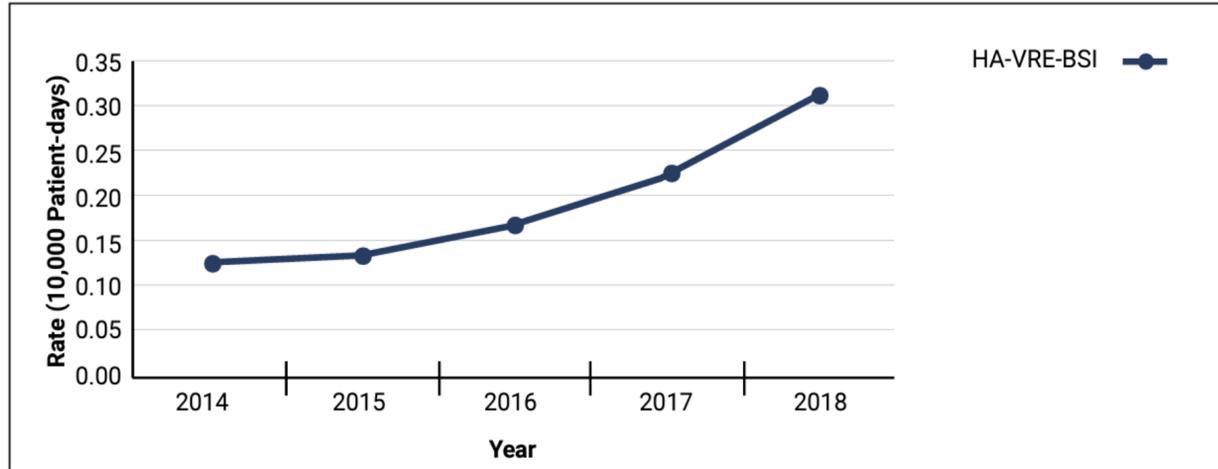
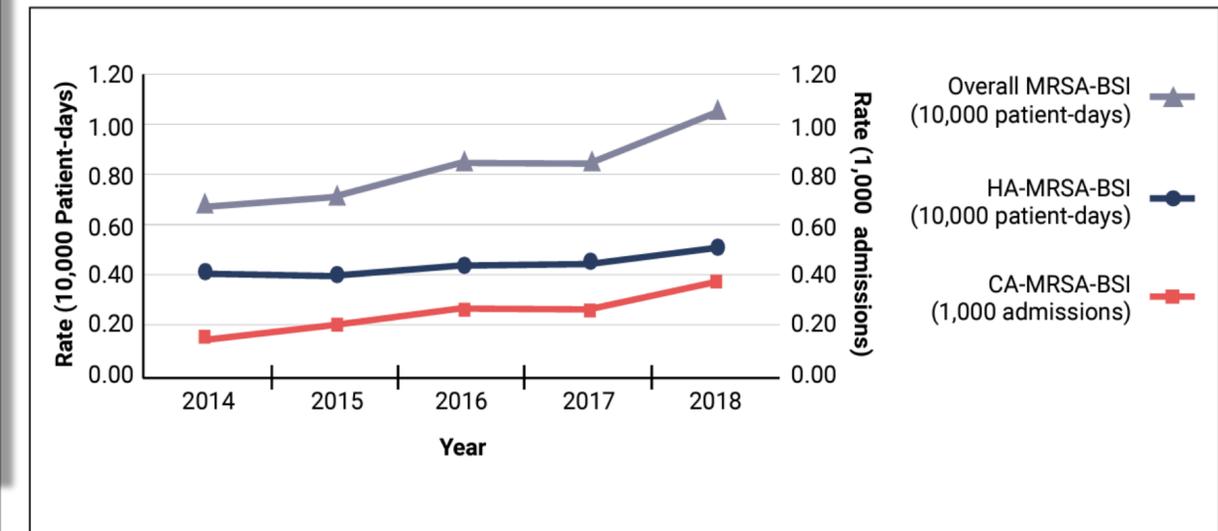


Figure 1: Incidence rate of healthcare-associated (HA) and community-associated (CA) methicillin-resistant *Staphylococcus aureus* (MRSA) bloodstream infection (BSI), Canada, 2014 – 2018





In response to broadscale consumer demand, Tyson Foods is now producing all of its Tyson® brand fresh chicken from birds "Raised Without Antibiotics."



Tyson all natural chicken breasts and chicken wings on display at a grocery store in Atlanta. Christopher Habermann/The Toidi/Adobe Stock

New York (CNN) — Tyson will once again use certain antibiotics in its chickens, eight years after it announced plans to ditch the drugs in some of its production and slapped a “no antibiotics ever” label on its packaging.

The company said the antibiotics it plans to use in chicken production are not important to the treatment of humans. Antibiotic use in food has come under intense scrutiny in recent years as some bacteria have become increasingly resistant to treatments as a result of frequent exposure to antibiotics. The Wall Street Journal first reported Tyson’s change.

GROWTH CURVE(S) OF BROILER BREEDERS

REARING PROFILES

Pre-pubertal phase:

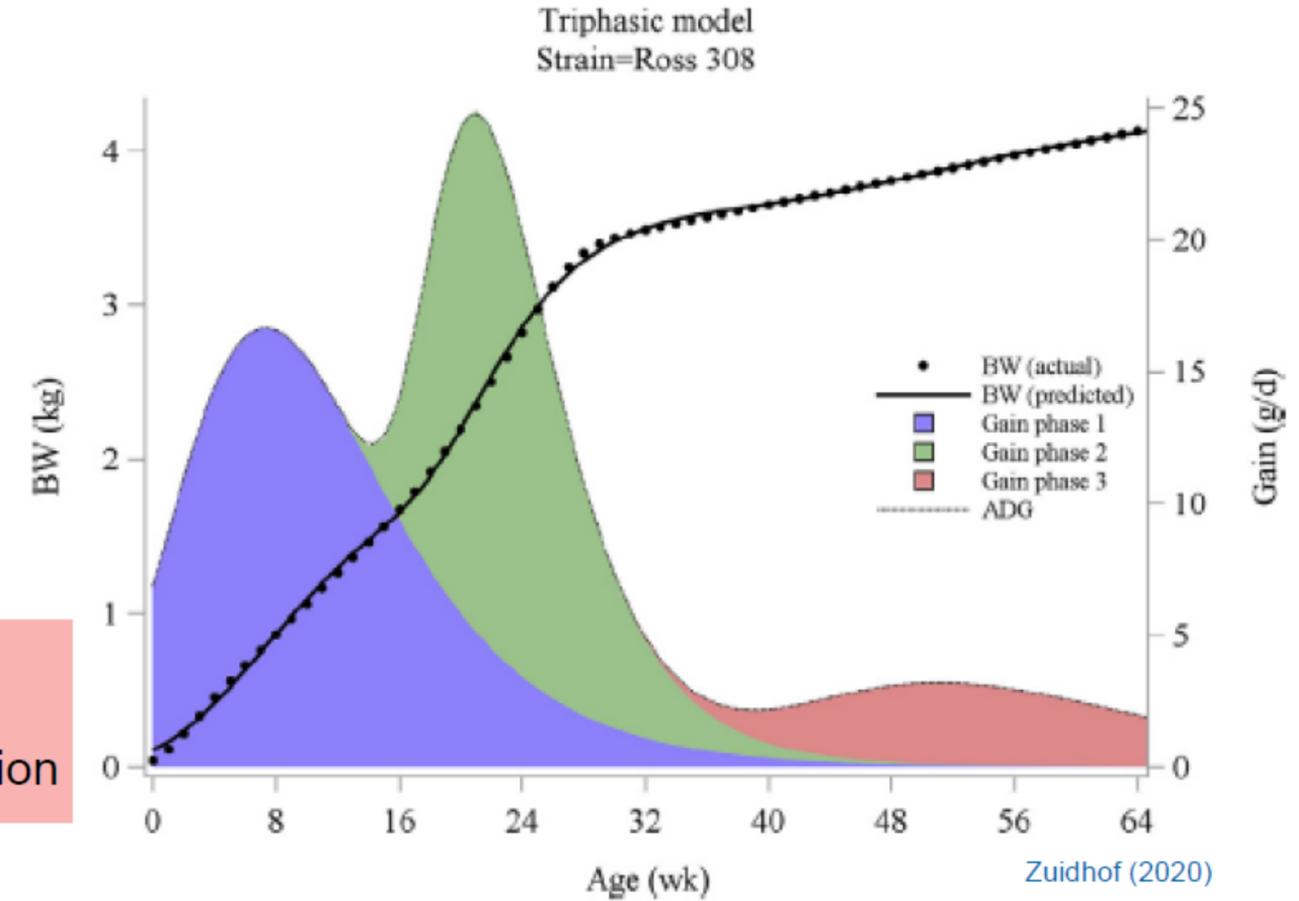
- Organs
- Skelet
- Feathers
- Muscle growth

Pubertal phase:

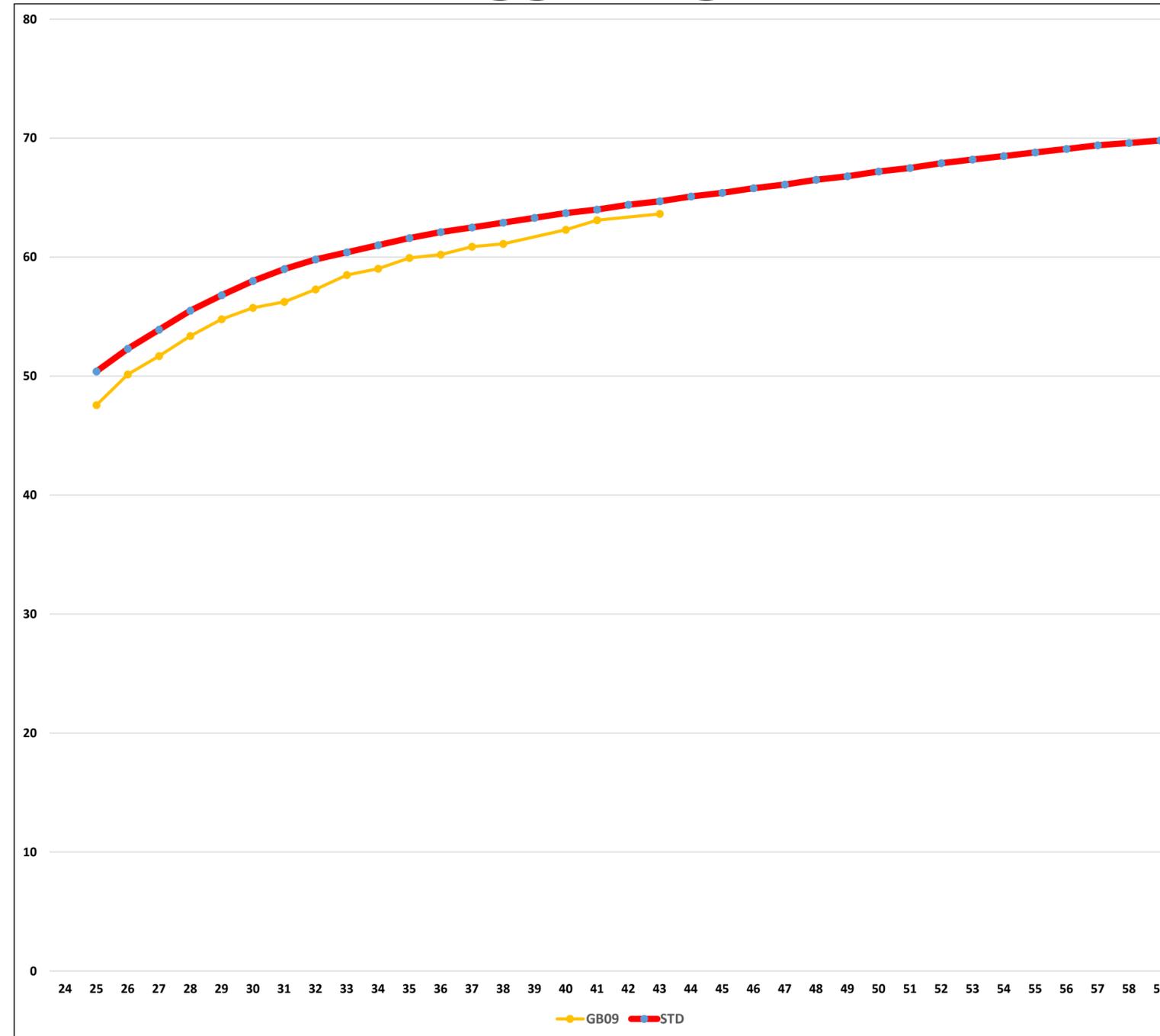
- Sexual maturation
- Gonad development
- Fat accumulation

Post-pubertal phase:

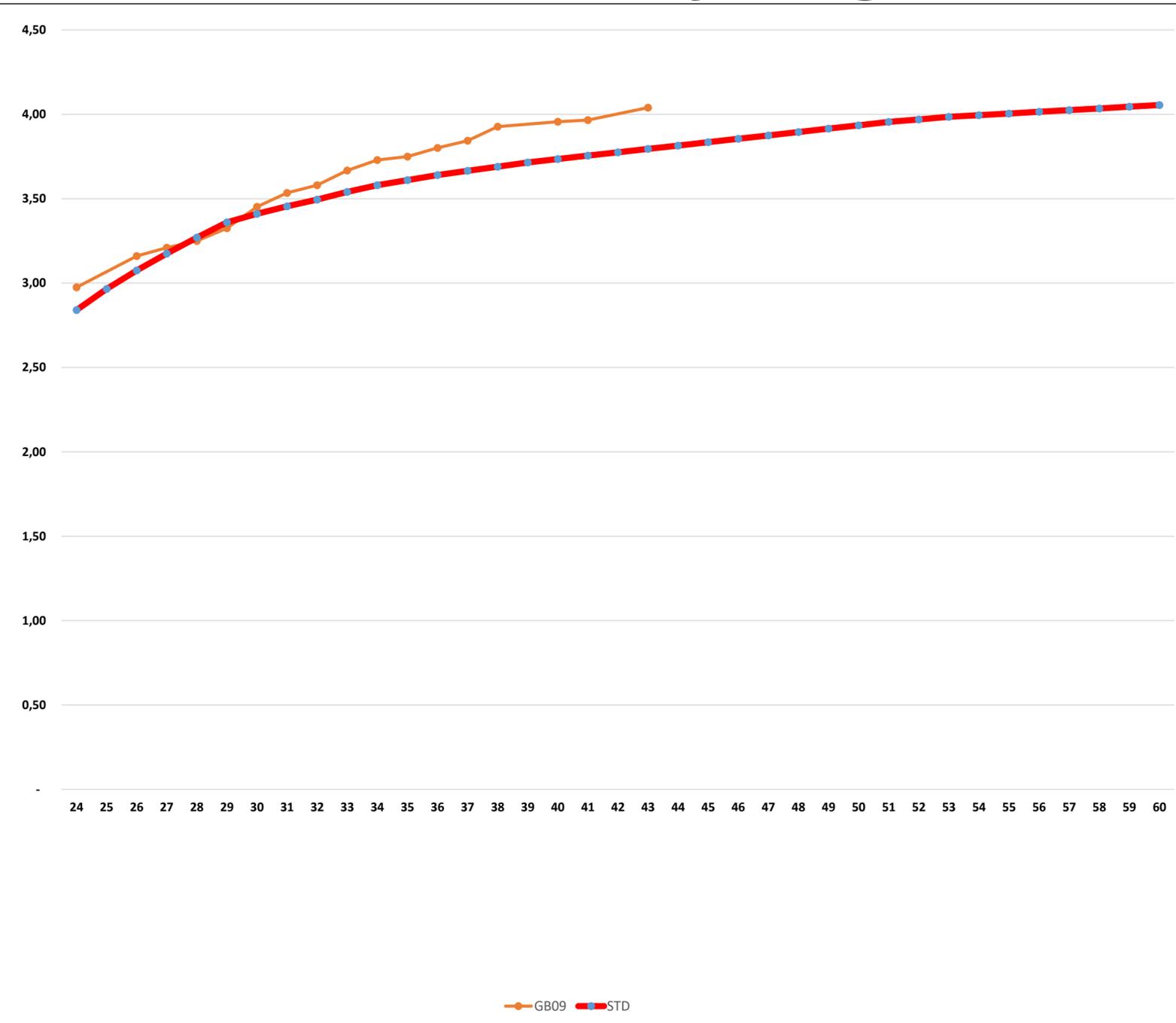
- Egg production
- Limited (fat) accumulation

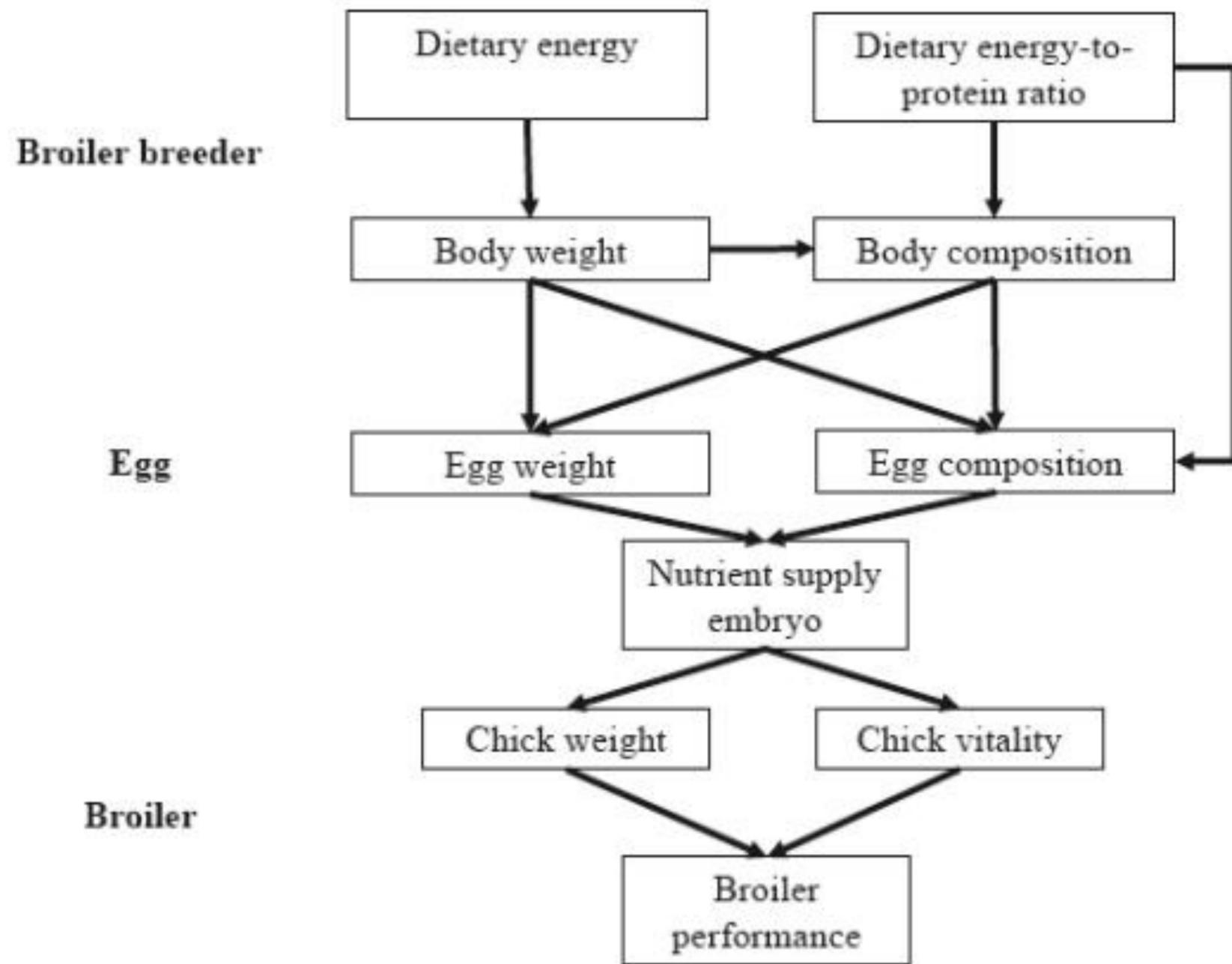


Egg weight



Female body weight

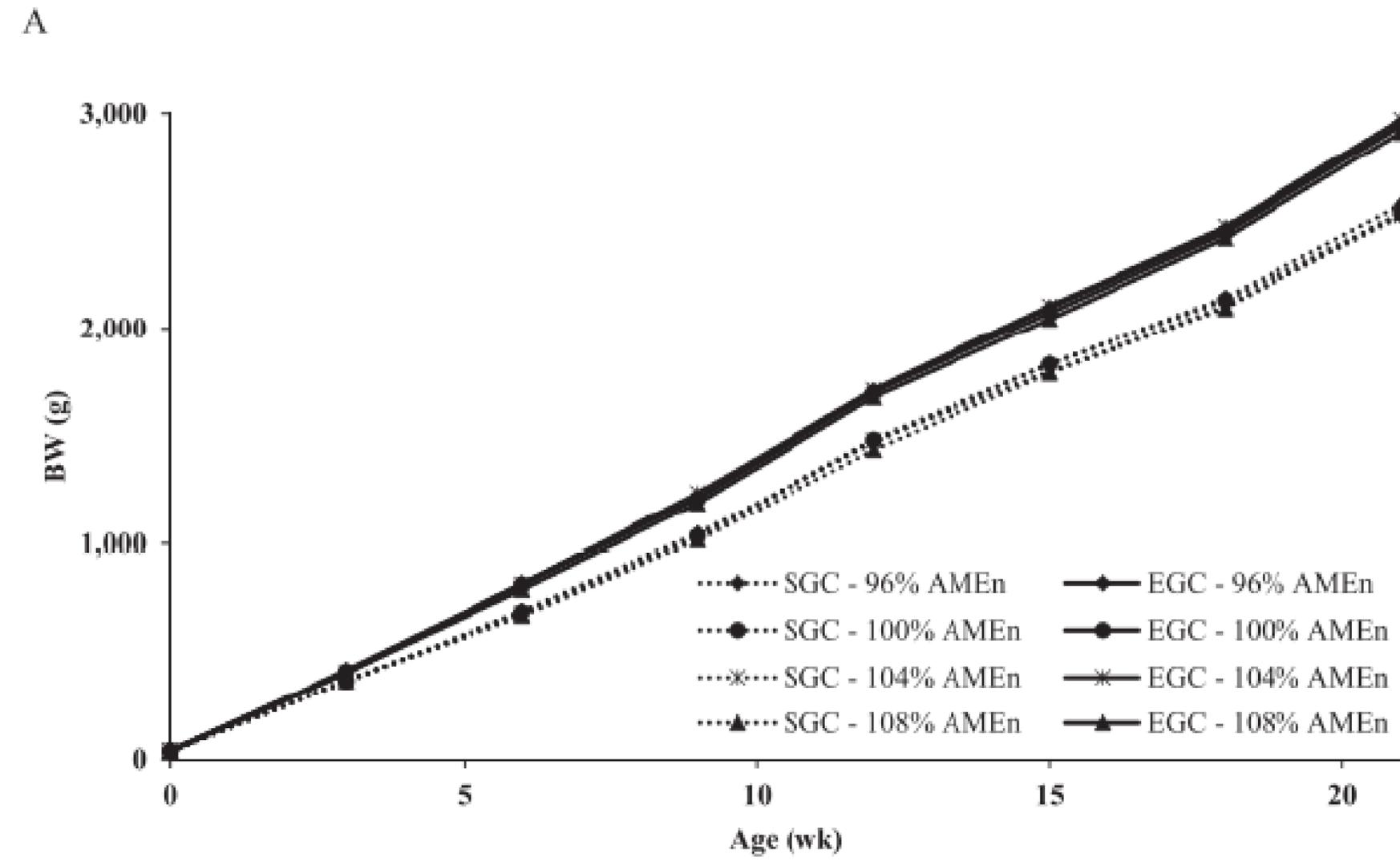




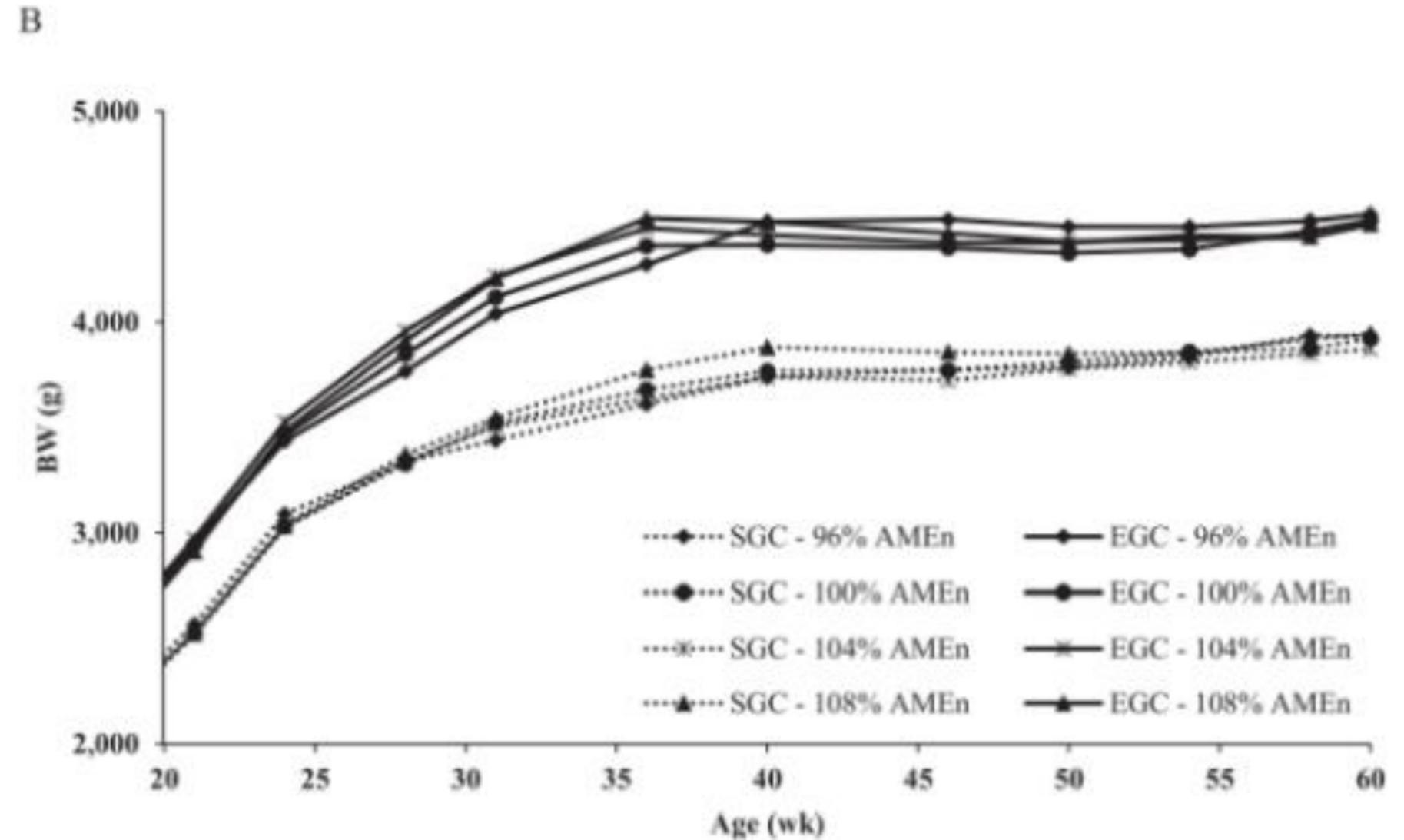
Potential interfering factors

- Breeder age
- Transgenerational epigenetics
- Energy source
- Feeding strategy
- Broiler diet

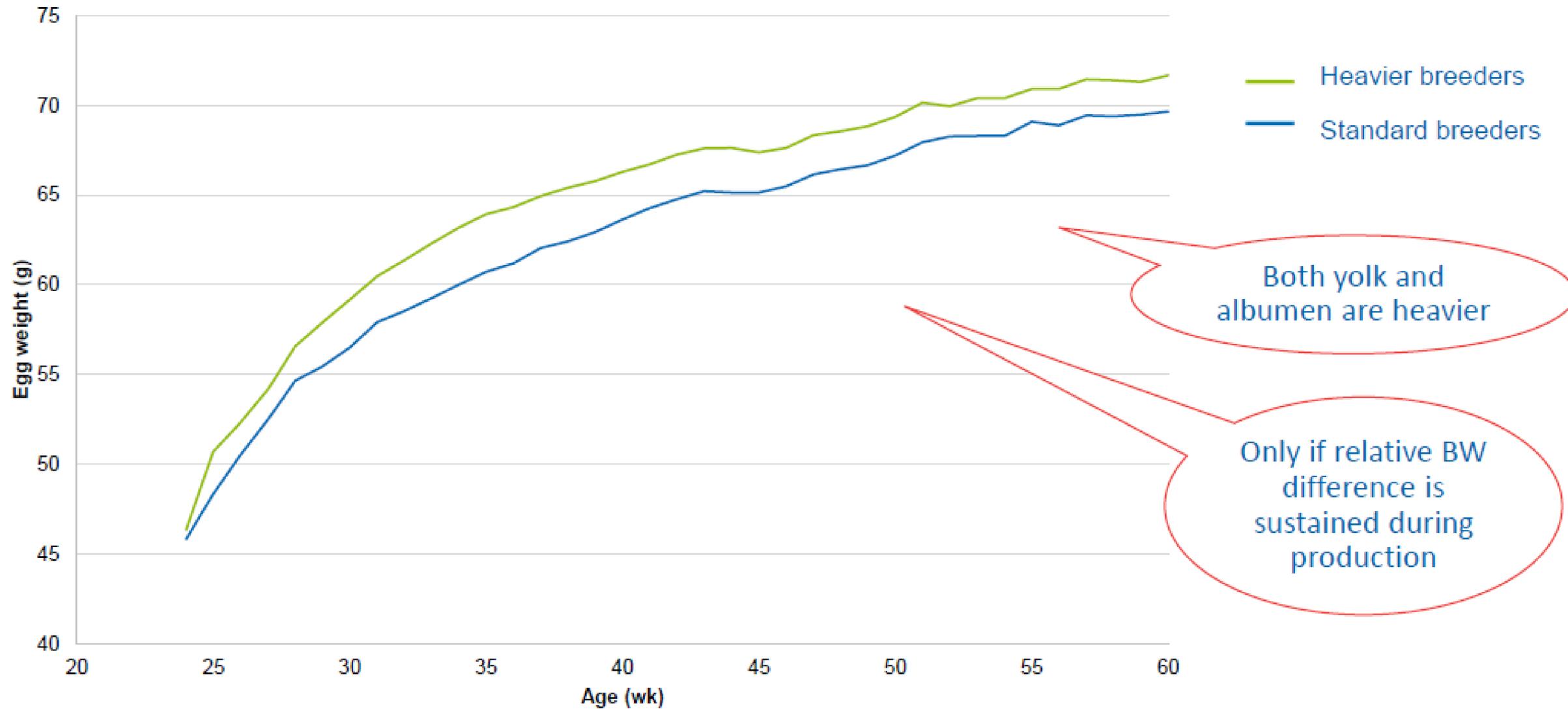
Results body weight during rearing phase (0 – 21 weeks)



Results body weight during production phase (22 – 60 weeks)



Heavier breeders produce larger eggs ($\Delta=2.3$ g)





- What are the consequences for sexual maturation, egg production and fertility?
- How should the growth curve look like?
- How should broiler breeders be fed?

Growth curve
↑ Body weight

Feed
↓ Energy-to-protein

	Growth curve ↑ Body weight	Feed ↓ Energy-to-protein	
Body composition	↑ body protein mass ↑ body fat mass (pubertal phase)	↓ body fat mass	
Sexual maturation	Earlier SM	≈ SM	body protein dependent
Egg production	Equal or higher	Equal or higher	
Egg weight	Higher when BW differences are maintained during production	Higher due to larger albumen	Cum. CP intake as predictor?
Offspring	Higher DOC BW	Lower embryo and DOC quality	

Indian River Parent

FEMALE BODY WEIGHT

Age (days)	Age (weeks)	Body Weight (g)	Weekly Gain (g)	Feed (g/bird/day)
Day old	0	40		ad lib
7	1	115	75	20
14	2	215	100	26
21	3	340	125	31
28	4	470	130	34
35	5	590	120	37
42	6	700	110	40
49	7	800	100	43
56	8	900	100	46
63	9	1000	100	49
70	10	1100	100	53
77	11	1200	100	56
84	12	1300	100	60
91	13	1400	100	64
98	14	1500	100	67
105	15	1600	100	71
112	16	1705	105	75
119	17	1815	110	80
126	18	1940	125	86
133	19	2090	150	92
140	20	2240	150	97

ROSS 308 PARENT STOCK

Female Body Weight and Feeding Program

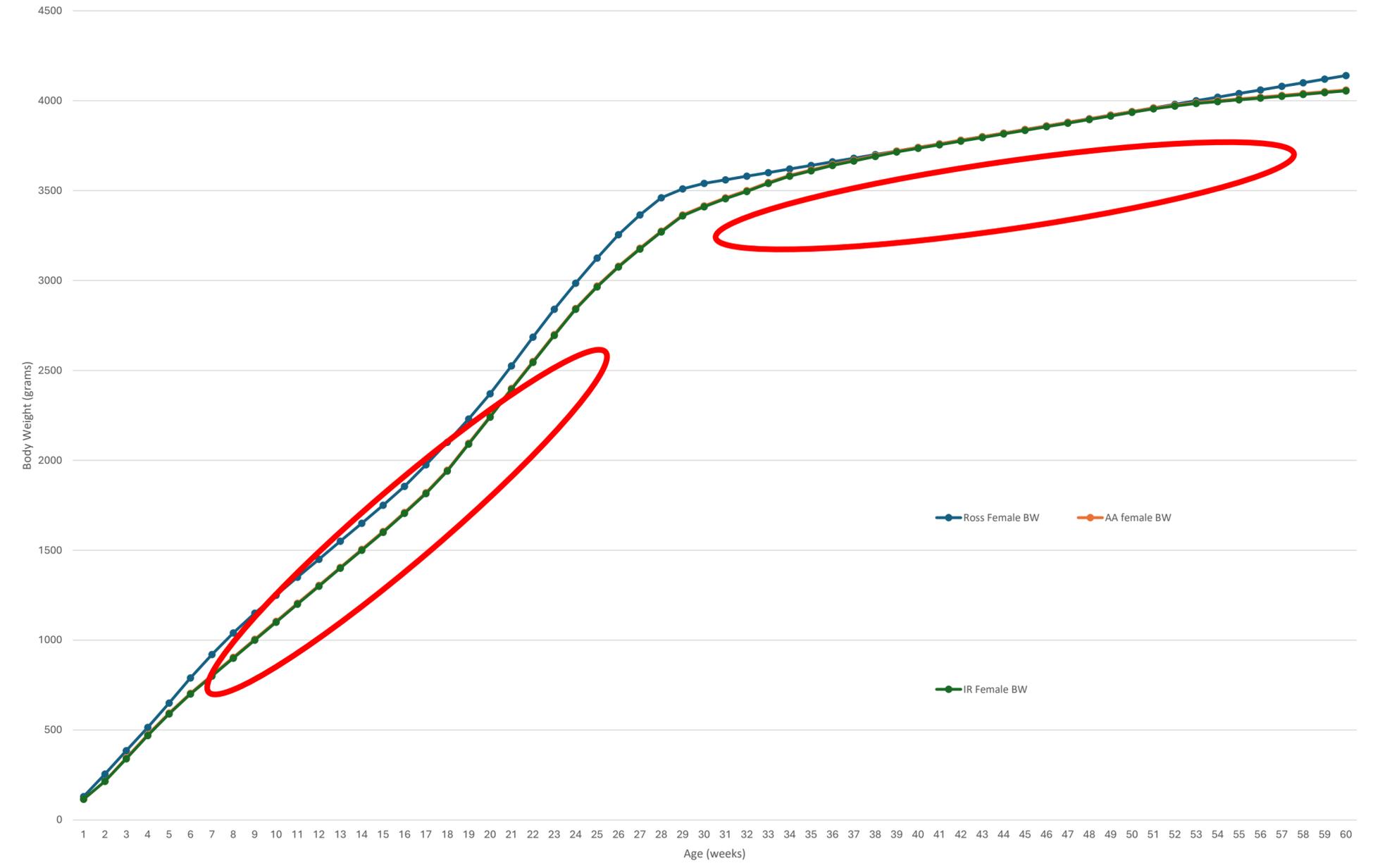
Age (days)	Age (weeks)	Body weight (g)	Weekly gain (g)
Day old	0	40	
7	1	130	90
14	2	255	125
21	3	385	130
28	4	515	130
35	5	650	135
42	6	790	+ 12.86%
49	7	920	130
56	8	1040	120
63	9	1150	110
70	10	1250	100
77	11	1350	100
84	12	1450	100
91	13	1550	100
98	14	1650	100
105	15	1750	100
112	16	1855	105
119	17	1975	120
126	18	2100	125
133	19	2230	130
140	20	2370	+ 5.8%

Arbor Acres Plus S Parent Stock

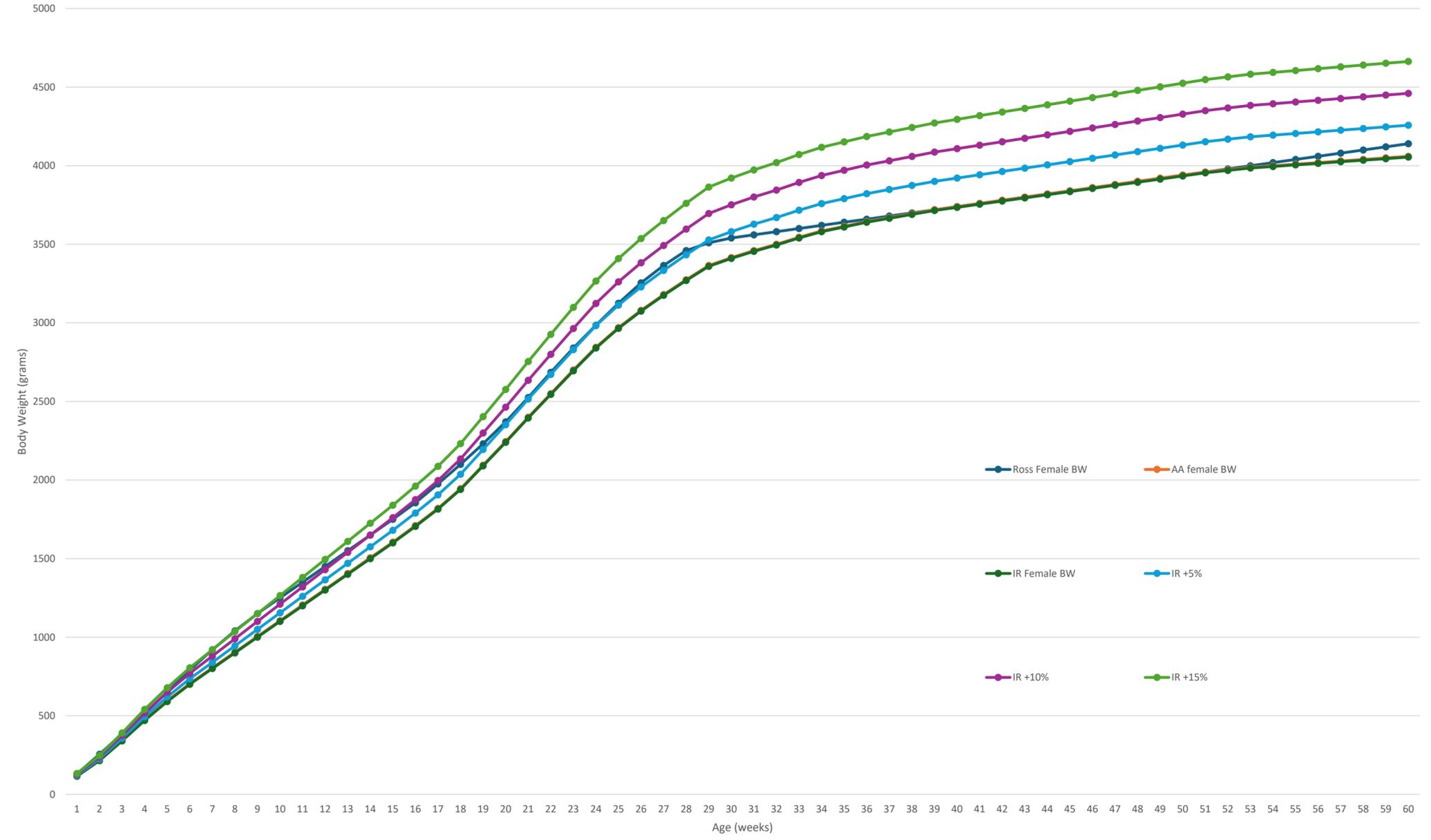
Female In-Season Body Weight

Age (days)	Age (weeks)	Body Weight (g)	Weekly Gain (g)
Day old	0	40	
7	1	115	75
14	2	215	100
21	3	345	130
28	4	475	130
35	5	595	120
42	6	705	110
49	7	805	100
56	8	905	100
63	9	1005	100
70	10	1105	100
77	11	1205	100
84	12	1305	100
91	13	1405	100
98	14	1505	100
105	15	1605	100
112	16	1710	105
119	17	1820	110
126	18	1945	125
133	19	2095	150
140	20	2245	150

Breeder Female Weight Comparison



Breeder Female Weight Comparison

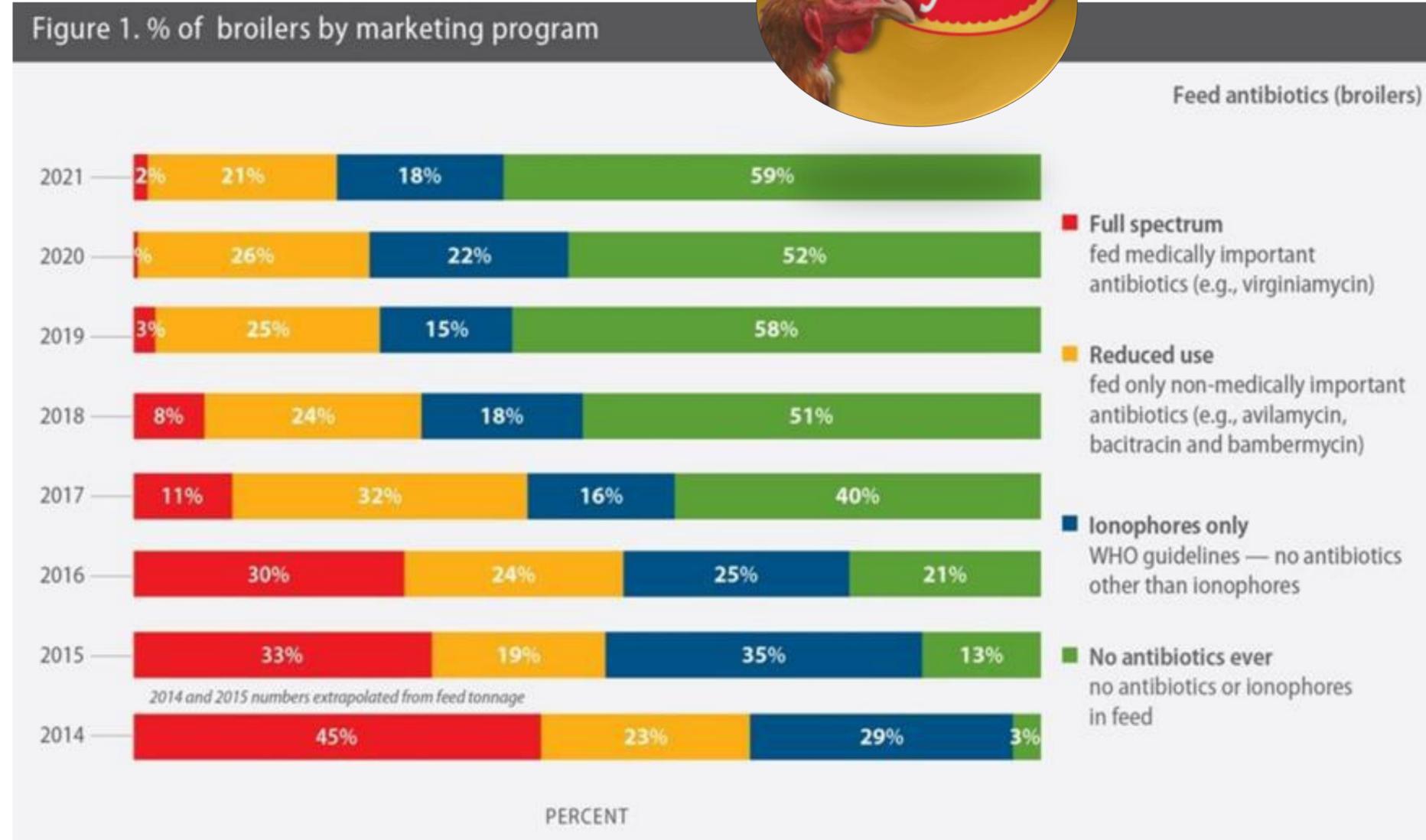


ADDITIVE CHOICE

- Enhance the ability of the immune system to deal with feed-borne pathogens.
- Responses tend to be inconsistent (de Lange, 2017)
- Dependant on the starting point - substrates, microbiota (Moore et al., 2017).
- May be used in combinations with each other.
- Lack of information on chicken-microbe interactions/relationships (Bourassa et al., 2018)
- Practically – they won't work if not needed.



- WHO guidelines - no drugs of importance in human medicine.
- Yet - supermarkets & QSR demand – drug-free products.
- No Antibiotics Ever (NAE) production systems.
- NAE – was 59% of US market.
- Production costs are about 20% higher.
- Have a larger carbon footprint (less sustainable).
- Excellent model for what we can/should not do.





Using and Choosing Feed Additives

How to decide what product classes and which products to use?

Remember:

- Each situation is different.
- What is the current situation (feed, management, enzyme additives)?
- Is there a problem on the farm?
- Therapies may be complementary.
- They are not inexpensive.
- We mostly have our own preferences and prejudices.

Select a Partner

Select additives from suppliers:

- Supply research-backed, consistent products.
- Understand the underlying science.
- Can assess the microbiota – before and after application.
- Offer support in terms of product choice.

Ensure trails are well-designed and properly reported.

Using and Choosing Feed Additives

Many products on the market.

Where they are registered matters (EFSA, FDA).

- Must be heat stable (pelleting).
- Must be gut-stable (enzymes, pH, and bile).
- Understand complementarity with other additives.
- Know which microbiota they inhibit/promote.

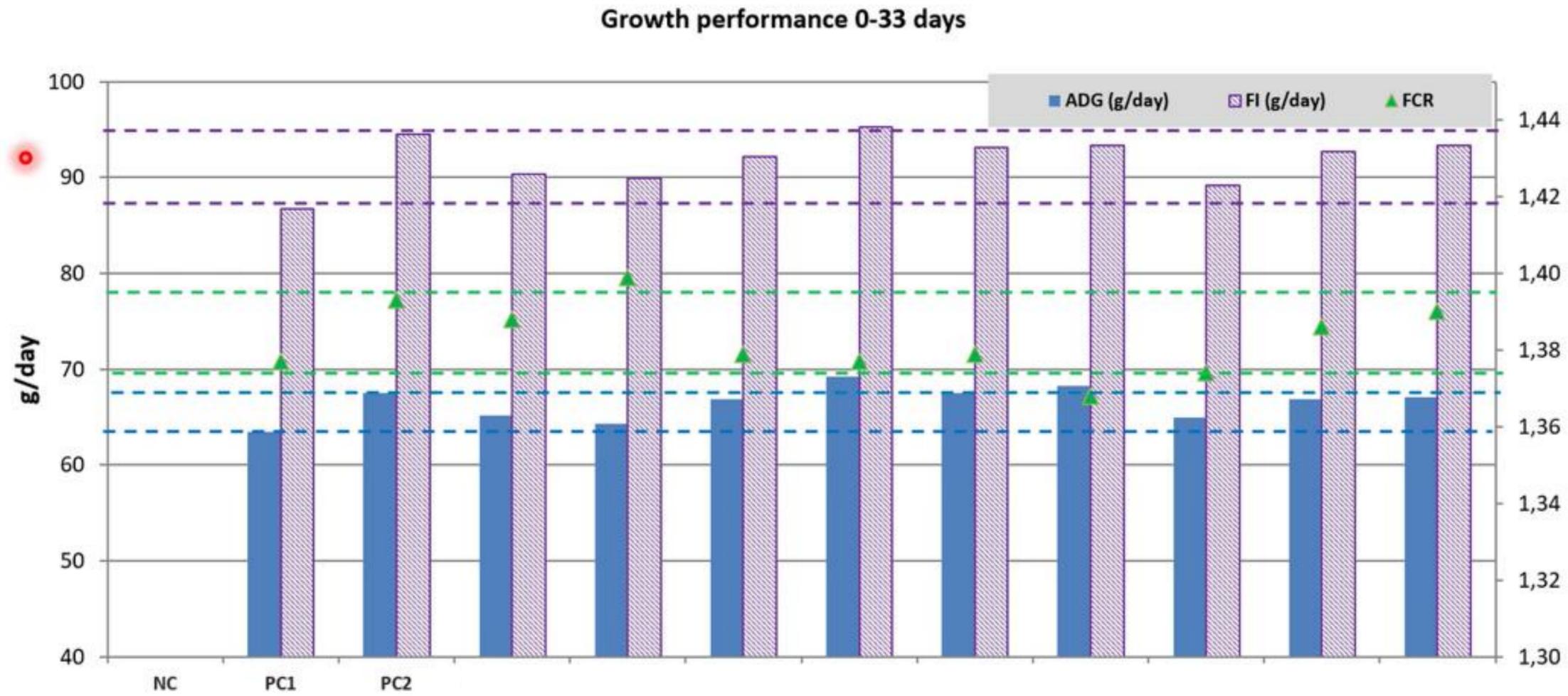
Using and Choosing Feed Additives

Trials should:

- Include negative & positive controls.
- Be replicated and randomised.
- Correct statistical methods.
- There is no such thing as “financially significant”
- Treat farm trials with caution (unless the dataset is large)
- Birds should be housed and fed correctly.
- Show ‘typical’ results.
- Measure starting and end points for substrates, enzymes, and microbiota (Angel, 2017).

Growth performance results, 0-33d period

No results for NC diet :
birds removed at 21 days



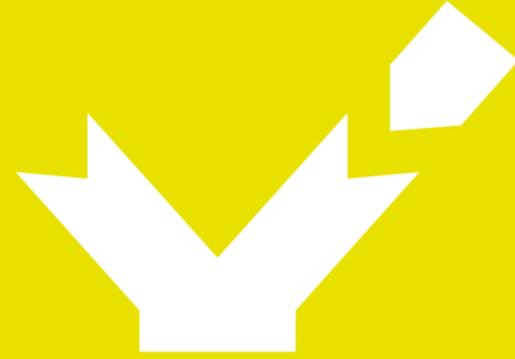
Last Step: Continuous improvement

- Gut health is a journey – not a destination.
- What worked yesterday may not work today.
- Continuous improvements/tinkering required.
- Measure performance, gut health and gut microflora.
- Return to step 1.

When to Stop?

- Use of feed additives is always questioned during tough times.
- Remember – they will likely become proportionally cheaper.
- Increasing the ROI through their use.
- Ask – why did we include the additive in the first place?
 - To address a specific problem?
 - Does the problem still exist?
 - Does it still work, and is it cost-effective?

Only then should we consider making a change.



THANK YOU