PART 1:

BROILER NUTRITION PRINCIPLES

*By **Stephan J***

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BROILER NUTRITION

- Feed cost contributes 70% of broiler farming cost
- Finely tuned genetics requires optimal nutrient intake
- Optimal balance of entire nutrient spectrum required
- Consistent quality and proven track record essential
- Epol provides the Perfect Balance with broiler feed ranges for the full variety of broiler farming operations

WHAT IS IN THE BAG?

Read and
Keep the label

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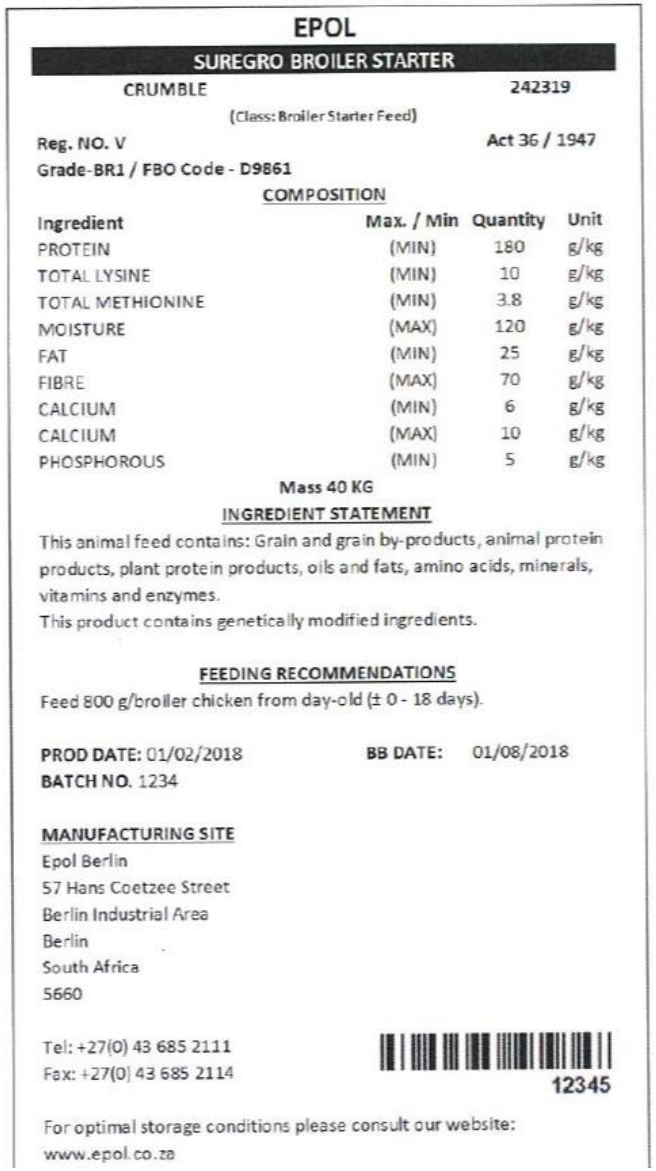
THE FINE PRINT EXPLAINED



EPOL

SUREGRO BROILER STARTER

CRUMBLE 242319

(Class: Broiler Starter Feed)

Reg. NO. V Act 36 / 1947

Grade-BR1 / FBO Code - D9861

COMPOSITION

Ingredient	Max. / Min	Quantity	Unit
PROTEIN	(MIN)	180	g/kg
TOTAL LYSINE	(MIN)	10	g/kg
TOTAL METHIONINE	(MIN)	3.8	g/kg
MOISTURE	(MAX)	120	g/kg
FAT	(MIN)	25	g/kg
FIBRE	(MAX)	70	g/kg
CALCIUM	(MIN)	6	g/kg
CALCIUM	(MAX)	10	g/kg
PHOSPHOROUS	(MIN)	5	g/kg

Mass 40 KG

INGREDIENT STATEMENT

This animal feed contains: Grain and grain by-products, animal protein products, plant protein products, oils and fats, amino acids, minerals, vitamins and enzymes.
This product contains genetically modified ingredients.

FEEDING RECOMMENDATIONS

Feed 800 g/broiler chicken from day-old (± 0 - 18 days).

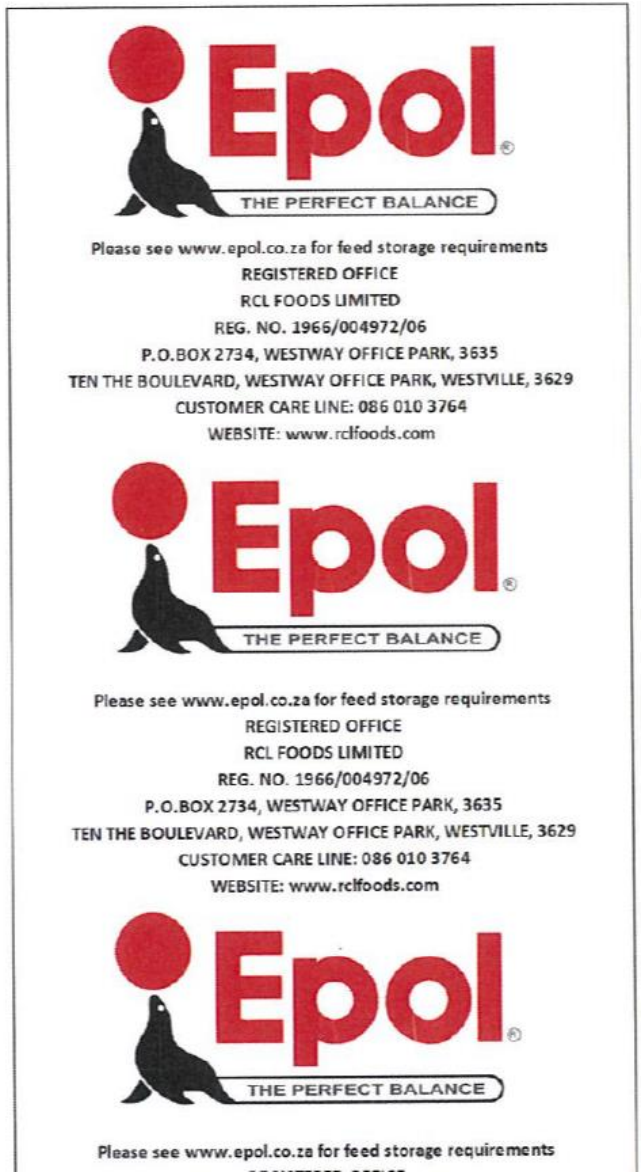
PROD DATE: 01/02/2018 **BB DATE:** 01/08/2018
BATCH NO. 1234

MANUFACTURING SITE
Epol Berlin
57 Hans Coetzee Street
Berlin Industrial Area
Berlin
South Africa
5660

Tel: +27(0) 43 685 2111
Fax: +27(0) 43 685 2114

12345

For optimal storage conditions please consult our website:
www.epol.co.za



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Please see www.epol.co.za for feed storage requirements
REGISTERED OFFICE
RCL FOODS LIMITED
REG. NO. 1966/004972/06
P.O.BOX 2734, WESTWAY OFFICE PARK, 3635
TEN THE BOULEVARD, WESTWAY OFFICE PARK, WESTVILLE, 3629
CUSTOMER CARE LINE: 086 010 3764
WEBSITE: www.rclfoods.com

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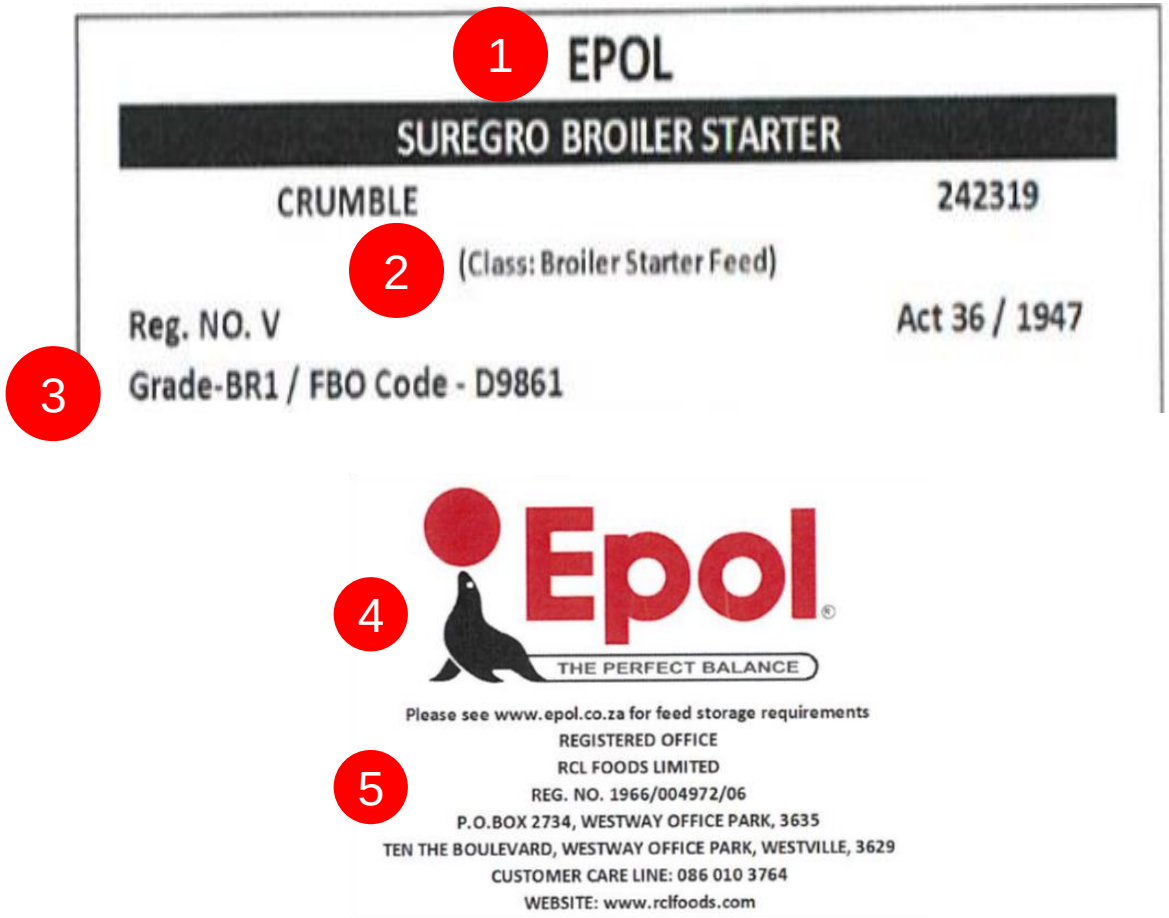
THE FINE PRINT EXPLAINED

1. Product name
2. Class registered as
3. Unique registration number
4. Brand identification
5. Legal entity name and address



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BAG LABEL - COMPOSITION

- Label reflects compulsory nutrients to be declared according to Act 36 of 1947
- Minimum and maximum value dictated by the Act
- Opportunity for feed companies to design and register products within these bands

Composition

Ingredient	Max. / Min	Quantity	Unit
PROTEIN	(MIN)	180	g/kg
TOTAL LYSINE	(MIN)	10	g/kg
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PHOSPHOROUS	(MIN)	5	g/kg

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PROTEIN AND AMINO ACIDS

- Second largest component of the diet
- Important because animal production (meat, eggs) revolves around conversion of feed protein into animal protein
- 20-25% of a broilers fat free body is protein
- 20-30% of total protein in feathers

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PROTEIN AND AMINO ACIDS

- Amino acids consists of carbon, hydrogen, nitrogen and sometimes Sulphur and/or phosphorus
- Amino acids → Peptides → Protein
- 22 Amino acids, complex combinations to form muscle, feathers, enzymes
- Amino acids more important than crude protein

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PROTEIN AND AMINO ACIDS

Essential	Synthesized from some substrates	Non-essential
Arginine	Tyrosine	Alanine
Lysine	**Cystine**	Aspartic acid
Histidine	Hydroxylysine	Asparagine
Leucine		Glutamic acid
Isoleucine		Glutamine
Valine		Hydroxyproline
Methionine		Glycine
Threonine		Serine
Tryptophan		Proline
Phenylalanine		

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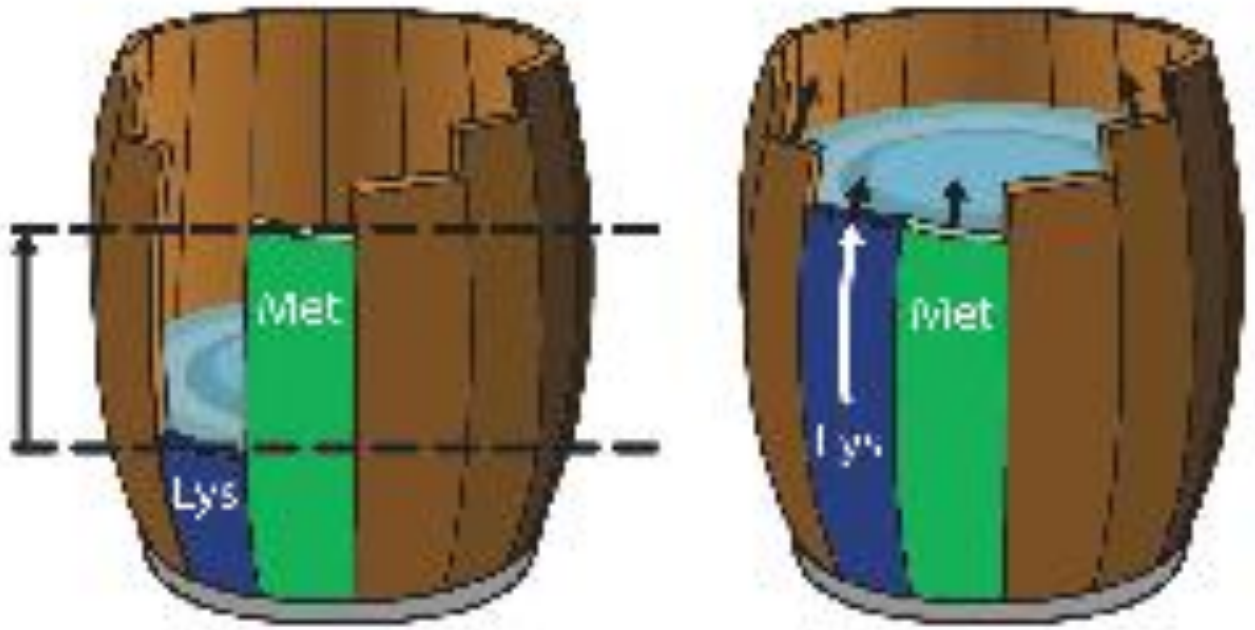
PROTEIN AND AMINO ACIDS – IDEAL PROTEIN CONCEPT

- The optimum balance of essential amino acids and nitrogen for synthesis of non-essential amino acids
- Normally related to lysine
- The better the amino acid profile fit the higher the biological value



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PROTEIN AND AMINO ACIDS

- Digestibility varies between raw materials and is influenced by processing
- Important aspect in selecting raw materials for different diets
- Constant relationship between protein and amino acid levels for different raw materials
- Synthetic Lysine, Methionine, Threonine and Tryptophan

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ENERGY

- Most expensive component of the diet
- Increasing energy demands will emphasize this – diet density
- Efficiency of food utilization depends on energy content
- Energy requirements are divided between maintenance and production

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ENERGY

- Measured in MJ/kg feed
- Metabolizable energy is used to formulate the energy requirements of the birds
- A number of variations to more accurately address energy requirements
- Main supply for broilers from carbohydrates, fats, oils and protein

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ENERGY

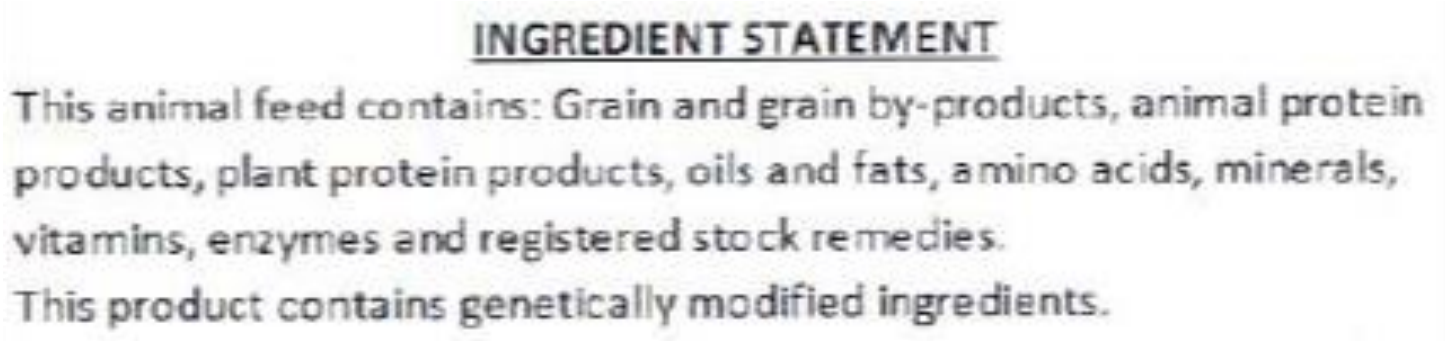
- **Maintenance requirements**
  - Basal metabolism
  - Adaptive thermogenesis
  - Physical activity

- **Production requirements**
  - Energy within products
  - Thermogenesis

MINERALS – CA & P

- Two single most important macrominerals
- Skeleton contains 99% of body Calcium and 80% of body phosphorous
- Crucial for leg health and skeletal development
- Sources include limestone powder, mono-calcium phosphate and natural occurrence in raw materials already included in diet
- Level and ratio equally important – Vitamin D interaction

BAG LABEL- INGREDIENT STATEMENT



INGREDIENT STATEMENT

This animal feed contains: Grain and grain by-products, animal protein products, plant protein products, oils and fats, amino acids, minerals, vitamins, enzymes and registered stock remedies.
This product contains genetically modified ingredients.

- Generic list of raw material types that could be present in the registered feed
- Mainly divided in broad raw material categories as well as additives such as enzymes and stock remedies

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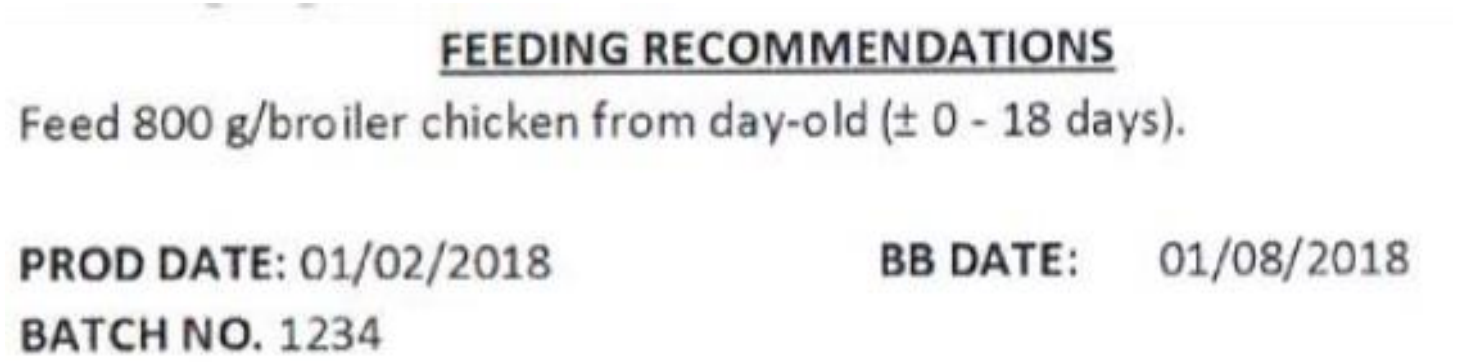
BAG LABEL – FEEDING RECOMMENDA-TIONS AND PRODUCTION INFORMATION



FEEDING RECOMMENDATIONS

Feed 800 g/broiler chicken from day-old (± 0 - 18 days).

PROD DATE: 01/02/2018 **BB DATE:** 01/08/2018

BATCH NO. 1234

- Production and best before dates
- Batch no. allows for traceability
- Enables future follow ups with regards to processing and quality assurance
- Phase and specie specific recommendation

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VITAMINS

- **Water Soluble**
  - Vitamin B1: Thiamine stimulates intake and role in formation of digestion enzymes
  - Vitamin B2: Riboflavin important effect on body processes – growth and oxidation
  - Niacin: Metabolism of energy and protein
  - Vitamin B6: Pyridoxine role in protein, carbohydrate and fat metabolism
  - Vitamin C: Alleviates stress an immune function support

VITAMINS

- Essential dietary factor required in small amounts
- Two main groups: Fat Soluble and Water Soluble

- **Fat Soluble**
  - Vitamin A: First line of defense, development and repair of epithelial tissue
  - Vitamin D: Absorption of calcium and phosphorous
  - Vitamin E: Cell productivity and blood formation
  - Vitamin K: Blood clotting

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MINERALS - MAKRO

- Integral part of all body tissues
- Small part of the diet but are vital
- **Sodium (Na) and Chloride (Cl)**
  - Together with potassium maintains acid-base equilibrium in the body
  - Supplied via salt and important intake stimulant
- **Potassium (K)**
  - Important for optimal growth
  - Not likely to be deficient in small quantities
- **Magnesium (Mg)**
  - Works with Ca and P in bone formation

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MINERALS – MICRO (Trace minerals)

- **Zinc (Zn)**
  - Enzyme function, protein and carbohydrate metabolism, immune response
- **Copper (Cu) and Iron (Fe)**
  - Production of red blood cells and general well-being
- **Selenium (Se)**
  - Vitamin E interaction and essential for certain enzyme systems
- **Manganese (Mn)**
  - Bone formation
- **Iodine (I)**
  - Component of thyroxin controlling body functions

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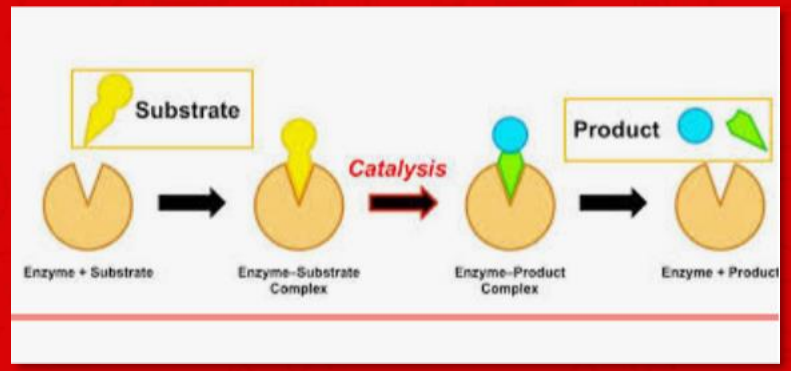
ADDITIVES - ENZYMES



- **Phytase**
  - Widely used
  - Releases bonded phosphorus in plants
  - Also release other nutrients
  - Reduces use of inorganic and expensive P
- **Protease**
  - Improves digestibility of proteins and amino acids
  - Effective in plant protein-based diets
- **Xylanase**
  - Improve digestibility of non-starch polysaccharides

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ADDITIVES - GROWTH PROMOTORS

Antibiotic Growth Promoters (AGP's)

- Works by altering gut microflora
- Controls enteropathogens
- Improved growth and performance

Performance (42 days)	WITHOUT AGP'S	RANGE	Value impact
Liveweight	- 50g	0 – 150	What is 50g's worth
FCR	- 0.4	0 - 0.08	What is – 0.4 worth
Mortality	+ 0.1%	- 0.13 - 1.0%	What is + 0.1% worth

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RAW MATERIALS – THE MATRIX

- Table of nutrient contents
- Unique to different raw materials
- Values are not fixed (Maize protein 6-9%)
- Derived from published tables, own analysis or stated values in case of vitamins and minerals

RAW MATERIALS – ENERGY SOURCES

- **Grain and Grain By-products**
  - Yellow maize, White maize, Wheat
  - Optimal grind size
  - Hominy chop, wheat bran, maize germ

- **Fats and Oils**
  - Soya oil, maize oil and blended oil

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RAW MATERIALS – PROTEIN

- **Plant based proteins**
  - Soya oilcake, full fat soya, sunflower oilcake
  - Gluten 60
  - Level of processing for nutrient availability
- **Synthetic amino acids**
  - Lysine, methionine, threonine and tryptophan widely used

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Water: The ignored nutrient

Water Quality Standards for Poultry

Contaminant, mineral or ion	Level Considered Average	Maximum Acceptable Level
Bacteria		
Total bacteria	0 CFU/ml	100 CFU/ml
Coliform bacteria	0 CFU/ml	50 CFU/ml
Acidity and hardness		
pH	6.8-7.5	6.0-8.0
Total hardness	60-180 ppm	110 ppm
Naturally occurring elements		
Calcium (Ca)	60 mg/L	
Chloride (Cl)	14 mg/L	250 mg/L
Copper (Cu)	0.002 mg/L	0.6 mg/L
Iron (Fe)	0.2 mg/L	0.3 mg/L
Lead (Pb)	0	0.02 mg/L
Magnesium (Mg)	14 mg/L	125 mg/L
Nitrate	10 mg/L	25 mg/L
Sulfate	125 mg/L	250 mg/L
Zinc		1.5 mg/L
Sodium (Na)	32 mg/L	50 mg/L

Source: Muirhead, Sarah, Good, clean water is critical component of poultry production, Feedstuffs, 1995.

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Water: The ignored nutrient

Relation between ambient temperature and water feed ratio

Temperature ºC / ºF	Ratio water and feed
4 °C / 39 °F	1.7:1
20 °C / 68 °F	2:1
26 °C / 79 °F	2.5:1
37 °C / 99 °F	5:1

Singleton (2004)

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FEED FORM

- **Starter Phase**
  - Crumble/Mash
  - Particle size between 1-3mm (Majority)
- **Grower/Finisher/Post Finisher**
  - Pelleted
  - Pellet diameter between 3.5 and 5mm
- **Benefit of crumbling/pelleting**
  - Ease of intake
  - Reduced wastage
  - Degree of processing due to high temperature (starch gelatinization)
  - Reduction in bacterial load

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FEED FORM - PELLET QUALITY

- Crumble quality – Uniformity and limited amount of fines
- Pellet quality – Durability (hardness) and limited amount of fines

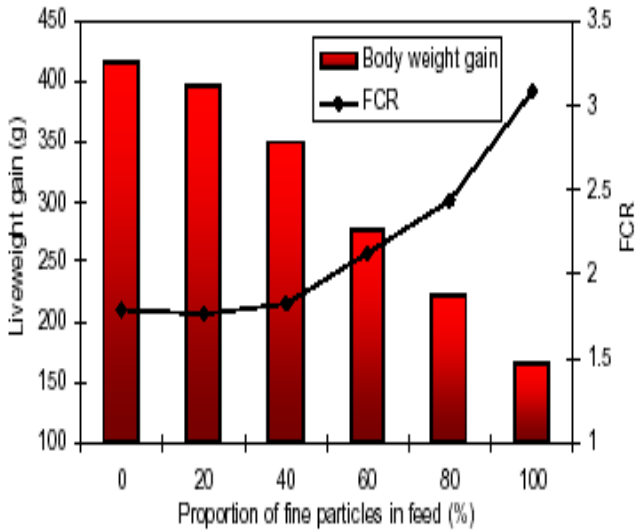

Figure 1. The influence of fine particles in the feed on broiler performance (Quentin *et al.*, 2004)

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Thank you

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PART 2:

Introduction to Broiler Nutrition

By Walter Hildebrandt

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WHAT WE WILL BE COVERING TODAY:

- Digestive Anatomy
- Phase Feeding
- Basic Quality checks

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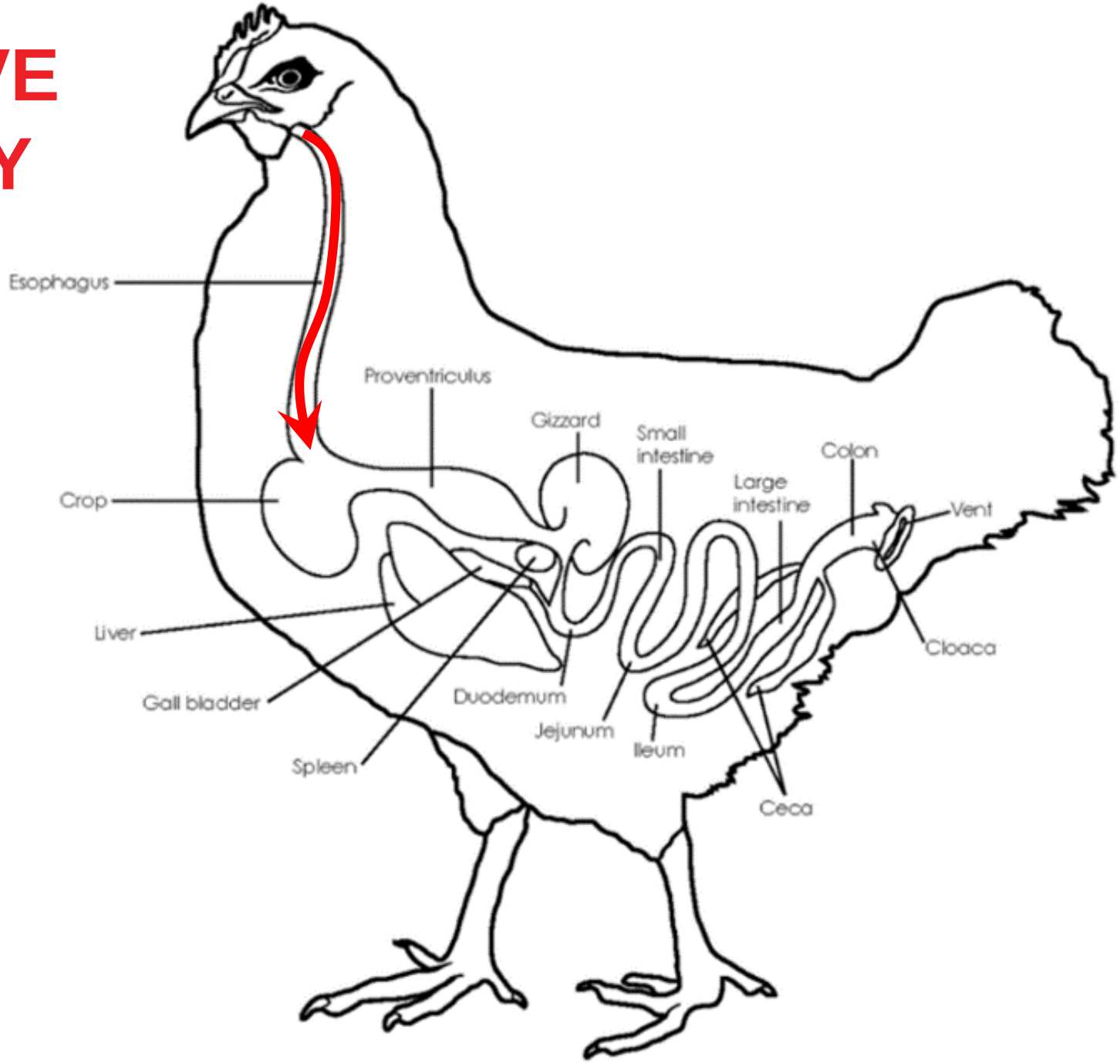
DIGESTIVE ANATOMY

Transport
& Moistening



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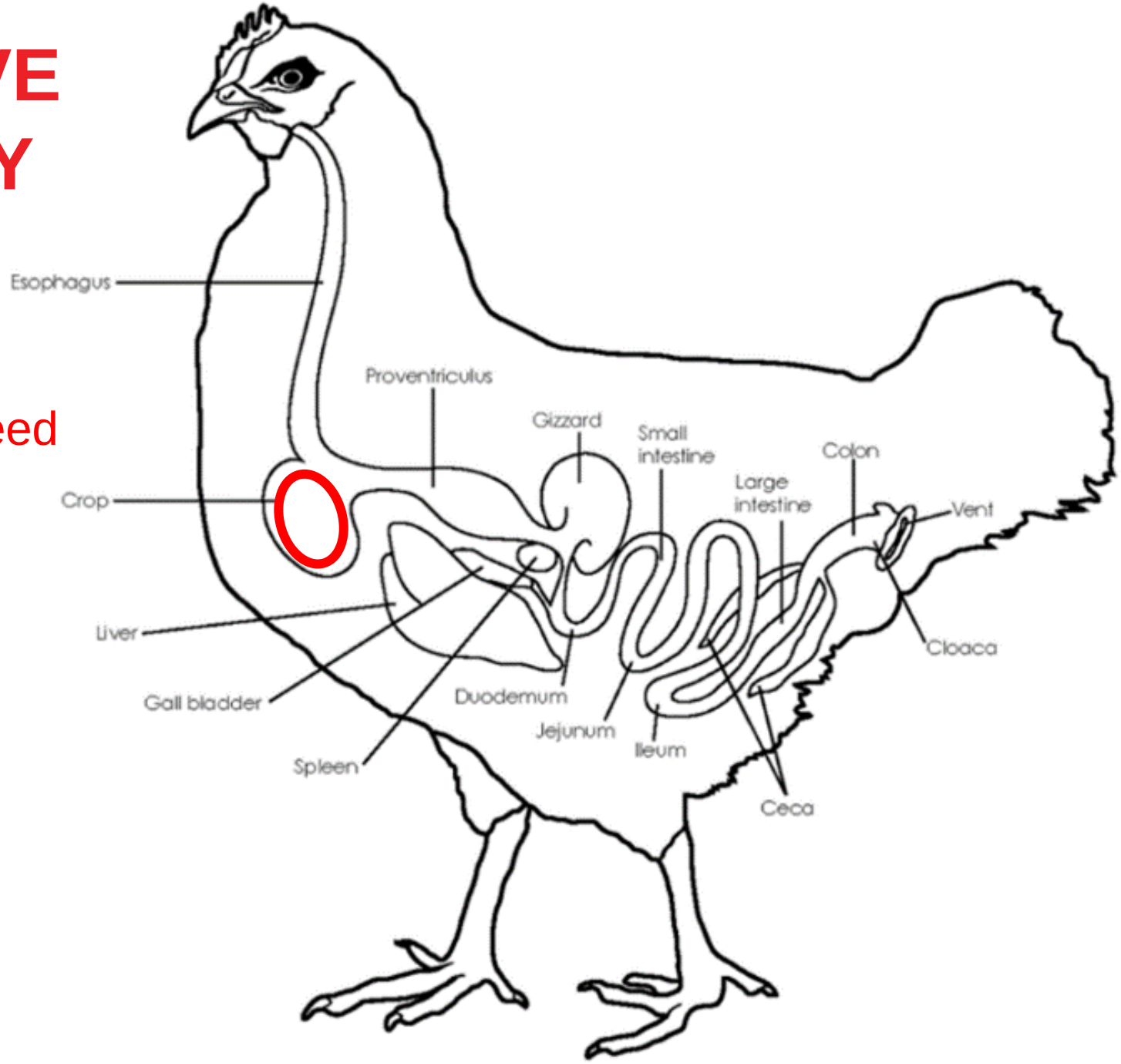
DIGESTIVE ANATOMY

Storage of feed
Moistening of feed
Ad Lib feeding reduces use



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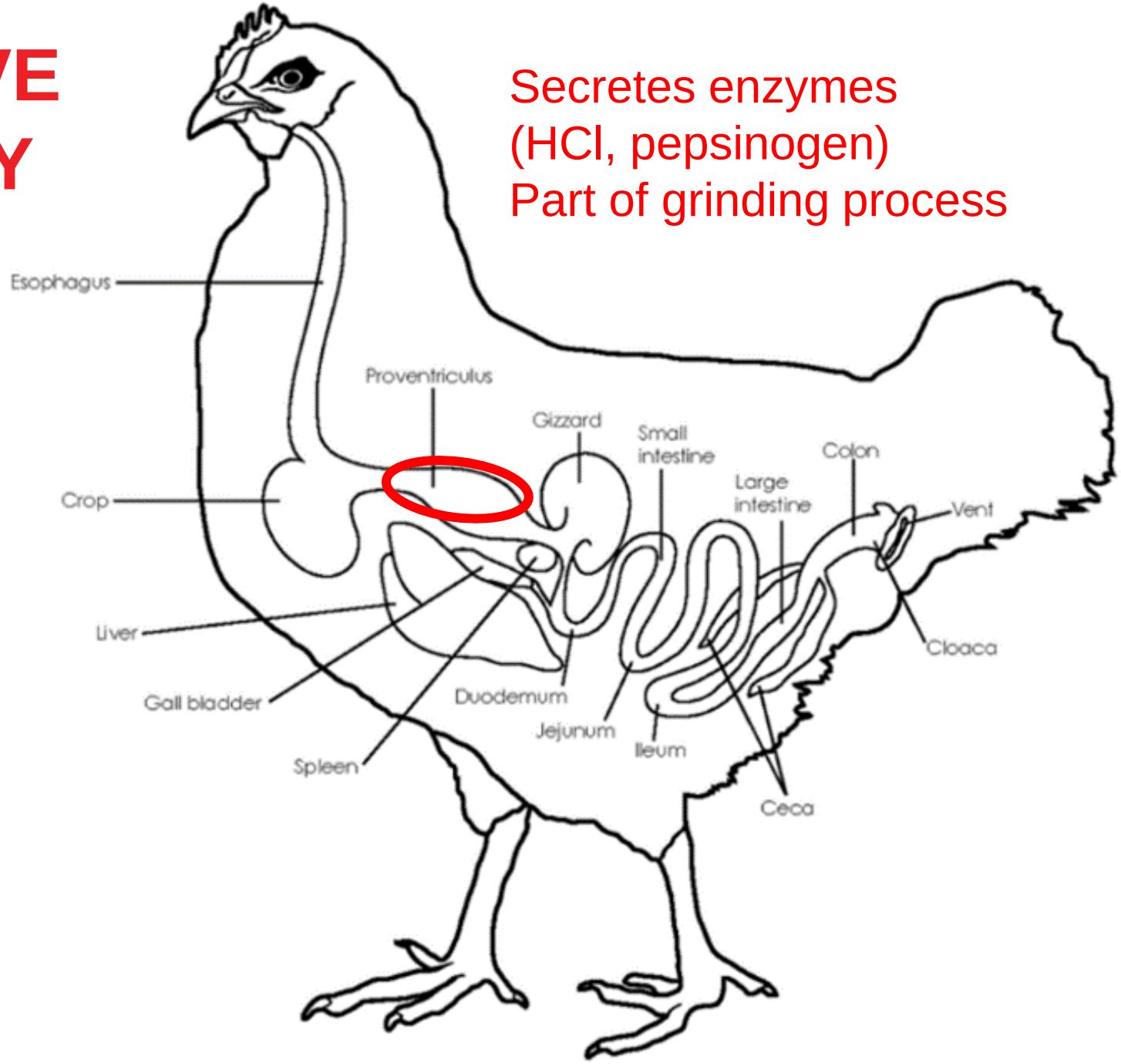
DIGESTIVE ANATOMY

Secretes enzymes
(HCl, pepsinogen)
Part of grinding process



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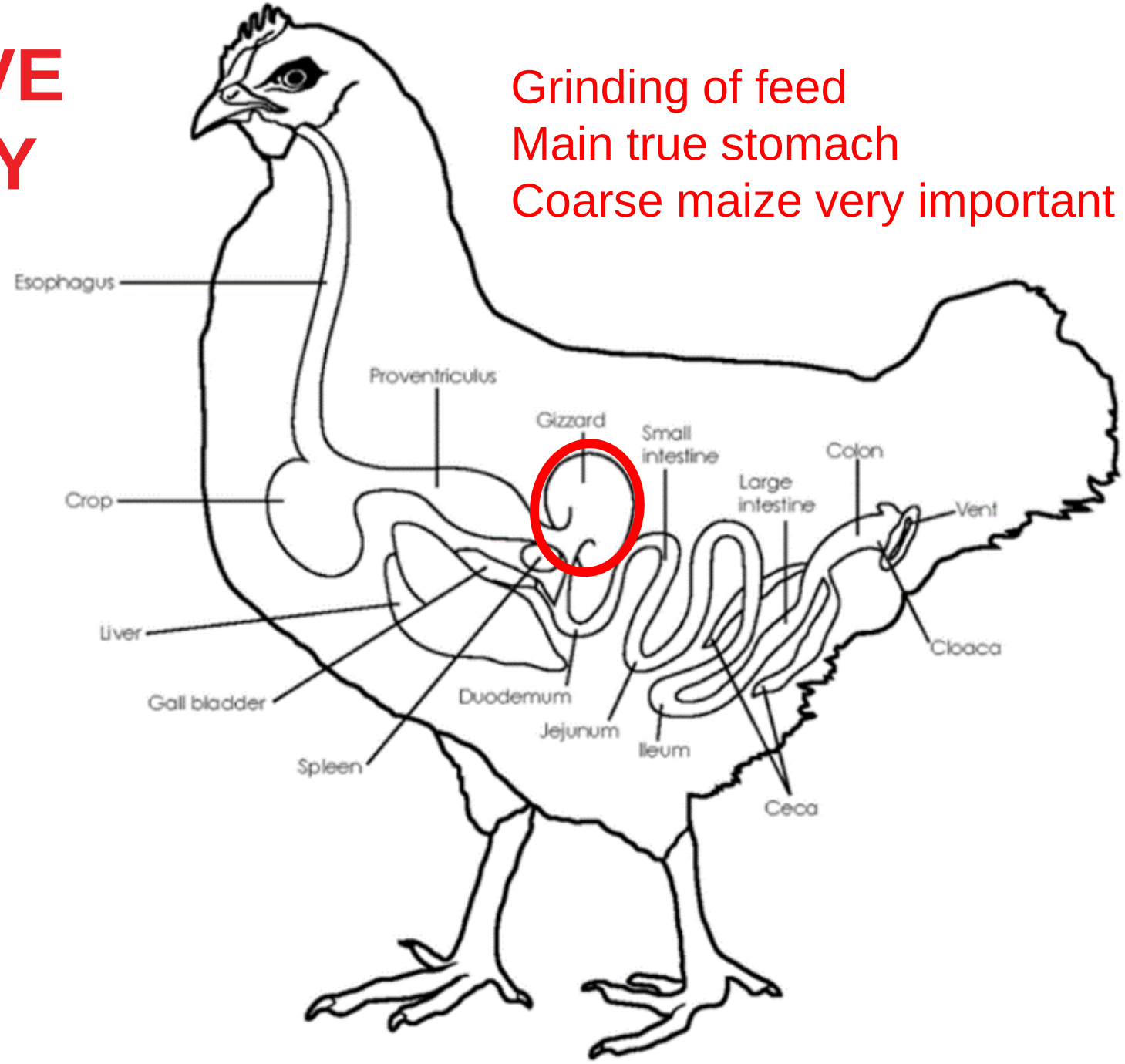
DIGESTIVE ANATOMY

Grinding of feed
Main true stomach
Coarse maize very important



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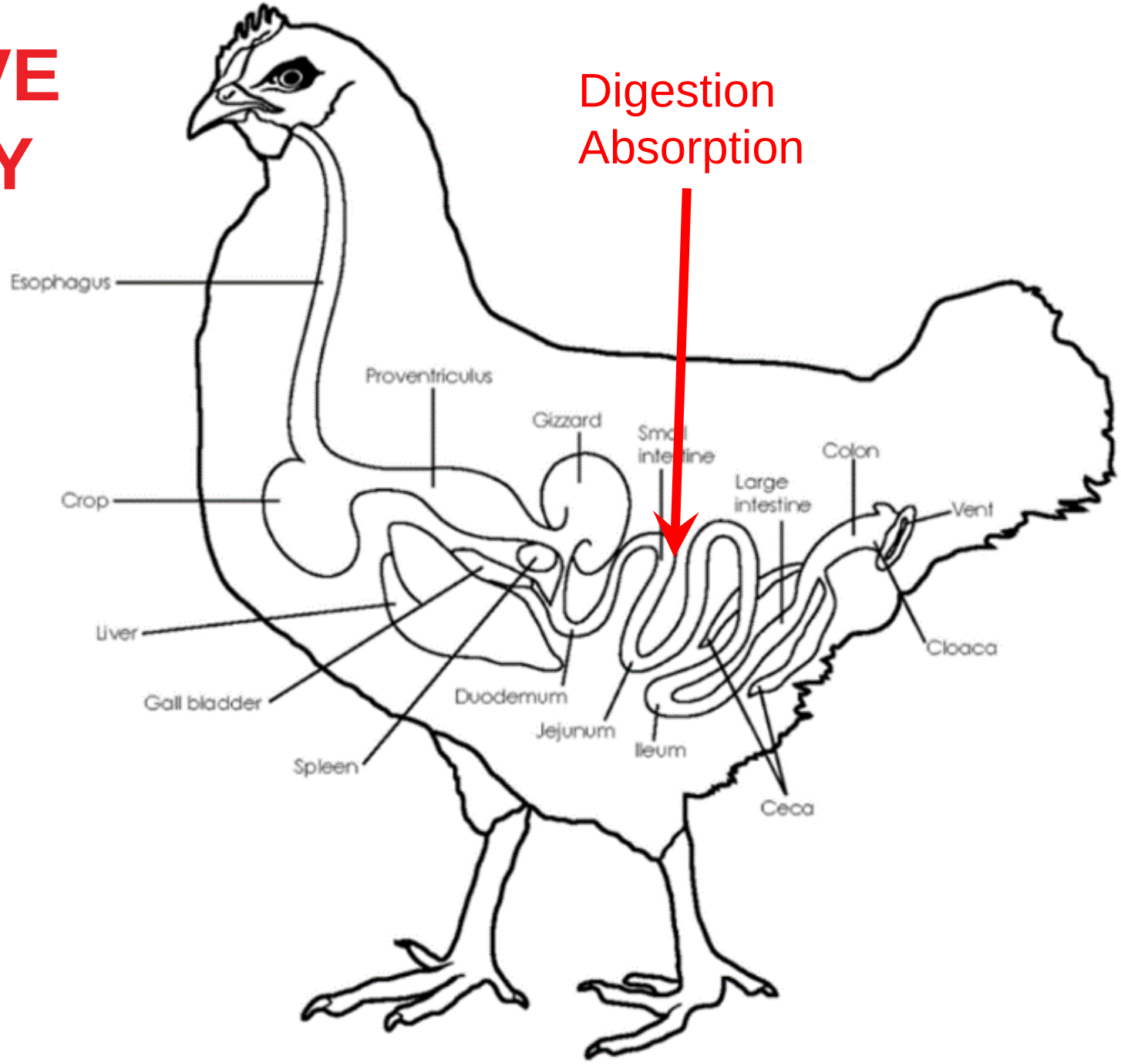
DIGESTIVE ANATOMY



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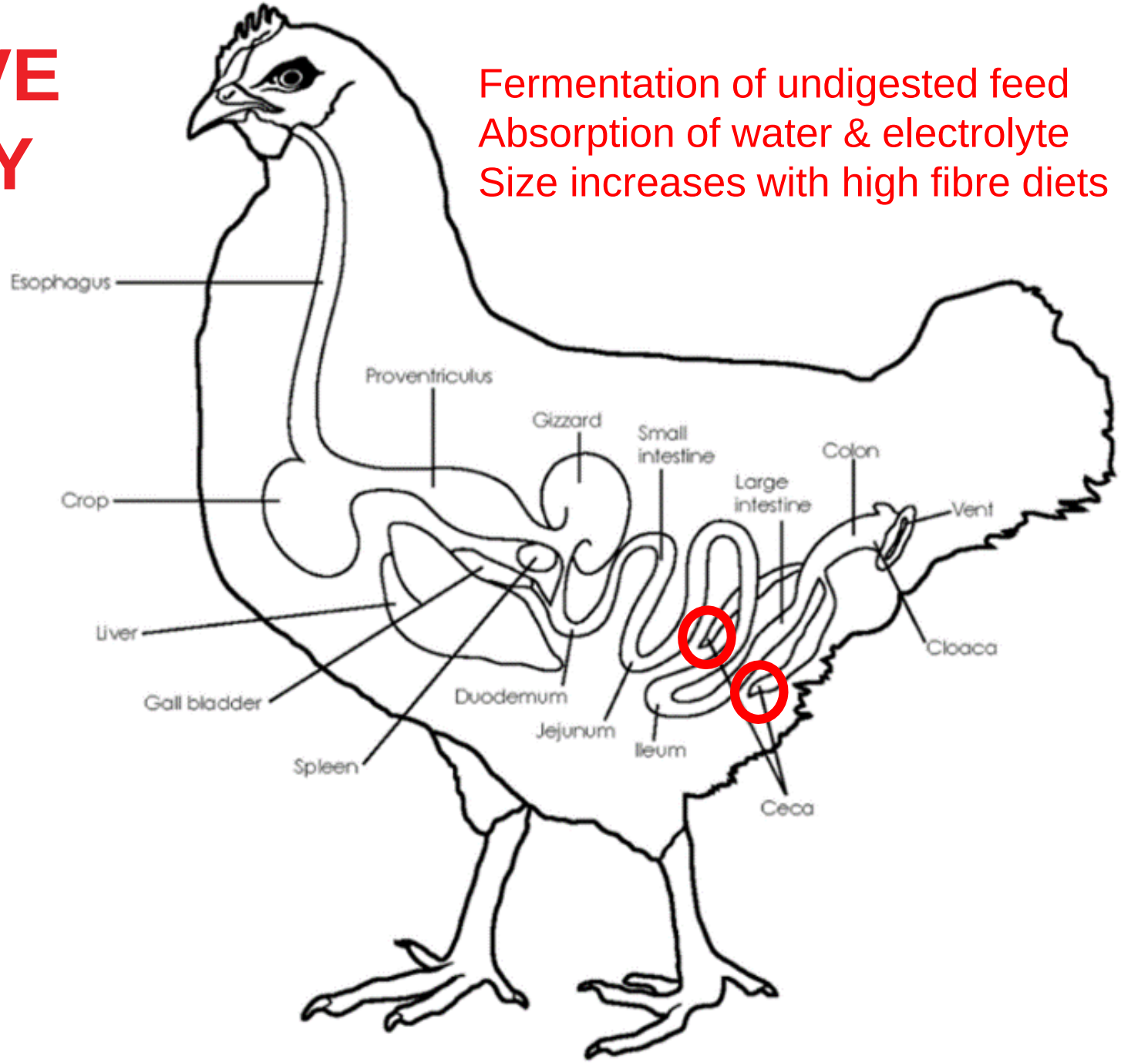
DIGESTIVE ANATOMY

Fermentation of undigested feed
Absorption of water & electrolyte
Size increases with high fibre diets



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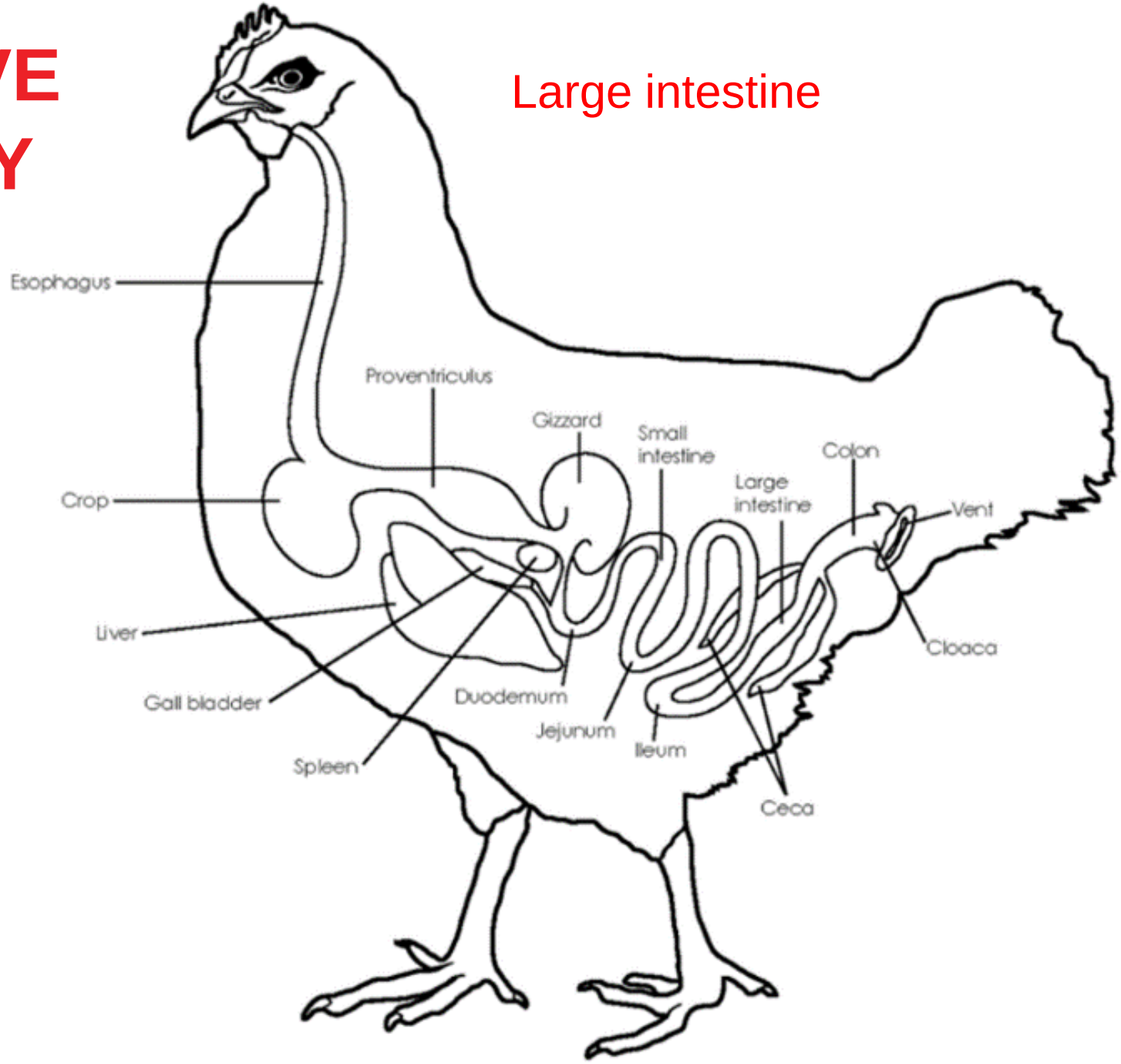
DIGESTIVE ANATOMY

Large intestine



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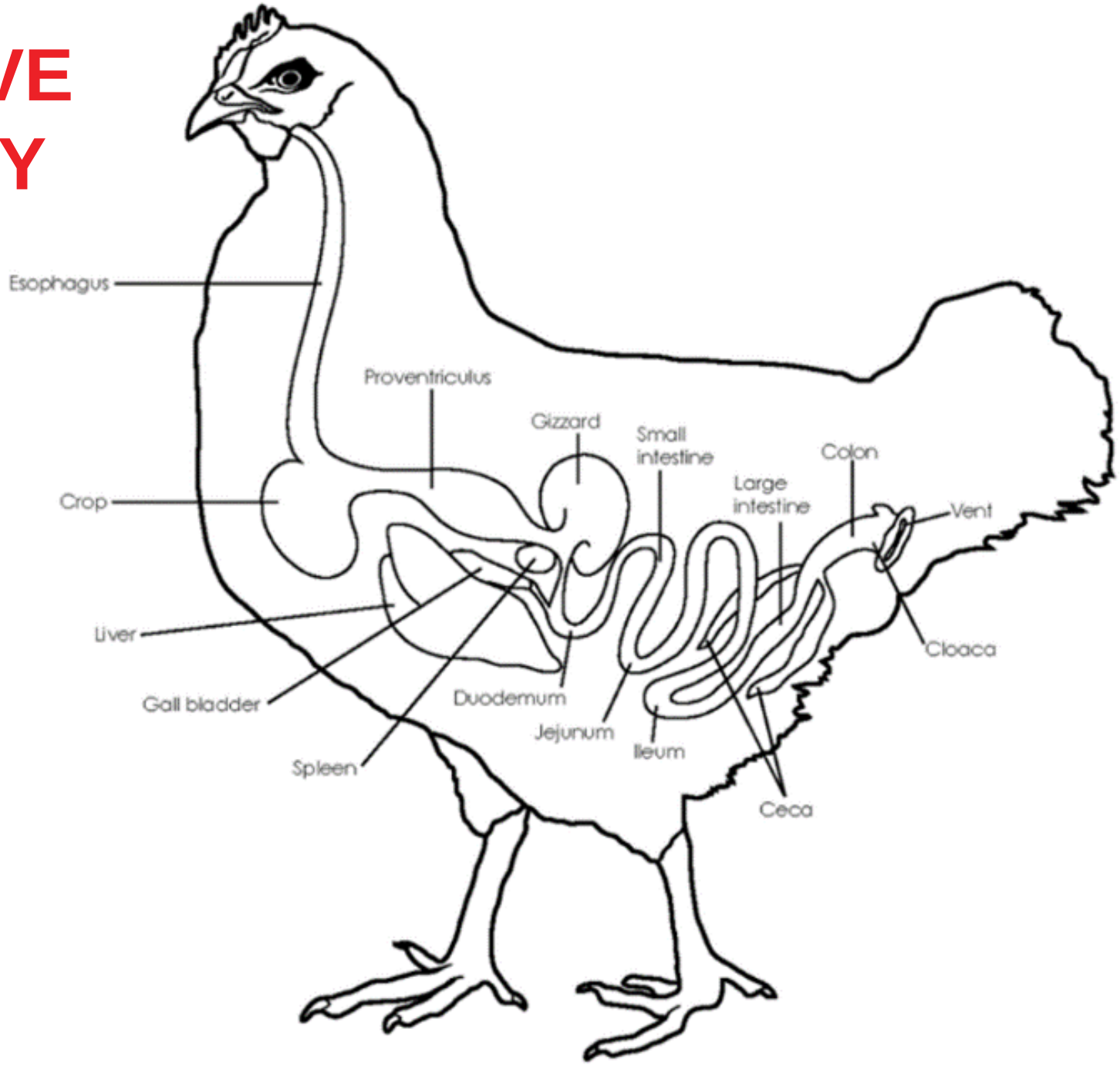
DIGESTIVE ANATOMY



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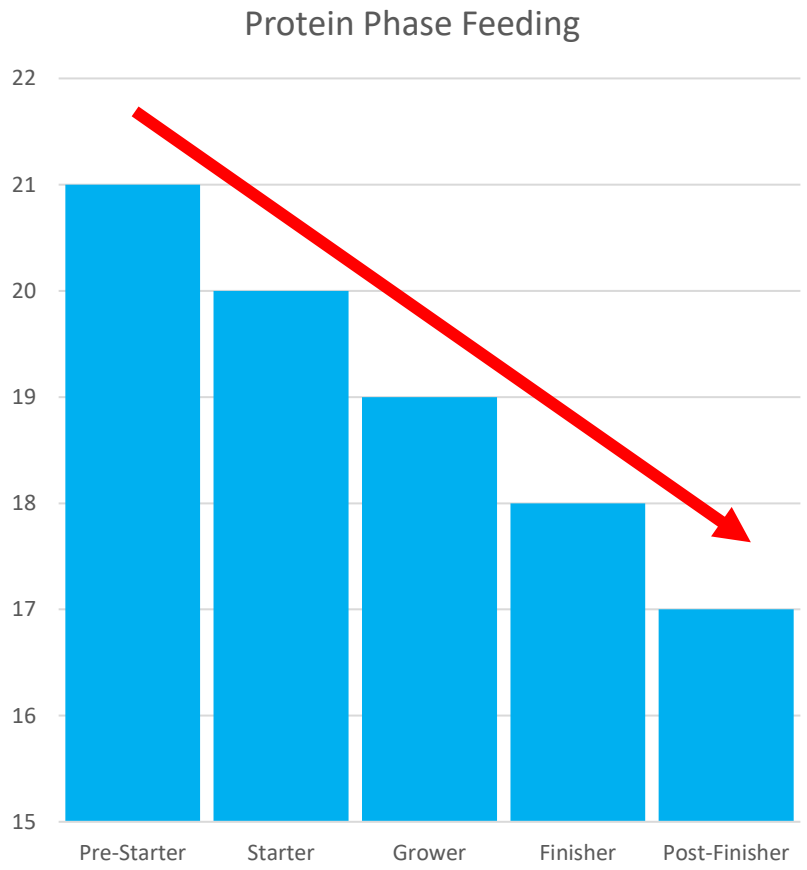
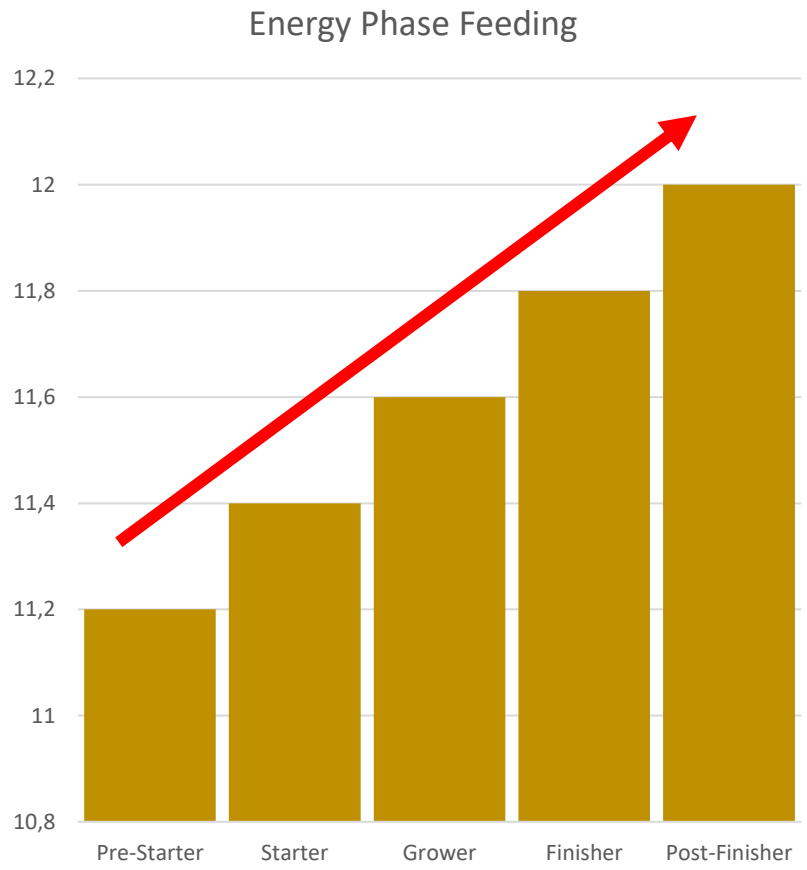
PHASE FEEDING – Matches needs





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BASIC QUALITY CHECKS

- **Before opening the bag**
  - Correct feed, check bag tag
  - Best before date/date of manufacture
  - Is the bag dry
  - Can you feel any clumps/lumps
  - Does the bag look old or dusty

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BASIC QUALITY CHECKS

- **After opening the bag (Sensory)**
  - Does the feed look fresh
    - No mould, flour mite (walking dust), etc.
  - Does the feed smell fresh
    - No rancid or other strange smells
  - Does the feed taste fresh
  - If you could answer yes to all of these, chickens will probably also say, yes please.

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THANK YOU

Mr. Walter Hildebrandt

EPOL Kwa-Zulu Natal

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Email: Walter.Hildebrandt@rclfoods.com