



Feed additives and supplements for poultry

Dr. P.Vasanthakumar, M.V.Sc., Ph.D.,

Professor & Head,
Department of Animal Nutrition,
Veterinary College and Research Institute,
Namakkal- 637 002, Tamil Nadu.



Feed additives and supplements for poultry



Broad classification of feed additives

Growth promoters	Disease preventing agents	Supplements/Vitamins	Auxiliary substances
I. Chemical 1. Ionophores	1. Antibiotics	1. Organic trace elements	1. Plant extract/herbal products
2. Antibiotics	2. Coccidiostats	2. Synthetic vitamins	2. Antioxidants
3. Prebiotics/ Oligosaccharides	3. Mould inhibitors 4. Immuno-modulators	3. Synthetic amino acids	3. Flavouring agents/ pigmentation compounds
4. Buffers			4. Emulsifiers
5. Organic acids/ Feed acidifiers			5. Toxin adsorbants
II. Biological 1. Probiotics			6. Preservatives
2. Enzymes			7. Pellet binders

Antibiotic growth promoters (AGP) in feed

The EU has banned Bacitracin, carbodox, olaquinox, tylosin, virginiamycin, avilamycin, flavophospholipol, lasalocid sodium, monensin sodium, and salinomycin as of 2009.

Government of India ban on colistin for use in poultry industry

AGPs in Feed – Field Survey

Broiler Chicken

- ▶ 10 % of farms
Chlortetracycline or
Oxytetracycline
- ▶ 90 % of farms
- ▶ Bacitracin
- ▶ Methylene Disalicylate (BMD)
- ▶ Zinc bacitracin
- ▶ Lincomycin in combination
with tylosin tartarate / phosphate

Layer Chicken

- ▶ 97 % of farms
- ▶ Oxytetracycline or chlortetracycline or
BMD in combination with any one of the
anti-mycoplasmal drugs
- ▶ Tiamulin hydrogen fumarate or tylosin
phosphate or tylvalosin tartrate or
tilmicosin

Antibiotics in drinking water

Broiler Chicken

- ▶ Enrofloxacin or
- ▶ Ciprofloxacin or
- ▶ Levofloxacin

Layer Chicken

- ▶ Enrofloxacin or
- ▶ Ciprofloxacin or
- ▶ Livofloxacin or
- ▶ Sulphatrimethoprim or
- ▶ Neomycin or
- ▶ Oxytetracycline

All the broiler and layer farms surveyed were using antibiotics as feed additive in some or the other form predisposing to the presence of antibiotic residues in meat or egg (Kavitha, 2021).



**Poorly absorbed by the host and thus are non-toxic – eg.
Avoparcin & Flavomycin**

Do not have a withdrawal period eg. Tylosin & Virginiamycin

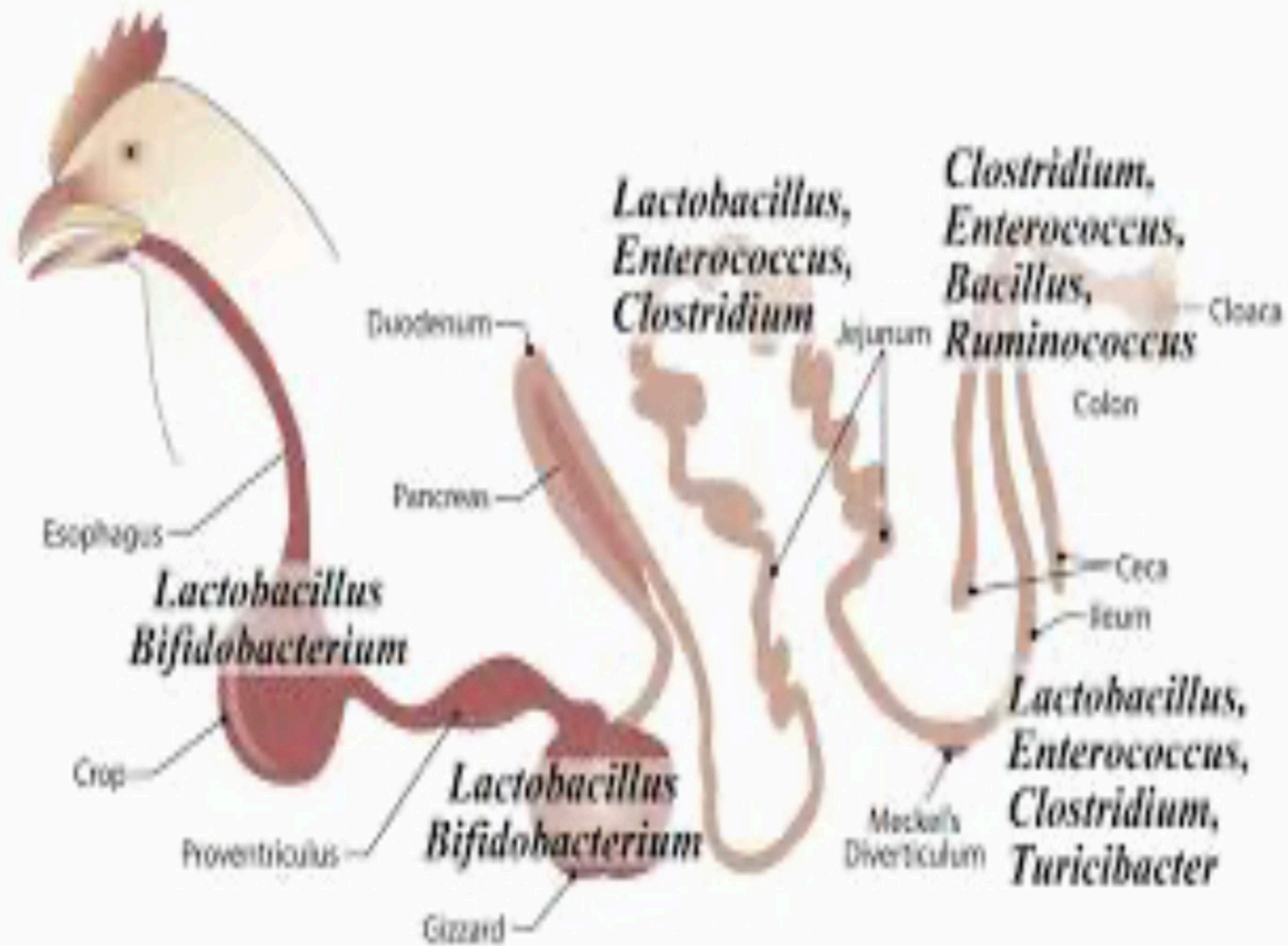
**Require withdrawal periods eg. Nitrofurans &
Quinoxaline-N-oxides.**

Improvements of 4–16 percent in growth rate & 2–7 percent FCR.

- **Response is greatest in young animals**

Gut Health

- ▶ **The poultry gastrointestinal microbiome regulates the host's growth and health.**
- ▶ **The use of antibiotics promotes drug-resistant pathogens, leading to dysbiosis.**
- ▶ **Non-antibiotic microbial growth promoters enhance performance and meat production.**



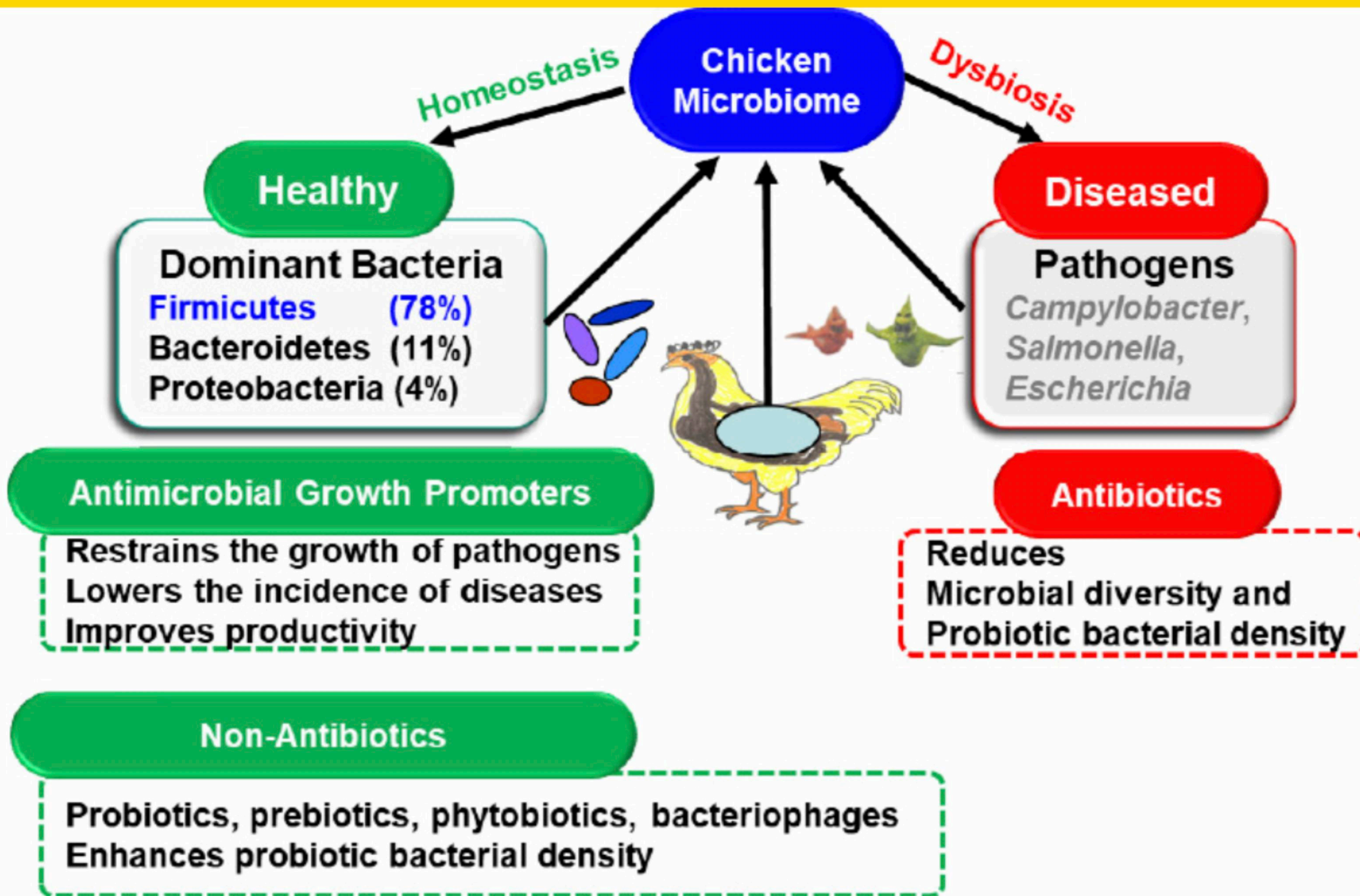
Alternatives to Antibiotics

- ▶ Phytochemicals,
- ▶ Organic acids,
- ▶ Prebiotics,
- ▶ Probiotics, and
- ▶ Enzymes

Modes of action –

synbiotic, antagonistic, and synergistic or combative effects between alternatives or other feed nutrients.

- ▶ Immuno-modulation,
- ▶ Enhance digestion, Improving nutrient availability, increase absorbability of nutrients,
- ▶ Antimicrobial, antioxidant activity,
- ▶ Enhancement of gut integrity, intestinal barrier function or improve intestinal health, nutrient for the host, and modulating the host gut microflora.



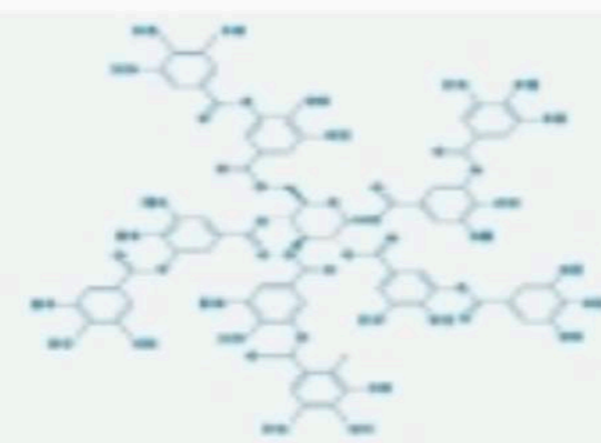


4 MAIN TYPES OF PHYTOGENICS



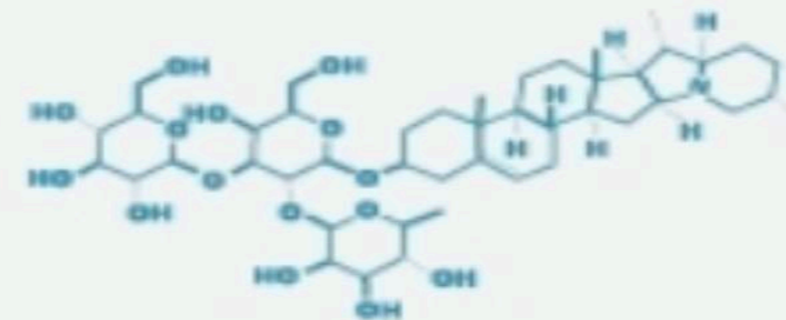
Tannin*

sorghum, gallnut, tree bark



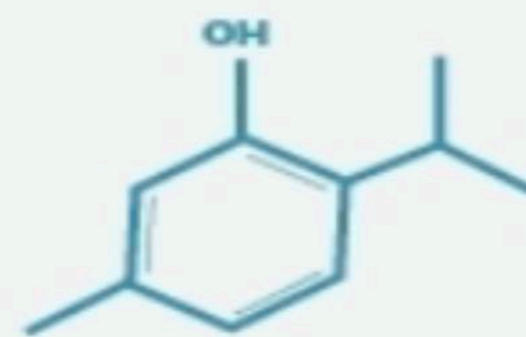
Saponin*

yucca plant



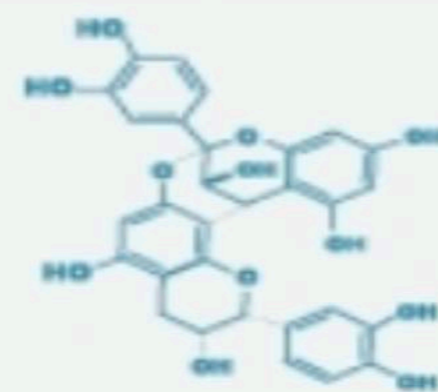
Essential oil*

oregano, rosemary, etc.



Flavonoid

citrus fruit and/or green tea



*Used in poultry

Saponins and gut health

- ▶ Chaudhary (2017) reported that soapnut shell powder saponin @ 75 and 150 ppm had significantly improved both cell mediated and humoral immune response in broiler breeders.
- ▶ Saponins can **stimulate secretion of cytokines** and trigger innate immunity (Song and Hu, 2009).
- ▶ Saponins reduces total cholesterol and LDLcholesterol levels in serum and meat.
- ▶ Saponin rich feeds : **Lucerne meal, tree leaves, soapnut, legumes, green leafy vegetables.**

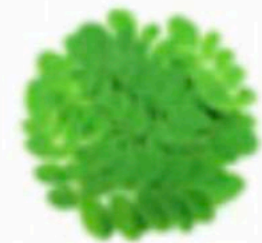




Black seed Ginger *Atrimisia annua* Fennel Red pepper Thyme Rosemary Dell Chicory Coriander Licorice



Radix Bupleuri



Moringa oleifera



Curcuma xanthorrhiza



Resveratol



Cinnamon



Ginkgo biloba

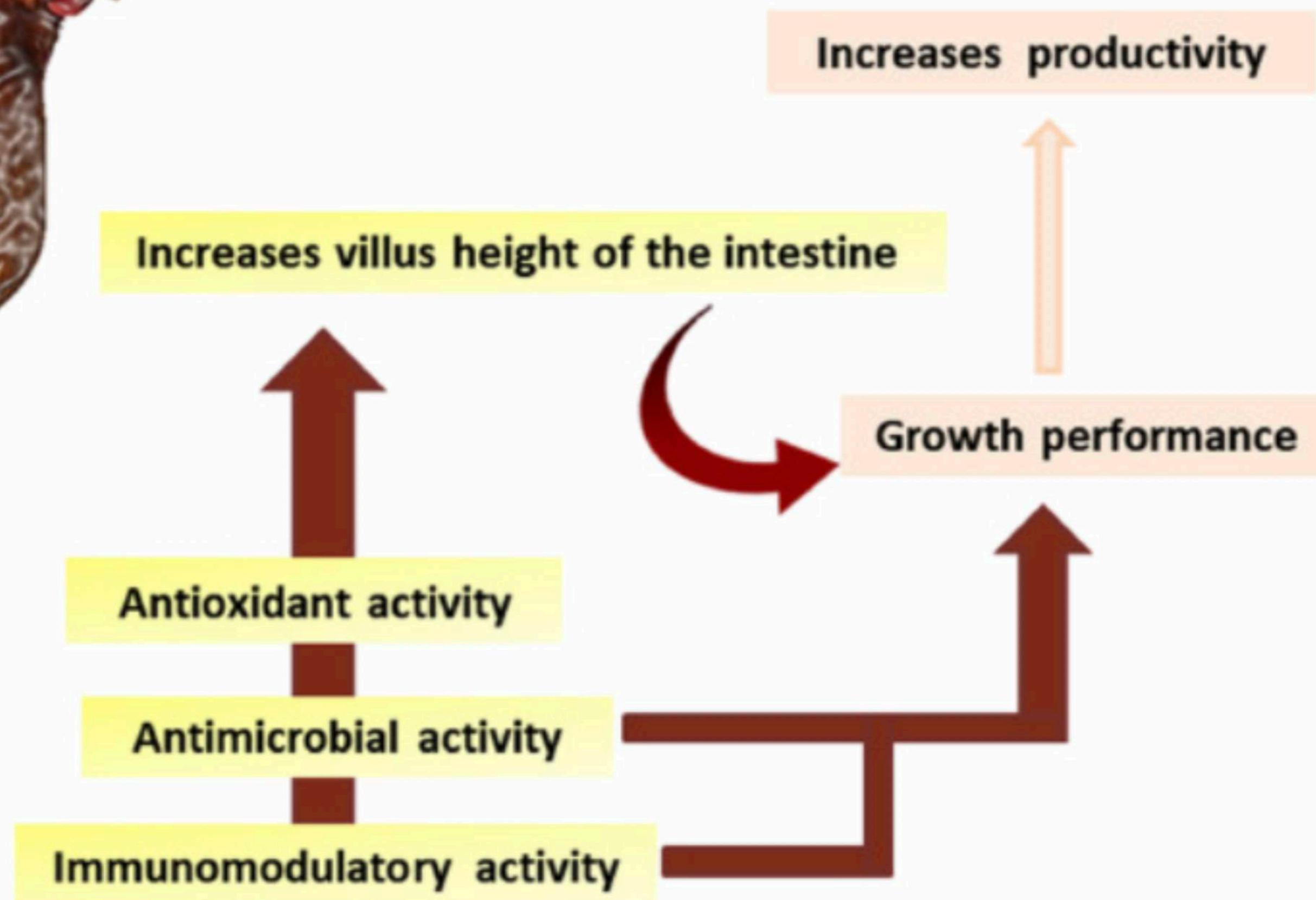
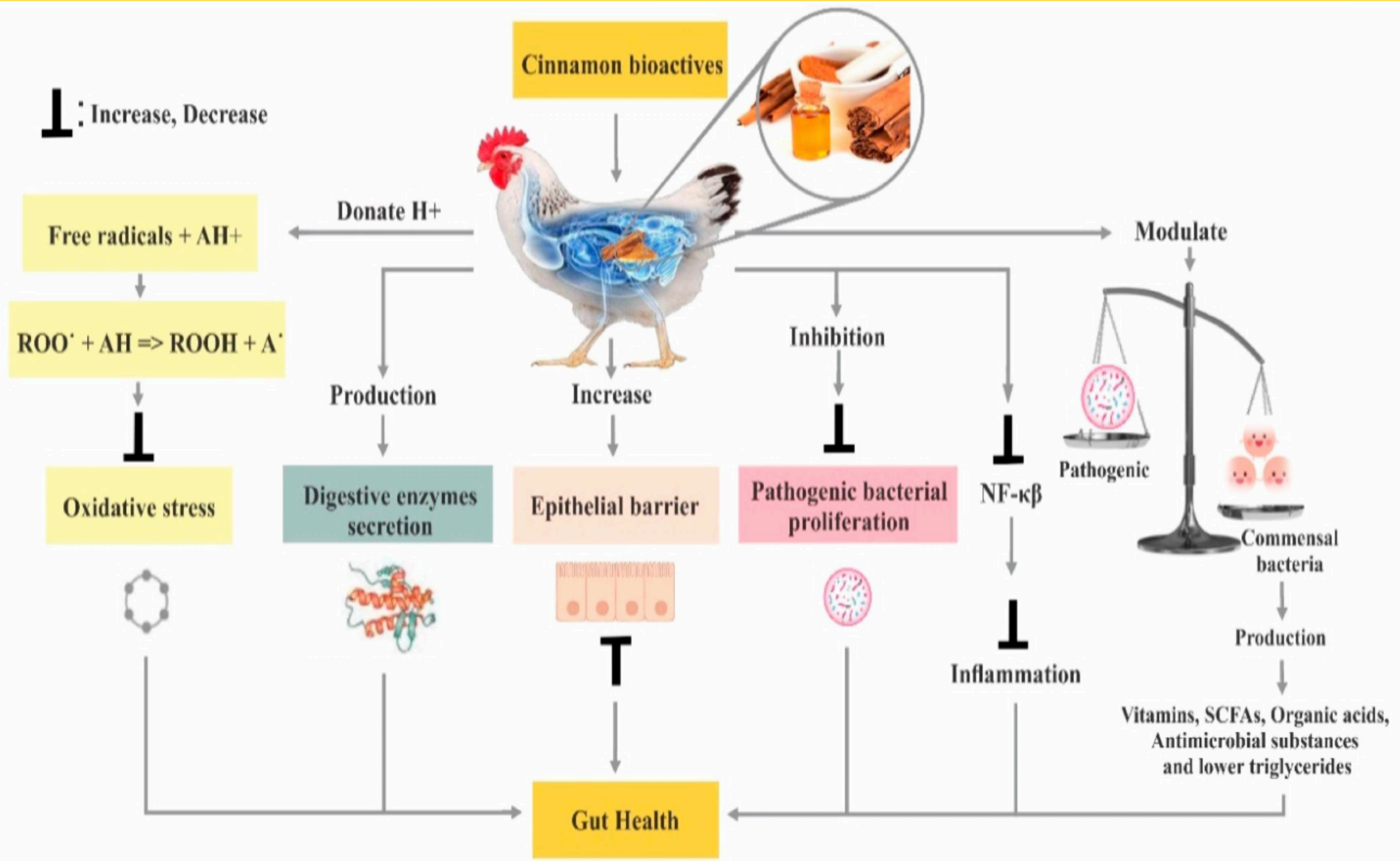




Table I. Effect of turmeric on poultry nutrition

Form of turmeric	Effects of turmeric	References
Turmeric oleoresin	Enhance the growth performance of broilers, resistance against avian necrotic enteritis, reduce the gut lesions	Lee <i>et al.</i> (2013)
Dietary turmeric powder (7 g/kg)	Improved relative growth rate and body weight, enhanced meat quality, reduced serum concentration of cholesterol and triglycerides	Hussein (2013)
Dietary turmeric rhizome powder	Enhancement of immune response in chicken, improvement in hematology, better stress tolerance, and immune response in heat-stressed broilers.	Akhavan-Salamat and Ghasemi (2016)
Dietary turmeric or <i>Curcuma longa</i> turmeric powder	Good egg quality like improved eggshell thickness and hardness but shows decreased yolk cholesterol content	Rahayu <i>et al.</i> (2015)
<i>Curcuma xanthorrhiza</i>	Improve meat quality, increase in carcass weight percentage	Rahayu <i>et al.</i> (2015)
Turmeric rhizome powder	Increase total cholesterol level and hemoglobin, decrease in blood albumin content	Emadi <i>et al.</i> (2007)
Curcumin	Improved egg quality, anticoccidial effect	Galli <i>et al.</i> (2018)
Turmeric rhizome extract	Improved antioxidant capability, high growth performance, increased breast muscle weight ratio, reduction in the abdominal fat ratio	Zhang <i>et al.</i> (2015)



Essential oils

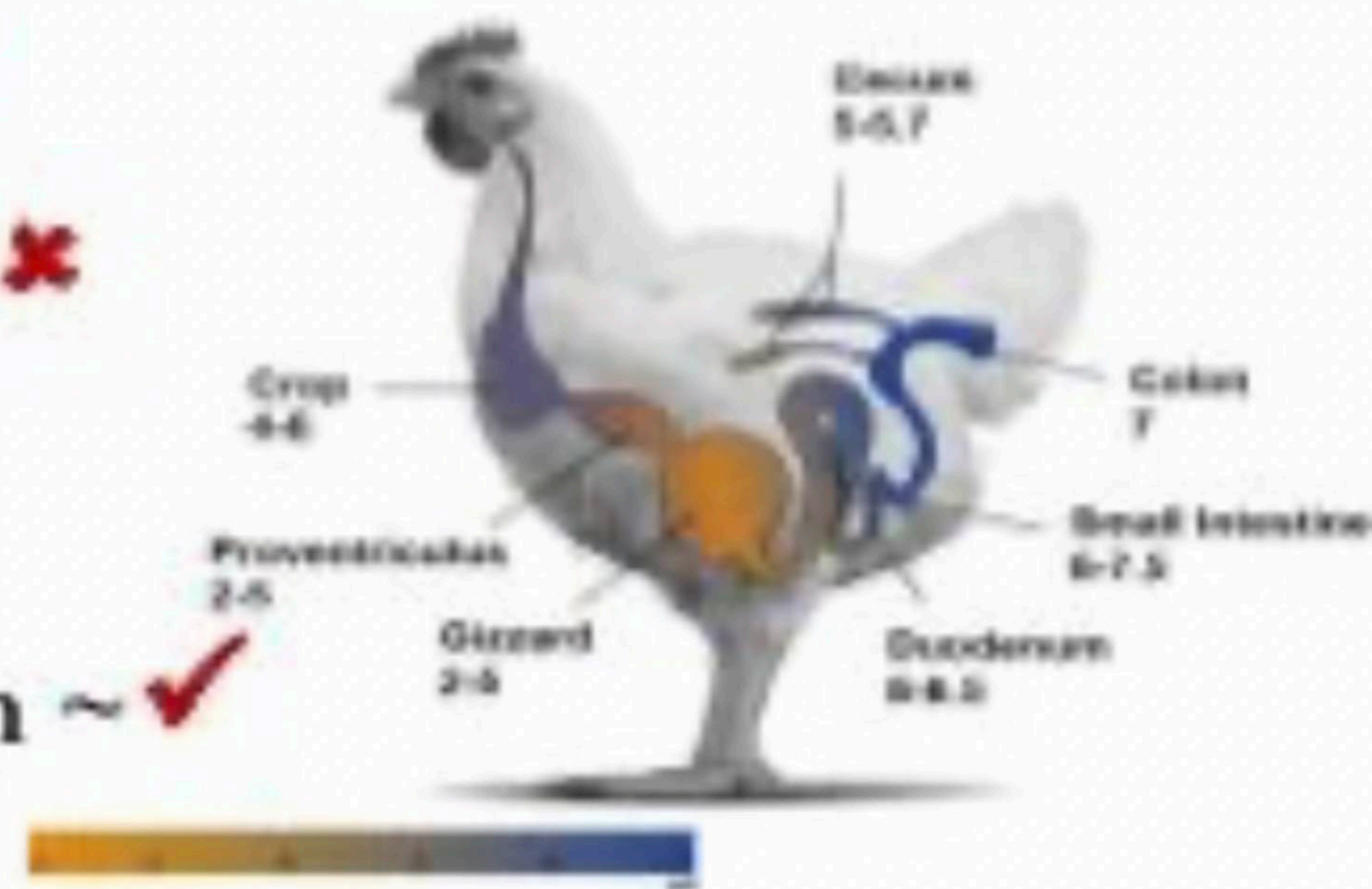
Aromatic oils used so far in poultry production include oils from

- ▶ Turmeric (*Curcuma longa*),
- ▶ Garlic (*Allium sativum*),
- ▶ Oregano (*Origanum vulgare*),
- ▶ Onion (*Allium cepa*),
- ▶ Lemon balm (*Melissa officinalis*),
- ▶ Peppermint (*Mentha piperita*),
- ▶ Rosemary (*Rosmarinus officinalis*),
- ▶ Cinnamon (*Cinnamomum zeylanicum*),
- ▶ Thyme (*Thymus vulgaris*),
- ▶ Ginger (*Zingiber officinale*),
- ▶ Eucalyptus (*Eucalyptus*), and clove (*Syzygium aromaticum*)



Effects of Essential Oils in the Avian Gastro Intestinal Tract

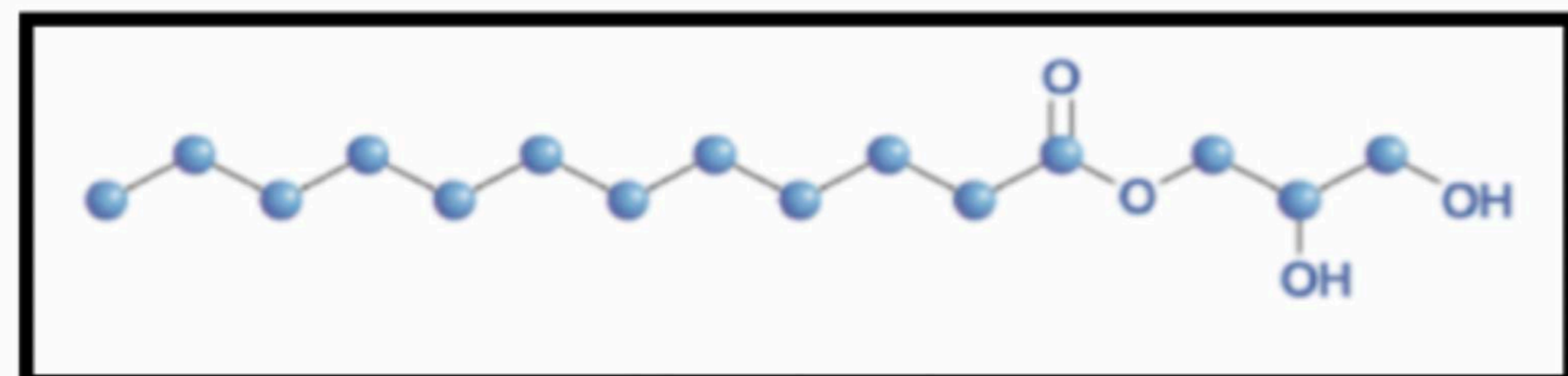
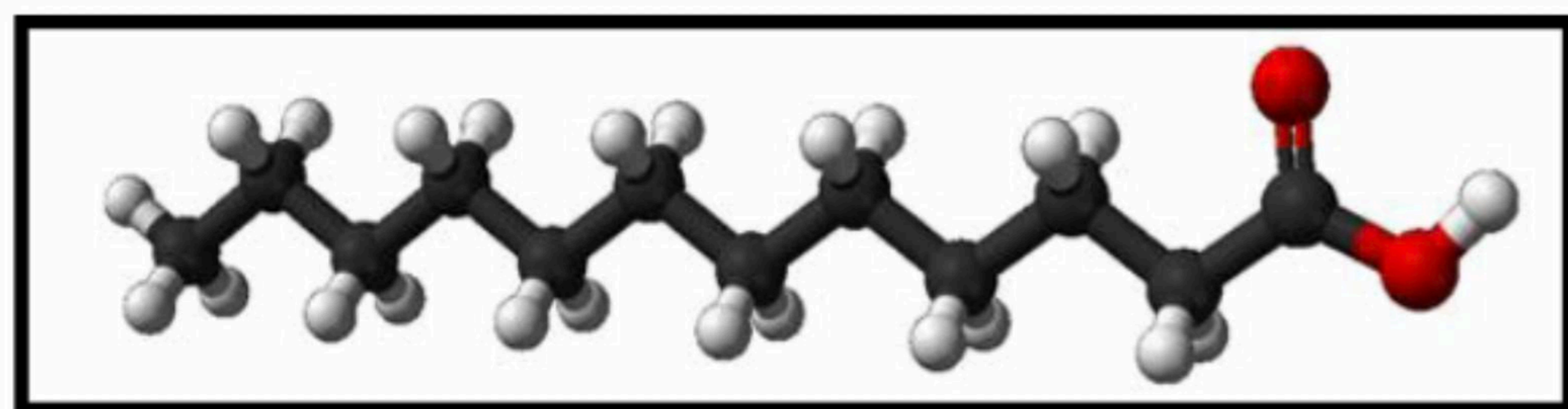
- Intestinal villus development ✓
- Mucin production ✓
- Enterocyte migration ✗
- Intestinal pH ~ ✗
- Pancreas stimulation ~ ✓
- Enzymes



Lauric acid and gut health

- ▶ Different sources of lauric acid could be considered as a suitable alternative to antibiotic growth promoters in the diet of broiler chicken

Lauric acid



Monolaurin



Palm oil and virgin coconut oil