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From the Editor's Desk



Nutrition Management in Poultry

Poultry nutrition involves providing a balance of nutrients that best meets their need for growth, maintenance, egg production, etc. Formulation of balanced diets is fundamental to economical poultry production and this process depends on a knowledge of the nutrient requirements of poultry and the nutritional attributes of nutrient sources.

Poultry diets are made up of a mixture of several different feedstuffs including cereal grains, soybean meal, animal by-product meals, fats and vitamins, mineral premixes, crystalline amino acids, and feed additives. For maximum performance and good health, poultry needs a steady supply of energy, protein, essential amino acids, minerals, vitamins, and most important, water.

We all know the six basic components of poultry nutrition: water, carbohydrates, fats, proteins, minerals, and vitamins. The deficiency of each nutrient can have serious health consequences for Poultry. A diet that combines these elements in the proper proportions will sustain poultry's normal breathing, eating, digestion, growth, reproduction, and egg production.

Some Factors like the reproductive state of birds, their overall health, housing systems, and production goals each entail unique dietary modifications. For example, birds with high production demands—such as daily egg laying—will need a diet rich in protein. On the other hand, a flock experiencing emaciation and weakness needs to be checked for vitamin deficiencies and determine which additives will reverse the negative effects.

Feeding strategy varies for producing layer and broiler bird. The aim of a layer diet is to optimize egg production (in terms of egg numbers, egg size, or egg mass), provide the nutrition required to safeguard health, and maintain the desired body weight. Feeding strategies for broiler chickens will vary depending on the target market for the final product. As the growth of layer birds is very slow, layers cannot be reared for meat production, and hence requirements of protein and energy as compared to broilers is lower.

Bhavana Gupta

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CHR HANSEN

Improving food & health

Probiotics Work With or Without Antibiotics

Christophe Bostvironnois, DVM, Global Poultry Product Manager

John Schleifer, DVM, DACPV, Technical Services Manager - North America

Feed additive antibiotics, including ionophores, are effective in broilers but concerns are increasing as a result of development of antibiotic resistant bacteria and the presence of antibiotic residues in poultry meat. Concurrently, interest in the use of probiotics in broiler production is on the rise. It is known that probiotics benefit poultry through various mechanisms by modulating the microbiome and without the negative connotations associated with antibiotics.

There are regular debates over whether or not probiotics should be used only for Raised Without Antibiotics (RWA) production systems, which include No Antibiotic Ever (NAE) and organic production.

One **MYTH** is that antibiotics provide a performance-enhancing effect by their pure antimicrobial action. Thus, no additional benefit can be achieved with the combined usage of a probiotic and an antibiotic. The misconception is that the mode of action for each of the products is similar and probiotics aren't necessary when an antibiotic is used.

A second **MYTH** is that the simultaneous use of the two products will result in the destruction of the probiotic by the antimicrobial activity of the antibiotic. This also is a misperception or over simplification as to the susceptibility of the probiotic bacteria to the antibiotic. In particular, the spore-forming bacteria probiotics are naturally protected against chemical aggressors (acids) or thermal stress. The non-spore forming probiotics, such as the *Lactobacillus*-based probiotics, could be sensitive. Further sensitivity verification of germinated probiotic bacteria can be analyzed by Minimum Inhibition Concentration (MIC) studies (Table 1).

Table 1. Compatibility of Chr. Hansen probiotics with most common antibiotics.

Antibiotic Name	Therapeutic Class	Recommended in feed Dose (ppm)	<i>B. subtilis</i> MIC (µg/ml)
Bacitracin	Polypeptides	10-50	>800
Colistin	Polypeptides	30-40	160
Lincomycin	Lincosamides	5-20	80
Tiamulin	Pleuromutilin	30-50	>800
Virginiamycin	Streptogramin	5-10	16

The **REALITY** is that Chr. Hansen investigated this question seriously years ago. Over the last 10 years Chr. Hansen has conducted many research studies analyzing the additive value of the combined usage of a *Bacillus*-based probiotic with a feed additive antibiotic. Those results consistently

demonstrate that Chr. Hansen probiotics deliver performance benefits with or without concurrent usage of a feed additive antibiotic, regardless of the type of antibiotic fed (Table 2).

The **REAL** explanation resides in the different and unique modes of action of effective and ethical *Bacillus*-based probiotics.

Mechanisms of action proven to be associated with these products are: Competitive exclusion (direct and/or indirect), immuno-modulation, bacteriosin production, and enzyme production.

Competitive Exclusion:

Competitive exclusion is a probiotic mode of action that can occur via several different mechanisms. The direct mechanism is the basic space-occupying effect of the probiotic on intestinal cells. The result is less space for pathogenic bacteria to populate the gut. The indirect mechanism is through the production of secondary metabolites which affect the immediate environment of the probiotic bacteria. These metabolites result in the proliferation of lactic acid-producing bacteria, which benefit the intestine.

Bacteriocin or antimicrobial peptide production:

Effective *Bacillus*-based probiotics produce antimicrobial substances that inhibit the growth of pathogens. Growth inhibitory and/or bacteriocidal effects against certain poultry pathogens have been described, based on *in vitro* analysis of a number of probiotic bacteria. Probiotic strains of *Bacillus* spp. are shown to be especially effective (Svetoch et al., 2005; Teo and Tan, 2005; Latorre et al., 2016; Poormontaseri et al., 2017).

A Case Study: *Bacillus licheniformis* and bacteriocin effects

Bacillus licheniformis produce lichenysin (antimicrobial peptide). However, it is known that other *Bacillus* species produce bacteriocins or bacteriocin-like substances, such as subtilin and coagulins.

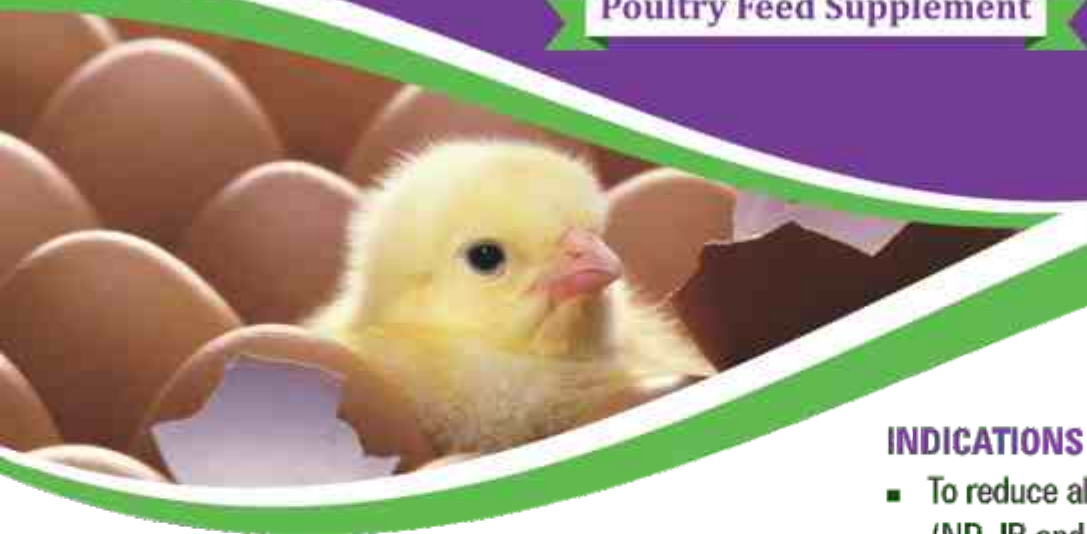
Bacteriocins are cationic (positive charged) peptides that display hydrophobic or amphiphilic properties and, in most cases, the bacterial membrane is the target of their activity. Several models have been proposed demonstrating the mechanism of action of these cationic peptides. The thrust of this action involves the formation of channels through which ions can pass and (or) the disruption of bacterial cytoplasmic membranes. This has a lethal effect on bacteria via the formation of pores in the bacterial membrane. The three principal steps required for this effect are: 1) binding of peptides to the bacterial membrane 2) peptide aggregation within the membrane 3) formation of channels.

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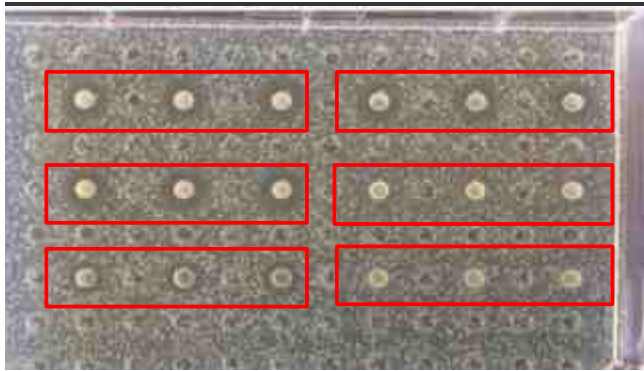
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Bacteriocins must cross the negatively-charged outer wall of Gram-negative bacteria, which contains lipopolysaccharides (LPS), or the outer cell wall of Gram-positive bacteria, which contains acidic polysaccharides.

Recently, Chr. Hansen discovered a combination of *Bacillus* strains, the first to demonstrate the inhibition of Gram-negative bacteria such as *Salmonella* spp. and *Escherichia coli* (Figure 1).

Figure 1. Example of direct *in vitro* pathogen inhibition of GALLIPRO® Fit against *S. Typhimurium*.



Enzyme production:

Bacillus-based probiotics can be a factory of digestive enzymes. Those enzymes are released in the intestinal content by the germinated probiotics. Once released they will continue to act locally, transforming the undigestible nutrients into digestible nutrients. Many of these enzymes are summarized in the table below.

Table 2. Example of enzymes produced by *Bacillus subtilis*.

Enzymes produced by <i>B. subtilis</i> determined by ApiZYM and API20E	Substrate
Alkaline phosphatase	Phosphorus (LPS of Gram neg. bact)
Estearase (C4)	Fat
Estearase lipase (C8)	Fat
Leucine arylamidase	Protein
Cystine arylamidase	Protein
Acid phosphatase	Phosphorus
α-galactosidase	NSP*
β-galactosidase	NSP*
α-galactosidase	Carbo**
β-galactosidase	NSP*

*NSP: non-starch polysaccharides **Carbo: other carbohydrates

Source: Chr. Hansen, Innovation CD News M1006

The practical differences between antibiotics and probiotics

Probiotics have a versatile and dynamic mode of action

Antibiotics are chemical molecules acting effectively on specific types of bacteria. Depending on the therapeutic class, the antibiotic affects either the bacterial cell wall, the cellular protein synthesis, or DNA synthesis of the bacteria. Probiotics can have a similar mode of action, (ex: lichenysin of *Bacillus licheniformis*). However, other beneficial effects on intestinal health associated with probiotics are absent with antibiotics. For instance, antibiotics do not modulate the intestinal immune system. Antibiotics do not produce enzymes that can digest the undigestible. Antibiotics do not occupy space on intestinal cells, thereby naturally excluding pathogen attachment.

There is no need for probiotic rotation

Long-term usage of antibiotics may result in antibiotic resistance by pathogens. This complicates the choice for poultry specialists and results in frequent rotation. Chr. Hansen continually evaluates the efficacy of our strains with pathogen inhibition assays. So far, there is no development of resistance or acquisition of resistance genes by pathogenic bacteria in relation to a probiotic being used as a feed additive.

Chr. Hansen probiotics are proven to have a complementary efficacy to antibiotics

Covering a span of over 10 years, Chr. Hansen has completed many research studies on the combined usage of their probiotics with commonly used antibiotics (Table 3). Studies consistently show an additive effect of probiotics with antibiotics. MIC (Minimum Inhibitory Concentration) studies show compatibility between feed additive antibiotics and Chr. Hansen probiotics. These effective probiotics can be used in RWA or NAE production systems, as well as conventional production systems which utilize feed additive antibiotics, including ionophores.

Table 3. Summary of 10 years of Chr. Hansen research on combined use of probiotics with antibiotics and ionophores.

Year	Institute	Probiotic Tested	Antibiotics Used	Combination Effect of Probiotic/Antibiotic on:			Combo Effect
				Weight	FCR	Mortality	
2005	Customer Experience, BR	GalliPro® GalliPro®MS	Avilamycin 10ppm Lasalocid 60ppm (S/G) Monensin 100ppm (F)	Yes	Yes	Yes	Yes
2010	Auburn University, Alabama, US	GalliPro® GalliPro®Tect	Virginiamycin 5ppm Monensin 90ppm	Yes	Yes	Yes	Yes
2010	University of Viçosa, BR	GalliPro®	Salinomycin 55ppm Bacitracin 50ppm	Yes	Yes*	=	Yes
2010	Southern Poultry Research, Georgia	GalliPro® GalliPro®Tect	Salinomycin 60ppm BDM 50ppm	Yes*	Yes*	NA	Yes
2010	Southern Poultry Research, Georgia	GalliPro® GalliPro®Tect	BDM 50ppm (S/G) Virginiamycin 20ppm (F)	=	Yes*	NA	Yes
2014	Chinese Academy of Agri. Sciences	GalliPro®	Virginiamycin 20ppm	Yes	Yes	Yes	Yes + (Yield)
2015	Bangladesh Agri. University	GalliPro®	Lincomycin 15ppm	Yes	=	No	Yes + (Yield*) under Heat stress challenge)
2016	Masagounder et al.	GalliPro®	Virginiamycin 5ppm BDM 50ppm Monensin 80ppm	Yes*	Yes*	NA	Yes (both Ross and Cobb*)

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Nutritional Management Strategy For Economic Poultry Farming In India

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Introduction

Poultry farming is an important livestock subsector. It not only provides solution for unemployment and malnutrition but also augments rural economy. This is evident from the fact that India ranks 3rd in egg production and 5th in poultry meat production. Additionally, the Indian poultry market has reached an appreciable value of INR 1,988 billion in 2020 and is predicted to grow at CARG of 15.2% in 2021-2026. The market is composed of three segments namely backyard poultry, small and marginal poultry entrepreneurs and commercial poultry players. Backyard poultry is a key component of rural household as it not only fulfills the nutritional requirement of rural households but also has the potential in adding the crucial little to the income. Commercial poultry indicates the growing market that is driven by increasing demand and supply. Tucked in between are the small and marginal poultry entrepreneurs that are crucial links in the overall supply chain of the poultry market in India. These entirely different segments co-exist and complement each other

thereby making the Indian poultry market a unique sector.

India has witnessed the escalation of poultry sector from backyard farming into a techno- commercial industry due to involvement of various key players as well as an appreciable investment in breeding, hatching and rearing. This advancement in the structure and operation can be accredited to the rising eggetarian and non-vegetarian population as well as increase in the proportion of health-conscious individuals in our society. Apart from this, it is predicted that the production and consumption will increase in upcoming years due to various factors such as shift in food habits, urbanization, rise in income etc. Despite the overall growth in poultry sector one significant area that needs utmost attention for increased productivity and profit is the nutrition management of poultry. The high feed cost limits poultry productivity. In addition, limited supply and poor quality of the feed hampers optimal poultry production in our country. The reason is mainly attributable to the diverse eco-regions of the country characterized by extreme or scarce rainfall. All these factors in turn result in low protein intake by humans which poses serious health issues. Therefore, the role of feed management in poultry farming is gigantic.

Current scenario of feed resources

Success of poultry industry is



primarily reflected by the quality of individual bird, managerial conditions provided to them, quality of feed provided to the birds and feed conversion efficiency of the breed employed. Of all these, quality of feed being the most expensive input deserves most crucial attention. Feed accounts for 65-70% of broiler and 75-80% of layer production cost. The most popular cereal used for poultry is maize which is used along with protein rich soybean meal. The increase in availability of maize is significantly below the production rate of meat and eggs. This necessitates the need for increasing maize and soybean production along with exploring the usefulness of alternative energy and protein rich meals in poultry diet. To meet the demand of increasing poultry industry and filling the huge gap between demand and availability of poultry feed, more scientific and holistic approach is needed. These

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approaches have been briefly enlisted below.

- Cereals and oil seeds which are conventional poultry feed are in direct competition with human food. With growing urbanization and decrease in agricultural land, the production of cereals and grains is not increasing at the same pace as required by the growing human population. Subsequently the availability of grains and oil seed meal is expected to decrease for the poultry industry. This escalates the cost of feed ingredients and consequently the cost of eggs and meat. This in turn may decrease the consumption of poultry products by poor section of the society impairing their protein intake. This vicious cycle goes on and on. Identification of new feed resources can solve this problem.
- Developing strains that are efficient feed convertors can also be beneficial in decreasing cost of poultry production.
- A more wholesome approach is to find for alternate and sustainable feed ingredients that are not consumed by human population and are available in plenty.
- Another strategy is utilizing technological advancements related to feed processing that allows poultry to utilize structural carbohydrates and phytate phosphates. This reduces their dependency on stored plant nutrients such as β -glycans, pentosans, mannans, cellulose, lignin and phytic acid which not only are indigestible by poultry but also generate digestive stress to them leading to wet litter

problems. Solution to this is use of feed enzymes.

- There are various technical and socioeconomic factors that constraints the use of agro industrial byproducts and unconventional feed stuff in practical formulations despite their immense potential. These constraints can be resolved by the feed industry with the help of scientists, planners and policy makers.
- Errors in mixing feed, nutritional imbalance, inadequate storage, improper handling of raw feed ingredients and loss of potency are likely causes of nutritional deficiency disorders in poultry. This leads to poor performance of the individual birds as well as the flock without manifestation of any clinical symptoms. Therefore, such errors should be minimized in feed industry.
- Inadequate knowledge of poultry nutrition

Strategies to reduce feed cost for economic poultry farming

Profitability and production efficiency of poultry enterprises is increased by reduced feed costs. These targets can be achieved by scientific feeding and management strategies. These strategies are enlisted below:

1) Timed feeding of broilers:

Broilers are fed ad lib to allow them achieve market weight in shorter time period. However timely feeding is recommended where the birds are fed specific amount of feed 4-6 times a day and then held without feed for an hour. This is beneficial as:

i) It reduces mechanical stimulation of feed intake which is routinely seen if the feeders are run throughout the day.

ii) During the time when birds are not provided with feed, they remain calm and quiet. This helps in better utilization of feed due to less requirement of maintenance feed.

2) Amino acids and enzyme supplements:

Protein is an expensive feed ingredient in feed ration and therefore is of great economic importance particularly in protein deficient tropical countries such as India. Therefore, the ration should be formulated in a way that at least optimal level of production is achieved without much expenditure on feed. The real benefit of increase in protein is usually limited to an increase of approximately 0.025% of lysine and methionine. Equivalent advantage can be gained by addition of 250g synthetic lysine and methionine per tonne of feed. Fortunately, with recent advancement in biotechnology, availability of such synthetic amino acids has become feasible which makes such an approach achievable.

Enzymes play vital role in enhancing feed utilization and reducing feed cost. For example, enzyme phytase releases some indigestible phosphorus and reduces its excretion thereby minimizing the need and cost of phosphorus supplementation. Another enzyme protease effectively releases protein anti nutrients in feed ingredients such

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Salmonella

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E. Coli

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Clostridium Perfringens

Type A, C, B, D, E

Staphylococcus Aureus





as soybean. Also, enzymes amylase and xylanase increase the available energy by 3-5% in birds when included in the diet.

3) Control of feed wastage: There are various ways through which feed is wasted without being utilized by the bird. These routes of feed wastage are burden on the economy of poultry farms and include:

- i) Design of feed trough: Due to availability at low price and resistance to physical damage, elongated troughs made of galvanized metal are typically used in poultry farms. These troughs elevate the problem of feed wastage and therefore should be replaced by pan or chain feeding system.
- ii) Level of feed in feeders: Feed should be adjusted and maintained at a certain level and overfeeding of the feed trough should be avoided.
- iii) Beak trimming: Birds with long beaks play with the feed which leads to spillage of feed. Once the feed gets mixed with the bedding material, it is not consumed by the bird. Therefore, beak trimming is necessary not only to avoid feed spillage but also to prevent certain vices such as cannibalism.
- iv) Control of rodents and wild birds: Infestation of the farm with rodents and wild birds hinders with feed utilization. Tonnes of feed can be lost in a year with only 50 rats in the farms. Hence proper care should be taken to control them. Using feed silos can protect the feed from their invasion.
- v) Feed spoilage: Feeds that are not processed properly are prone to

ENERGY SOURCES

- Deoiled seed meal
- Tapioca meal
- Dried poultry waste
- Molasses
- Small millets

VEGETABLE PROTEIN SOURCES

- Mustard cake
- Soyabean meal
- Sesame meal
- Cluster bean
- Sunflower seed meal
- Safflower meal
- Ramtil cake

ANIMAL PROTEIN SOURCES

- Blood meal
- Liver residue meal
- Silkworm pupae meal
- Feather meal
- Poultry by-product meal
- Hatchery by product meal

spoilage and mould growth. In addition, tropical region where the climate is hot and humid favors mould growth. To prevent this problem, 0.5% of calcium alumino silicate can be added to the feed without deteriorating the health of birds. Additionally, usage of silos can alleviate the problem of feed spoilage.

4) Use of flavoring agents: Several experiments have been conducted to test the effect of feed flavors in birds. The results indicated that birds receiving flavoring agents were 8 grams heavier than the control birds at four weeks of age and 3 grams heavier at eight weeks. In addition, improvement in feed conversion was also witnessed which resulted in saving tonnes of feed.

5) Use of non-conventional feed: Non-conventional feed refers to feed not used traditionally for feeding purpose. There are wide varieties of NCF that have been enlisted below. They are mainly

organic in nature and their economic value is less as compared to their cost of collection and transportation. Some of these feed resources may contain anti nutrients and toxic factors therefore they should be properly processed and used as supplement to overcome the limited feed resources.

Conclusion

Shortage of feed resources is an alarming situation in poultry industry that needs to be taken care of by efficient nutritional management. There exists a significant gap between the need and availability of feed resources that needs to be filled by various strategies such as use of non-conventional feed, flavoring agents, protein and enzyme supplements. Currently these options are not being exploited to the fullest for inclusion in poultry ration. However, with advent of knowledge and new discoveries, the future challenges will be faced to enhance the prosperous future of poultry production in India.

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“

Incorporation of **betaine** in pig diets also leads to a **reduction in the maintenance energy requirement of the animal.**

Enzyme production

A possible reason for observing an improved digestibility of nutrients, is an influence of betaine on enzyme production. In a recent in vivo study regarding the effect of betaine supplementation in weaned piglets, the activities of digestive enzymes (amylase, maltase, lipase, trypsin and chymotrypsin) in digesta were evaluated (Figure 1). All enzymes, except for maltase, showed an increased activity and the effect of betaine was more pronounced at 2,500 mg betaine/kg feed than at 1,250 mg/kg. An increased activity could be a result of higher enzyme production, but also by improving the catalytic efficiency of the enzymes.

In an in vitro trial, it was demonstrated that by the addition of NaCl to create hyperosmolarity, trypsin and amylase activity are inhibited. The inclusion of different levels of betaine in this test restored the inhibitory effect of NaCl and increased enzyme activity. However, when no NaCl was added to the buffer solution, betaine inclusion did not influence enzyme activity at lower concentration but did show an inhibitory effect at relatively high concentration.

Reduced maintenance energy

Not only an increased digestibility can explain the reported improved growth performance and feed conversion in pigs supplemented with dietary betaine. Incorporation of betaine in pig diets also leads to a reduction in the maintenance energy requirement of the animal. Hypothesis for this observed effect is the reduced need for ion pumping, an energy requiring process, when betaine is available for maintaining the intracellular osmolarity. Under conditions where energy intake is limiting, effects of betaine supplementation are therefore expected to be more pronounced, by increasing the availability of energy for growth instead of maintenance.

Intestinal structure

The epithelial cells lining the intestinal wall, need to cope with highly variable osmotic conditions, generated by the luminal content during nutrient digestion. Meanwhile, these enterocytes need to control the exchange of water and different nutrients between the intestinal lumen and the plasma. To protect the cells against these challenging conditions, betaine is an important organic osmolyte. When looking at the betaine concentrations in different tissues, the intestinal tissue contains considerably high betaine levels. Moreover, it was observed that these levels can be influenced by dietary betaine concentration.

Well balanced cells will have a better proliferation and good resilience. Accordingly, researchers found that increasing betaine levels in piglets increased duodenal villus height and ileal crypt depth, and that the villi were more uniform.

In another study an increased villus height could be observed in duodenum, jejunum and ileum, without influence on the crypt depth. The protective effects of betaine on intestinal structure might be even more important under specific (osmotic) challenges, as observed in broilers infected with coccidia.

Gut barrier effect

The intestinal barrier mainly consists of epithelial cells, attached to each other by tight junction proteins. The integrity of this barrier is fundamental to prevent the entry of harmful substances and pathogenic bacteria that otherwise will cause inflammation. In pigs, a negative effect on the gut barrier is recognized as a result of mycotoxin contamination of feed, or as one of the negative impacts of heat stress. To measure the influence on the barrier effect, in vitro tests on cell lines, measuring the trans-epithelial electrical resistance (TEER), are often used. With the application of betaine, an improved TEER could be observed in multiple in vitro experiments. When cells are exposed to high temperatures (42°C), there is a decrease in TEER (Figure 2). The addition of betaine in the growth medium of these heat exposed cells, counteracted the decreased TEER, indicating an improved heat resistance.

Additionally, in vivo research in piglets, measured an increased expression of tight junction proteins (occludin, claudin1 and zonula occludens-1), in the jejunal tissue of animals on a diet with 1,250 mg/kg betaine compared to control. Also, the marker for intestinal mucosal injury, diamine oxidase activity in plasma of these pigs was significantly lower, indicating a stronger gut barrier. When betaine was supplemented to the diet of growing finishing pigs, an increased gut tensile strength was measured at slaughter.

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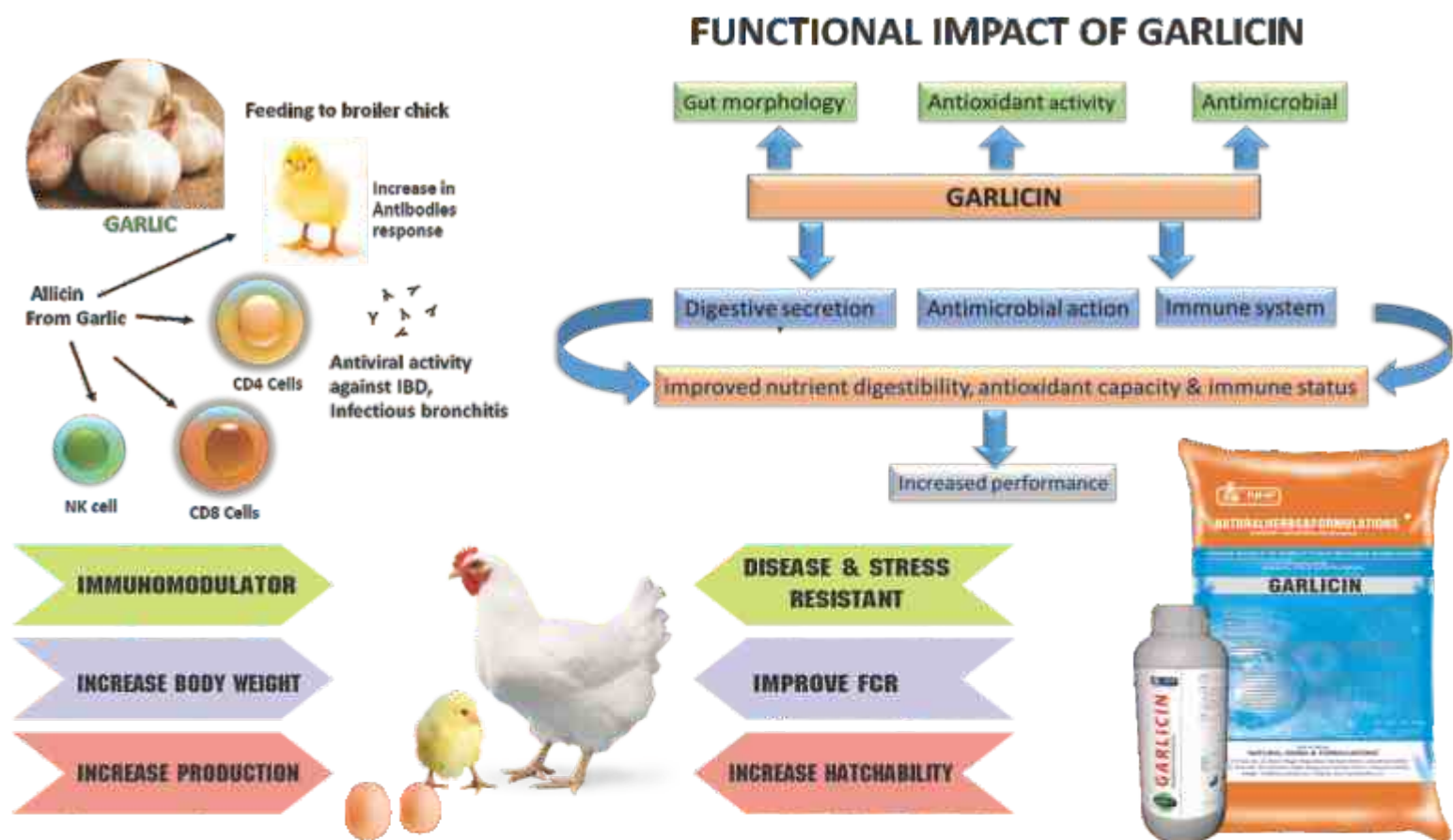
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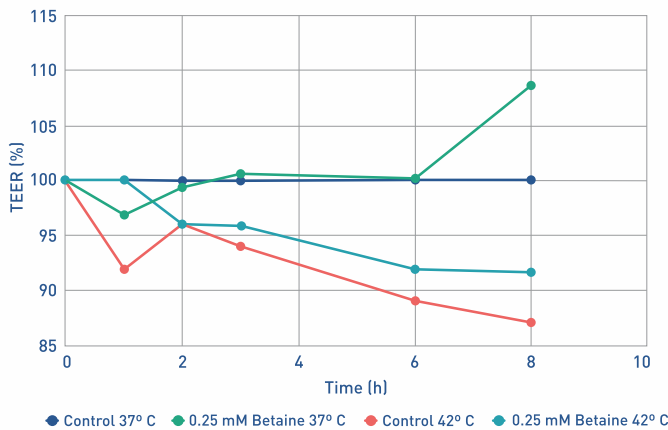
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Antioxidative effects:

Lately, some studies link betaine to the antioxidative system and describe reduced free radicals, lower malondialdehyde (MDA) levels and improved glutathione peroxidase (GSH-Px) activity. A recent study in piglets showed an increase in GSH-Px activity in jejunum, while MDA was not influenced by dietary betaine.

Microbiota

Betaine not only acts as an osmoprotectant in animals. Also multiple bacteria can accumulate betaine by de novo synthesis or by transport from the environment. There are indications that betaine can have a positive effect on the bacterial population of the gastro-intestinal tract of weaned piglets. Total ileal bacterial numbers, and specifically the number of bifidobacteria and lactobacilli, were increased. Also, lower numbers of enterobacteria were found in the faeces.

Decreased diarrhoea rate

A last observed effect of betaine on gut health in weaning piglets, is a decrease in diarrhoea rate. This effect could be dosage dependent: Dietary supplementation of 2,500 mg/kg betaine was more effective than 1250 mg/kg in decreasing the diarrhoea rate. However, performance of weaned piglets was similar at both supplementation levels. Other researchers already showed lower diarrhoea rates and morbidity in weaned piglets when betaine was supplemented at 800 mg/kg.

Betaine hydrochloride (HCl) as acidifier

Interesting food for thoughts to end, is the potential acidifying effect of betaine hydrochloride as a source of betaine. In human medicine, betaine HCl supplements are available, often in combination with pepsin, to support people with stomach problems and digestive troubles. Betaine HCl serves in this case as a safe source of hydrochloric

acid. Although no information is available about this property when betaine HCl is included in piglet feed, it could be of great importance. For the young weaning piglet, it is known gastric pH can be relatively high (pH>4), impairing the activation of the protein degrading enzyme pepsin from its precursor pepsinogen. Optimal protein digestion is not only important for a good availability of this nutrient for the animal. Moreover, indigested protein leads to an unwanted proliferation of opportunistic pathogenic bacteria, and increases problems with post-weaning diarrhoea. The low pKa value of approximately 1.8 for betaine, leads to the dissociation of betaine HCl after ingestion, resulting in an acidification of the stomach.

That transient reacidification was already observed in a pilot study in humans and in a study in dogs. After a single dose of either 750 mg or 1500 mg betaine HCl, gastric pH of dogs previously medicated with a stomach acid reducing agent, severely dropped from an approximate pH 7 to pH 2. In the unmedicated control dogs, however, the stomach pH level was approximately 2, independent of the supplementation with betaine HCl.



A last observed effect of betaine on gut health in weaning piglets, is a decrease in diarrhoea rate.

Betaine benefits gut health

Betaine positively influences gut health of weaning piglets. This review of literature highlighted different opportunities for betaine to support nutrient digestion and absorption, improve the physical barrier of protection, impact microbiota and enhance piglets defence.

References available on request (maele@orffa.com).

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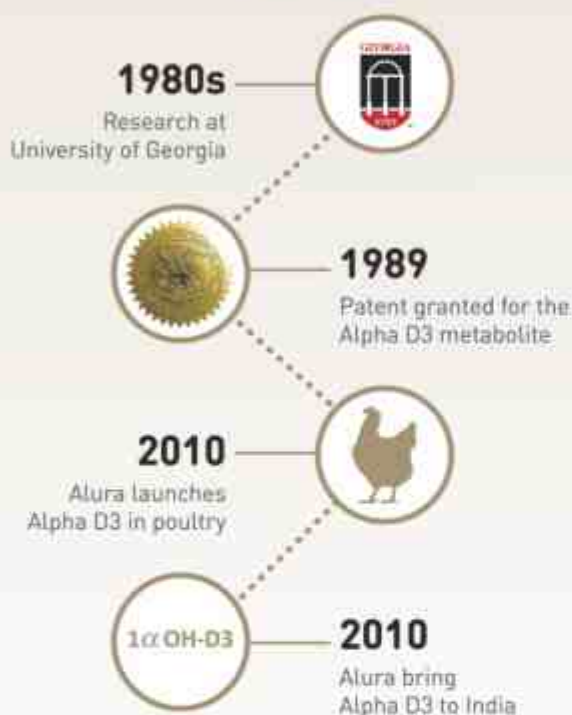
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Non-Antibiotic Way to Check Diarrhea In Poultry Birds

Dr. Vandana Sharma, Dr. Asra Khurshid

Technical Manager, Nutricare Life Sciences,

Email Id- vandana.sharma@nutricare.in

Consultant, Nutricare Life Sciences



Dr Vandana Sharma

Poultry production has grown dramatically over the last four decades in its quest to reach a sustainable level of production, but the sector still faces numerous challenges, including diseases, high feed costs and the indiscriminate use of antibiotics. The indiscriminate use of antimicrobials leads to drug resistance that threatens the health of both animals and humans. Antimicrobial resistance in food animals has a significant impact on animal health and may be associated with resistant infections in humans. Because of these challenges, developed world was compelled to ban use of antibiotics as growth promoters and the developing world is following in pursuit. The usage of antibiotics for treatment purposes is indispensable and the major challenge before the world is researching for alternatives to usage of antibiotics. Phytogenics has emerged as an efficient and effective alternative to antibiotics. The plants and plant derivatives have been used to promote healthy gut and prevent dysbiosis.

Gut health is the most important factor for sustainable production that combines diet, microbiology, immunology, and physiology. When gut health is damaged, digestion and nutrient absorption are disturbed, which has a negative impact on feed conversion, resulting in financial loss and increased

disease susceptibility. The gastrointestinal (GI) tract of poultry harbor a diverse and complex microbiota that plays a vital role in digestion and absorption of nutrients, immune system development and pathogen exclusion. However, the integrity, functionality, and health of the poultry gut depend on many factors including the environment, feed, and the GI microbiota.

Intestinal microbiota is considered crucial that plays an integral role in maintaining the health of poultry by modulating several physiological functions including nutrition, metabolism, and immunity. The digestive process is strongly linked to gut microbiota, nutrient absorption, feed digestibility, energy harvest and therefore productivity are influenced by microbiota composition and diversity. The intestinal bacterial population forms a protective barrier that borders the gut, preventing the growth of bacteria that are less friendly or harmful, such as Salmonella, Campylobacter, and Clostridium perfringens. Through competitive exclusion the commensal bacteria dominate attachment sites on gut cells, decreasing pathogen attachment and colonization opportunities. Some bacteria may release substances such as volatile fatty acids, organic acids, and natural

antibacterial compounds (bacteriocins) that either impede the growth of less desirable bacteria or render their environment unsuitable for them. Intestinal epithelia form tight junctions that are critical to the physical intestinal barrier's function, regulating the paracellular passage of ions, solutes, and water across the intestinal epithelium. One of the most important roles of the tight junctions structure is to provide a physical barrier to luminal inflammatory molecules. Impaired integrity and structure of the tight junctions barrier result in a forcible activation of immune cells and chronic inflammation in different tissues.

Violation in gut health results in diarrhea and is one of the most common challenges to poultry. As birds urinate and defecate in one motion, normal chicken droppings should be firm and brown with a white area on top made by urates (the chicken's urine). Any yellow frothy or bloody droppings are considered abnormal. Various causatives of diarrhea include Coccidia, Worms, Viruses like rotavirus and adenovirus, Bacteria like Salmonella and E. Coli, Kidney problems or Imbalanced diet. Diarrhea has a number of negative consequences. Birds become lethargic and lose weight due to less nutrient absorption. Gut is unable to absorb as much water, as it should,

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producing dehydration, which can lead to death. In severe circumstances, bacteria or toxins will be able to escape the gut and enter the bloodstream, resulting in blood poisoning and death. Diarrhea causes the feathers surrounding the back end to get dirty and matted, as well as moist and polluted bedding. The diarrhea results in loss of economic traits in the form of reduced body weight gain, followed by increased FCR and expenses on chemoprophylaxis. There is a greater challenge from chemoprophylaxis in the form of antibiotic resistance. Diarrhea causing bacteria with resistance genes can survive and thrive under selective environmental pressure caused by the presence of antimicrobial agents. The risk of antibiotic-resistant strains being transferred from animal species to the environment and people via direct or indirect interaction with animal-derived food is an extremely dangerous consequence of their creation. Many *E. coli* strains are resistant to β -lactam antibiotics (Ampicillin and Amoxicillin with Clavulanic acid), Aminoglycoside antibiotics (Gentamicin), Fluoroquinolones, and combination preparations comprising Trimethoprim due to the careless use of antibacterial medicines in animals. To avoid this greater risk and to reduce these losses, phytogenics is an effective and novel way that not only contains the losses but optimizes the production as well.

Phytogenics is the usage of phytochemicals for promoting health and containing diseases. Plants produce a wide range of phytochemicals with a wide range

of bioactivities, including phenolics, polyacetylenes, alkaloids, polysaccharides, terpenoids, and essential oils. Essential oils have the potential to promote gut health due to the inclusion of active compounds such as thymol, carvacrol, and eugenol, as well as the fact that they have no known negative effects. Pathogens' membrane permeability is altered by thymol and eugenol, resulting in intracellular content leakage. Furthermore, when thymol, carvacrol, and eugenol are combined, they have synergistic or additive antibacterial properties, even at low concentrations. They have high activity against pathogenic bacteria such as *E. coli*, *Clostridium perfringens*, and *Salmonella* strains, but have moderate activity against helpful *Lactobacillus* strains, encouraging eubiosis in poultry guts. Researchers are advocating the usage of herbal compositions to avoid antibiotic resistance and to promote healthy gut. These compositions have herbs like *Aegle marmelos*, *Punica granatum*, *Holarrhena antidysenterica*, *Cyperus rotundus*, *Tinospora cordifolia* that effectively control diarrhea.

It has been deciphered that the essential oils in these herbs causes the bacteria's cell membrane to disintegrate, allowing ions to migrate outside of the cells. Phenolic chemicals increase the manufacture of interferon by increasing macrophage phagocytic activity and the number of activated B and T cells. The active compounds in *Aegle marmelos*, such as Marmelosin and Aegelenine, have antibacterial and

antifungal properties. Punicalagin and elagic acid found in *Punica granatum* has anti-diarrheal properties. Alkaloids namely, conessine, conkurchine, kurchine, holarrhemine, holarrhenine, kurchicine, and conkurchinine of *Holarrhena antidysenterica* are anti-diarrheal in action. They effectively control loose motions, constipation, flatulence, abdominal cramping, diminished appetite, and mucus in stools related like clinical amoebiasis and giardiasis. It has been discovered to help with the issues created by magnesium chloride, such as footpad lesion, high litter and faecal wetness, and poor faecal consistency, which are all symptoms of wet litter. Cyperene, Beta-Scliene, and Cyperone, all derived from the *Cyperus rotundus* plant, are effective against diarrhea-causing pathogens. Tinosporine, cordifol, heptacosanol, Berberine, and palmatine are phytoconstituents from *Tinospora cordifolia* with gastro protective and antidiarrheal properties. It is also used as a chologogue and anti-stress supplement. Garlic and its sulphur components, allicin, alliin, ajoene, diallylsulphide, dithiin, and allylcysteine, have been shown to have broad antibacterial activity, which can help to eradicate the detrimental effects of microbial infections. *E. tenella* sporulation is effectively inhibited by the compound allicin. It can be well understood that the herbal compositions may provide an effective alternative to use of antibiotics for checking diarrhea, however the field needs more

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Maintaining Water Quality Vital For Flock Performance.

Dr. V. Rajendra Prasad

Poultry Consultant



1. Water is often the forgotten nutrient but plays a very important role in unlocking genetic potential.
- a) Water quality and management of the system supplying water to the birds is vital to ensuring optimum flock performance.
- b) Water constitutes about 55% to 75% of body weight in poultry birds and is considered as one of the most important nutrients for their growth and development.
2. On an average, birds consume twice the amount of water as feed on weight basis.
3. Water quality challenges can have detrimental effects on the normal physiology of the birds resulting in reduced performance.
4. Drinking water for poultry arrives from different sources posing a serious threat to the quality of water due to the presence of a wide variety of
 - a) bacterial contaminants,
 - b) inorganics
 - c) or other pollutants,which directly or indirectly affect the overall performance and health of birds.
5. Hence, maintaining and providing good quality water is essential for the efficient development of birds in terms of health and nutrition.
6. Water quality is evaluated by several criteria such as
 - a) total alkalinity,
 - b) hardness,
 - c) total dissolved solids (TDS), etc.,
7. But the primary and most important parameters in poultry are
 - a) pH,
 - b) hardness
 - c) and microbiological analysis.
 - d) TDS
8. Ideal parameters in Poultry drinking water:
 - a) ideal pH between 6 to 6.5
Hardness increases pH of water.
 - b) hardness between 60 – 180 ppm
 - c) TDS: Less than 1,000 is desirable and No serious burden to any class of poultry.
 - between 1,000 to 2,999 is Satisfactory.
 - d) microbiological analysis:
To be considered acceptable, water should contain less than 100 CFU/ml of coliforms and less than 100,000 CFU/ml of total bacteria.
- e) There should be no Salmonella contamination in the drinking water.
- d) and microbial count of less than 1000 colonies forming units (cfu) /ml is optimum for poultry drinking water.
9. Hard water has higher concentrations of dissolved minerals, such as calcium and magnesium.
 - a) High levels of magnesium sulfate (MgSO₄) may cause an increase in water consumption, wet droppings, and a drop in production & thin shelled eggs.
 - b) Extreme hardness may diminish the effectiveness of water-administered medications, disinfectants, and cleaning agents.
 - c) Water is softened by removing these minerals, either mechanically or chemically.
10. RO water purifiers are used in few Poultry farms where hardness and TDS is on higher side due to ground water.
 - a) Main disadvantage is wastage of water up to 50%.
 - b) 10% of water is being used for cleaning and washing.
 - c) Remaining 40% of water is used for gardening and agriculture purpose in few farms.
 - d) This RO method is more viable in Poultry farms where underground water is adequate and sufficient.
11. TDS include inorganic and organic substances that cannot be filtered through a filter paper.
12. The main risk with closed water systems is the build-up of a biofilm which typically is not visible.
 - a) This biofilm is a thick mucus (slime) secreted by bacteria which builds up on the inside of a waterline if the system is not managed properly.
 - b) This biofilm can cause flock health challenges as it harbours bacteria such as E. coli and salmonella.
 - c) Biofilms are also difficult to remove and require mechanical action to remove them from the water system.
 - d) They may also block nipples or cause them to leak.
13. A robust cleaning and sanitising programme during a turnaround is recommended to prevent biofilms.
14. Flush water lines regularly
A high pressure flush should be performed on water lines between each flocks.
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15. Please use DT Smart of Huvepharma which is a alkaline detergent for cleaning of pipes , feeding systems and cleaning machines between flocks.
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 - b) High descaling and degreasing power.
 - c) dissolves organic matter and mineral deposits.

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Bioflavonoids – Natural Antioxidants for Growth and Productivity Improvement in Poultry

Dr. Sekhar Sushil Basak

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Food producing animals are highly prone to oxidative stress because of genetic selection for their growth rate and productivity and because of the environmental conditions in which they are reared. Oxidative stress has significant impacts on growth & performance and meat quality & safety. As such, antioxidants are often added to their diets to prevent oxidative stress and to ensure the quality and safety of the meat. Bioflavonoids are the biggest group of natural antioxidants having strong potential for application in livestock nutrition.

What are Bioflavonoids?

Bioflavonoids are natural-origin, bio-active polyphenolic secondary metabolites found in vascular plants, fruits and vegetables. They are found within plant cell membranes, and they consist of a group of naturally-occurring molecules responsible for the yellow hue seen in citrus fruits. They play a vital role in safeguarding the cells against oxidative damage.

How do flavonoids work?

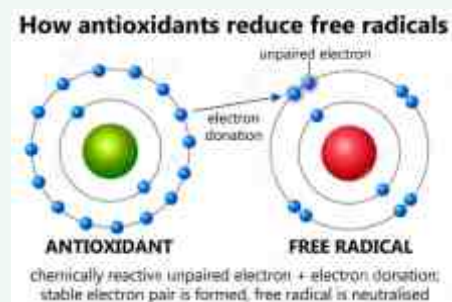
Free radical-induced oxidative stress is a major factor in the development of several degenerative diseases in livestock. Oxidative stress can cause



oxidative damage to large biomolecules such as lipids, proteins, and DNA, resulting in increased inflammation, impaired immunity and therefore poor health and production. To prevent or slow the oxidative stress induced by free radicals, sufficient amounts of antioxidants are required.

The chemistry of flavonoids is complicated. But simply put, flavonoids are most commonly seen as antioxidants. Antioxidants are important, because they protect the body against harmful and damaging free radicals. Free radicals are atoms or molecules in the body that have a single unpaired electron. Having an unpaired electron make these substances highly unstable and

they roam throughout the body seeking to steal an electron from another atom or molecule. When an atom or molecule has an electron stolen from a free radical it then becomes a free radical as it now has an unstable number of electrons. This process continues creating a chemical chain reaction through the body. Most important when a free radical creates another free radical sometimes the loss of electron is so damaging that the cell can no longer function or becomes to function in an abnormal way. As such free radicals are seen as a major cause or enabler for numerous diseases or illnesses. Here's where flavonoids come into play. As antioxidants they combine with and neutralize the free radicals in the body before they can kill the



cells or damage their functions. Essential function played by flavonoids is that they help the body function more efficiently while protecting it against everyday toxins and stressors.

What is BioFlav?

BioFlav is a Citrus bioflavonoid complex (CBC) with Hesperidin, Isonaringin and Didymin as major constituents.

Hesperidin, Isonaringin and Didymin are the most common bioflavonoids in the Genus Citrus. They occur mostly in the peel of some citrus such as Bitter orange, sweet orange, lemon etc., although they may also be present to a lesser extent in their pulps, juices, leaves, seeds and flowers.

Benefits:

Strong antioxidant: BioFlav is a strong chain-breaking antioxidant that provides potent cellular antioxidant defence against the damaging effects free radicals.

Improves Immunity: BioFlav enhances mucosal and humoral immunity by increasing intestinal intraepithelial lymphocyte numbers, lymphoid organs (thymus, spleen and bursa) indices, as well as improving anti-avian influenza and anti-Newcastle disease antibody titres in poultry.

Mitigates Heat Stress: As a natural antioxidant, BioFlav helps mitigate heat stress during summer by decreasing heterophil-to-lymphocyte ratios, and quenching reactive oxygen species generated by summer heat stress.

Improves carcass quality:

Supplementing BioFlav in poultry diets has shown the potential to progress the nutritional, sensorial and microbiological quality of poultry meat and eggs. In the last decade, several studies have determined the benefits of flavonoids for inhibition of lipid oxidation and microbial growth, check any pH-dependent deterioration and improve the colour stability of meat and related products. Flavonoids are typically absorbed in the ileum where pH is between 5-6.8. Furthermore, flavonoid supplementation in the chicken diet has been reported to positively alter the fatty acid profile of meat and eggs by reducing the cholesterol and triglyceride content. Meat colour, in terms of lightness, can be improved by up to 5%.

Citations:

Effect of Citrus Flavonoids Supplementation on Growth Performance and Serum Oxidant Levels of Broilers

Nicha Rodsatian, Ornrapun Songserm, Koonphol Pongmanee, Nuria Blanco-Pascual, Yuwares Ruangpanit

Citrus flavonoids are important natural compounds with diverse

biological activities. They can be used as an alternative to replace antibiotic growth promoters (AGPs) in poultry diets. This experiment was conducted to determine the effect of citrus flavonoids on growth performance and antioxidant status in broilers. A total of 1,440 one-day-old Ross 308 male broiler chicks were randomly allotted into 4 treatments with 12 replicates of 30 birds per replicate. The chicks were fed a control diet (CON), a control diet supplemented with 500 g of bacitracin/ton of feed (AGPs 500), 300 g of citrus flavonoids/ton of feed (CTF 300), or a mixture of 300 g of bacitracin/ton of feed and 200 g of citrus flavonoids/ton of feed (AGPs 300 + CTF 200), respectively. There were no significant differences in body weight gain, feed intake, feed conversion ratio, number of culling and mortality among dietary treatments during the starter, grower and finisher periods ($P > 0.05$). However, for overall performance (1-37 DOA), birds fed diets supplemented with citrus flavonoids alone had lower FCR and mortality ($P < 0.05$) when compared to that of the control group. In addition, the supplementation of citrus flavonoids alone reduced serum thiobarbituric acid reactive substances (TBARs) of broiler ($P < 0.05$). The present study indicates that, citrus flavonoids had beneficial effects on growth performance. Therefore, citrus flavonoids could be used as a substitute for antibiotic growth promoters in broiler diets.



Aqgromalin- Uplifting Farmers

Co-founded by Bharani CL and Prasann Manogaran, Aqgromalin is a Chennai-based agritech startup providing a high-tech-driven solution to farm holders. The agritech platform has built a comprehensive one-stop shop for a farmer's everyday necessities, and it navigates farmers to diversify into animal husbandry and aquaculture. Aqgromalin is a company whose primary function is weaved around helping farmers obtain better outputs, and their objective is to make sustainable lives feasible.

There is a peal inclination towards Agritech in current years. The Chennai-based startup has raised a total of Rs. 39.5 Cr from investors, which include Sequoia Capital India's - Surge and Venture funds, Omnivore Partners India, and Zephyr Peacock India, with an objective to expand the network and operation. The startup has raised a hefty amount in its pre-seed round and aims to work upstream and downstream on complete stack tech solutions in the poultry and aqua market.

The revenue has recorded a 10 fold growth in the last 6 months

and has reached 3,00,000 farmers and micro-entrepreneur. The main interest of investors lies in their revenue and supply chain model. The startup has designed a unique app, AQAI wherein farmers can order high-quality inputs, and the ordered inputs are directly delivered to their farm gate. After the harvest, their downstream trading platform assists farmers to exit their produce via a network of retailers (like butcher shops and fish markets), traders, and exporters. They are on a mission to organize the world's protein supply, stated the company.



Additionally, Bharani CL, cofounder of Aggromalin, stated, "Animal Husbandry and Aquaculture are highly fragmented and underserved sectors in the Indian agricultural landscape. As part of the fund acquisition, we look forward to expanding our operations and helping farmers overcome the challenges of limited availability of quality live inputs and lack of access to markets." It is estimated that the poultry industry will be at an all-time high in the coming years. Aggromalin has understood the current poultry industry need and has developed a full-stack agritech platform to help farmers diversify into animal husbandry and aquaculture.

The lack of timely and consistent supply of high-quality live input materials in animal husbandry and aquaculture has led Farmers to pay high rates due to the unavailability of transparent pricing. Post-harvest, the animal

trade ecosystem is affiliated with supply chain disruptions, and income gets speculative for the stakeholders due to fluctuating demands.

Aggromalin has decoded this issue by building a tech platform to blend the farmer-trader ecosystem. With transparent pricing, the

company enables farmers to access high-quality live products at the farm gate. Postharvest their downstream animal trade system allows a safer market, predictable prices, and supply. End-to-end traceability is a remarkable feature of their app AQAI.

Aggromalin is a startup that serves the community by aiding farmers. Aggromalin successfully strikes young entrepreneurs' blooming minds, directing them towards building firms in the community and for the community. Providing high-quality inputs results in high-quality output, implying a substantial growth of farming and the farm holders. The introduction of technology is a way to streamline the animal husbandry and aquaculture industry and hence a great initiative by Aggromalin.



NUTRINOMICS

Role of Probiotics in Poultry Gut Health

Welcome to Nutrinomics...

"Nutrinomics, is the merging of the nutrition and health economics disciplines to assess the impact of nutrition on animal health and disease and to illustrate the health and economic aspects of specific changes in the daily nutrition and nutrition recommendations through the lens of cost effectiveness".

Introduction

Probiotics are living microorganisms which when administered in adequate amount confer health benefits on the host. Probiotics are one of the more efficient methods of pathogen control and have not detrimental effects to the environment as antibiotics. The benefits include improved gut histomorphology, increase in beneficial microbiota, improved immunity, enhanced growth and laying performance.

Probiotics can be provided as a live microbial feed supplement for poultry, also known as direct fed microbials (DFMs), in the poultry diet or water or can be administered to the developing embryo using in-ovo feeding technology. The use of probiotics in poultry has increased steadily over the years due to the higher demand for antibiotic-free poultry. The probiotics market was reached 80 million USD in 2018 and is projected to reach 125 million USD by 2025 at a compound annual growth rate of 7.7% (Ahuja et al 2020).

Bacillus spp, Lactobacillus spp, Streptococcus spp, Bifidobacterium spp., Lactococcus spp and yeast Candida spp. are commonly used probiotics strains. Bacillus spp. are producing heat-resistance spores. This make it possible to

make feed added with probiotics which is also made using a granulation process. Multi-strain probiotics act on different sites and provide different modes of action that create synergistic effects. The criteria for selecting probiotic strains include tolerance to gastrointestinal conditions, the ability to adhere to the gastrointestinal mucosa, and the competitive exclusion of pathogens. Probiotics should have survival ability in manufacturing, transportation, storage and application processes.



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Properties of Good Probiotics:

- Probiotics must be a normal inhabitant of the gut and capable to adhere gastro-intestinal epithelium.
- Probiotic microorganisms must be able to survive in high temperature.
- Probiotic microorganisms must be able to survive in aerobic as well as anaerobic environment.
- Probiotic microorganisms must have tolerance to low pH and presence of bile acids.
- Probiotic microorganisms must be non-pathogenic and non-toxic to the host.
- Probiotics must exert its beneficial effects like enhanced nutrition and increased immune response.
- Probiotics must be sustainable under normal storage conditions.

Mechanism of action:

A. Probiotics helps in maintaining normal gut health and intestinal microflora by:

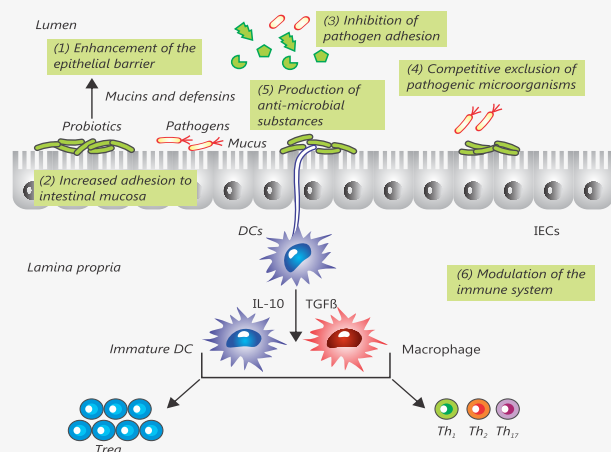
- Enhancement of the epithelial barrier with releasing of gut protective metabolites like arginine, glutamine, short-chain fatty acids, conjugated linoleic acids etc.
- Competitive exclusion by increasing adhesion to intestinal mucosa and by inhibiting pathogen adhesion to it.
- Production of antimicrobial substances like bacteriocins which helps to reduce pathogenic bacteria.
- Alteration in gene expression of pathogenic microorganisms.

B. Probiotics supplementation alters digestion, absorption and metabolism of nutrients by:

- Increasing digestive enzyme activity.
- Decreasing bacterial enzyme activity.

C. Probiotics supplementation develops Immunomodulation by:

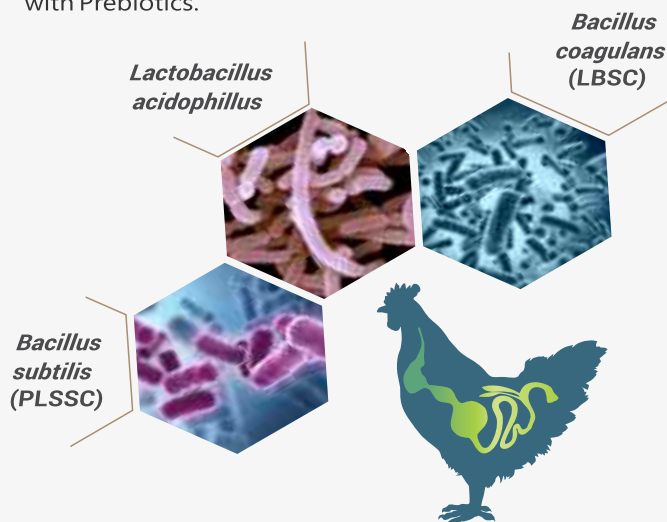
- Enhancing serum and intestinal antibodies production against foreign antigens.
- Enhancing secretion of cytokines, lymphokines and anti-inflammatory mediators, resulting modulation of immunity.

**Benefits of Probiotics:**

- Promotes optimal development of gut microbiota especially post-hatch.
- Re-establishes balanced gut microflora during post-antibiotic application.
- Reduces incidence of wet litter and pasty vent.
- Improves weight gain and feed conversion in broilers.
- Helps to maintain consistent egg production in layers and breeders.
- Effectively reduces early chick morbidity and mortality.
- Effectively replaces AGPs.
- Zero withdrawal period and it can be administered throughout the life cycle.

About CosBac™:

CosBac™ is a uniquely blended, poultry-specific, multi-species synbiotic product that promotes development of beneficial gut microflora, increase in beneficial microbiota, improved immunity, which further leads to healthy & economics production parameters through the combined action of carefully selected probiotic microorganisms and prebiotics. It comprises *Bacillus subtilis* (PLSSC) 5×10^9 CFU/g, *Bacillus coagulans* (LBSC) 3×10^9 CFU/g and *Lactobacillus acidophilus* 2×10^9 CFU/g with guaranteed total potency of $\geq 10 \times 10^9$ CFU/g along with Prebiotics.



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NOVUS

SOLUTIONS SERVICE SUSTAINABILITY

Understanding the Role of Bacillus Bacteria in Poultry Nutrition



Pratap Munde

Director of Sales, NCH Life Sciences

With more than a decade of experience in agriculture inputs organization, Pratap Munde is associated with NCH Life Sciences, a global leader in probiotic technology with a vision of developing superior technologies for animal healthcare in the probiotic field through achievements in biological solutions.

Make sure to follow NCH Life Sciences on LinkedIn and website www.nchlifesciences.com to stay informed on everything happening within our business.

Today, poultry and other livestock are often exposed to a stressful environment. This leads to an imbalance in their gut flora. Consequently, they suffer from health conditions such as poor weight gain and persistent diarrhoea. There have also been cases of high mortality rates in animals for these reasons. Various studies have indicated that probiotic care is instrumental in reinstating and maintaining the balance of gut flora in animals.

Probiotics

Probiotics are live micro-organisms that improve the health and performance of poultry animals. They support the digestive health and gastrointestinal flora of animals also boosting their immune system and contribute to a diverse population of useful bacteria in their digestive system.

Poultry of all ages can be fed probiotics daily to help them maintain a healthy digestive system. However, probiotics provide better results during stress situations such as hatching, vaccination, unknown surroundings, changes in food, water and temperature, etc. Probiotics also work well after antibiotic treatment.

Bacteria play a crucial role as probiotics in animal nutrition. Bacteria enable poultry animals to extract energy and cycle biomolecules. One of such beneficial bacteria is Bacillus.

Bacillus Bacteria

Bacillus are considered spore-forming bacteria. A spore is a tough, dormant, and non-reproductive structure that certain bacteria like Bacillus produce. It is a multi-

layered protective structure composed of several proteins and provides resistance to environmental stress. It reaches a metabolically active state and multiplies when it reaches the gastrointestinal tract of poultry animals.

Spores are also known as endospores. They grow in unfavourable conditions such as extreme temperature, starvation, and extreme pH. They are resistant to heat, radiation, and chemical reactions for an extended period. Hence, they are tougher than other micro-organisms.

Importance of Bacillus Bacteria in Animal Nutrition

Bacillus have a tendency to populate rapidly. This means that they will not allow the growth of bad bacteria. Their physiologic characteristics enable them to produce antibiotics, metabolites, and antibiotics which are necessary for poultry animals.

Bacillus strains are useful in bioremediation. They can also decrease nitrogenous waste. Both these factors together improve the environmental conditions.

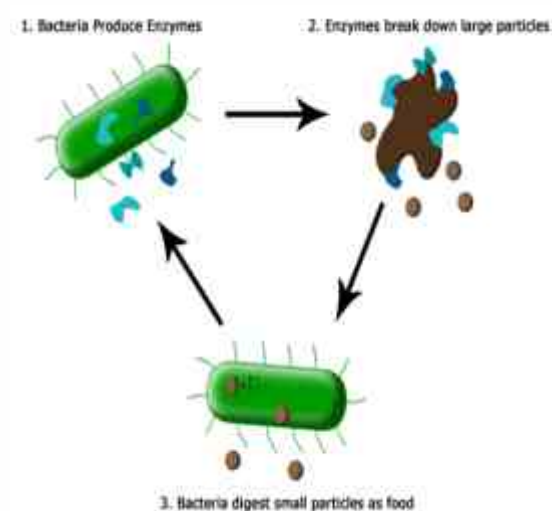
Optimized Enzymes Production for Feed Digestion

Probiotics are nature's enzyme factory. Ensuring the adequate quantity of probiotics in animal diet can support to ensure proper digestion and use the complete feed energy for animal growth and overall development. Probiotics produce the right amount of the right enzyme inside the gut of the chicken.

This ultra-efficient digestion process is what improves feed conversion in the bird, they are more easily absorbing nutrients to use for growth from the same feed they always consume.

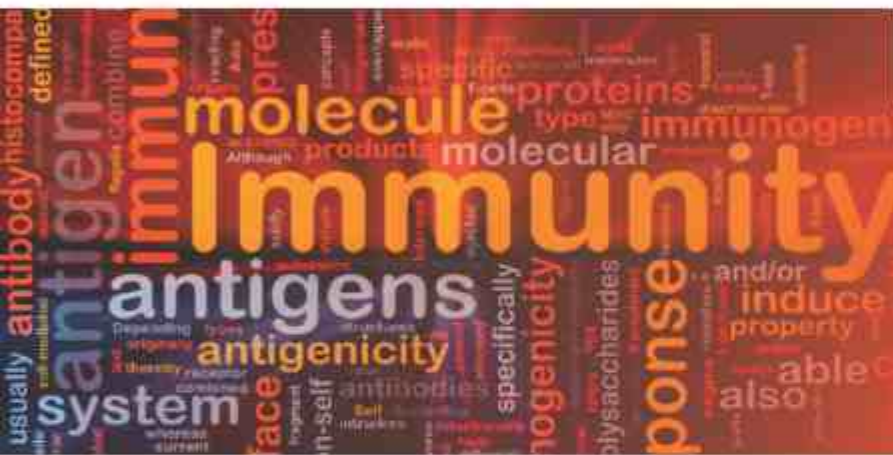
Old technologies use live, active cultures like Lactobacillus and Bifidobacterium that are sensitive to stomach acid. This causes a sizeable percentage of them to die in the stomach before they reach the small intestine. Even if they do survive, they are weakened and take the entire length of the small intestine before they can begin growing and provide little to no benefits.

Conclude, the use of Bacillus bacteria as superior probiotics in poultry animal feed is on the rise. In the coming years, it will become a prominent health ingredient for poultry animals.



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- Generates ability to positively respond to various stress factors.
- Better response to ancillary treatment.
- Improved FCR and healthier birds.

Clear visualization of biofilm removal from drinking water lines with Intra Hydrocare

Clean and fresh drinking water is essential for bird health and performance. Even when the incoming water is clean, a biofilm may rapidly form at the inner lining of a drinking water system. This biofilm reduces the water flow, clogs drinking nipples, and provides an ideal hiding place for pathogens.



Figure 1 – Visual appearance from the outside of the tube (top row), inside the water system (middle row) and on the inserts (bottom row) before (left) and after (right) the continuous addition of Intra Hydrocare to the water.

biofilm inside a line is not just a slimy layer, but actually a well-structured and highly organized microbial community. This process of biofilm formation is further accelerated by the relatively high temperatures in a broiler house, and stimulated by the low water flow volumes at the start of a round.

Intra Hydrocare effectively removes biofilm

Traditional disinfectants, like chlorine, may disinfect the water, but form harmful residues and/or negatively affect the taste of the water. Intra Hydrocare is a silver-stabilized hydrogen peroxide solution that disinfects the water and also physically removes the biofilm from the inner lining, without residues and taste changes. Due to its unparalleled stability, Intra Hydrocare remains active from the beginning of the water line until the last nipple. Its addition to the drinking water guarantees that the water will remain free of microorganisms and no biofilm will build up in the water system. The functionality of Intra Hydrocare has proven itself around the globe in the most varying practical conditions, the study described in this article clearly visualizes its functionality under experimental test conditions.

Intracare

Biofilm is an invisible threat

Gerwen Lammers PhD,
Tom van Oorsouw BSc,
Jan Schönberg,
Marc Spackler MSc,
Carly Vuldiers BSc

Intracare BV, Veghel, The Netherlands

The build-up of a biofilm typically starts with the attachment of a single microorganism cell in suspension onto a surface, for example the inner surface of a drinking water line. This microorganism starts to multiply and secretes extracellular matrix components to build a protective environment. So the

Biofilm generator to study biofilm formation and removal

Intracare has developed a biofilm generator as a model to study the natural growth and

subsequent removal of biofilm with Intra Hydrocare in an experimental set-up. Plastic tubes representing the drinking water lines were filled with contaminated water and animal drinking behavior was mimicked by a daily flow/no-flow schedule. Water quality was determined by measuring the amount of adenosine triphosphate (ATP) as a marker for micro-organisms using the Intra Clean Quick Scan in Relative Light Units (RLU). Removable plastic inserts were positioned inside the tubes to assess the number of bacteria in the biofilm.

When the growing biofilm was clearly visible by eye and water ATP measurements stabilized, the continuous addition of an extremely low ppm level of Intra Hydrocare was started to investigate its effect on the biofilm.

Visible growth of biofilm and its fast removal with Intra Hydrocare

From the start of the experiment, a gradual formation of a biofilm was noticed by eye, resulting in a clearly visible greasy layer in the inner lining of the tubing and inserts (Figure 1). This visible biofilm completely disappeared from all surfaces after the continuous addition of Intra Hydrocare was started.

During the biofilm growing period, the water ATP count rapidly increased up to 1,662 RLU, indicating severely polluted water (Figure 2a). After the continuous low maintenance addition of Intra Hydrocare, the RLU count rapidly decreased within a short timeframe and remained low, as the measurement in week 19 shows with an RLU value of 66.

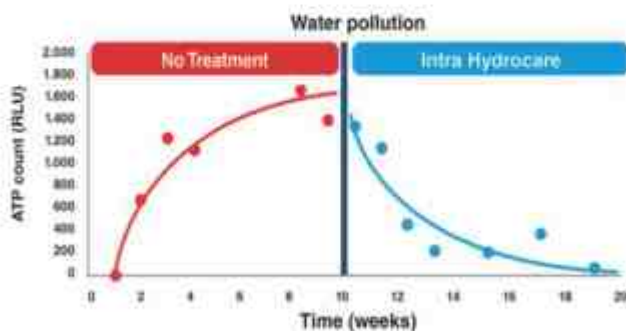


Figure 2a – Water pollution before (red) and after (blue) the continuous addition of Intra Hydrocare.

The ATP measurements are in line with the bacterial counts from the inserts, which rapidly increased within 6 weeks (Figure 2b) to an almost two million-fold ($1.9 \times$

10^6) increase. The subsequent continuous addition of Intra Hydrocare quickly resulted in a two million-fold ($\log 6$) decrease, demonstrating the fast and effective removal of microbiological contamination from the surface of the inserts and inner lining of the tubes.

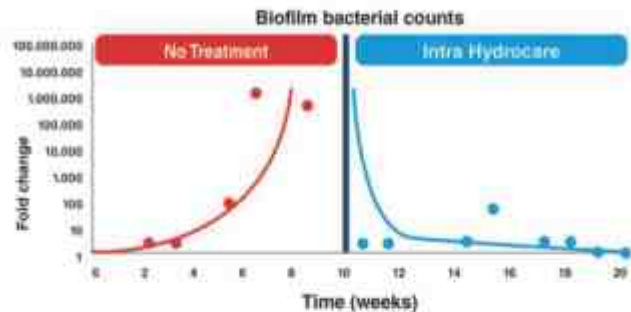


Figure 2b – Biofilm bacterial counts before (red) and after (blue) the continuous addition of Intra Hydrocare. Please note that the bacterial counts are plotted on a logarithmic scale.

Practical use of Intra Hydrocare in broiler houses

The biofilm generator enabled us to visualize the rapid growth of a biofilm inside a drinking water system and clearly demonstrated the fast and effective removal of this biofilm already with the continuous addition of low maintenance ppm levels of Intra Hydrocare.

Biofilm bacterial counts dropped immediately. The RLU measurements in this laboratory model indicate that with these extremely low levels it may take up to two weeks before the entire system is cleaned. In order to guarantee direct results, it is in broiler houses allowed to use a higher maintenance dosage up to 250 ppm. Especially when taking into account that in practice the water system will also be used for the addition of feed supplements or medication to the animals, and during these days it is not advised to dose Intra Hydrocare.

Please note that for a quick and effective cleaning and disinfection of the drinking water system, the lines of an empty house should always be cleaned with 1-3% Intra Hydrocare to guarantee a clean system at start of a new round. A low maintenance dosage during the round ensures that the water system remains clean.

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Care with Compassion - A Cadila Pharmaceuticals Limited initiative



In order to ensure the complete success of its initiatives, Cadila Pharmaceuticals Limited uses customized strategies. The company also runs numerous awareness programs to spread awareness about these topics. Cadila Pharmaceutical's contributions to society are commendable. The CSR initiatives run by Cadila Pharmaceuticals Limited are not limited to those mentioned above. There is another feather in their cap, the health care sector. They run the Kaka-Ba hospital. The impact Cadila Pharmaceuticals Limited has created in the health sector is tremendous. Having treated more than 10 lakh patients, they have presented an example for other businesses. Cadila Pharmaceuticals also runs more than 100 awareness programs that educate people about community hygiene and health. In addition, they provide free dialysis service with a pick-up and drop facility to the needy.

The CSR initiatives run by Cadila Pharmaceuticals Limited are genuine and noteworthy. They have not only created a healthy impact in the society but have also made given CSR a new definition.

Under its Corporate Social Responsibility, Cadila Pharmaceuticals Limited has been giving back to society in several ways. Their noble CSR scheme includes several projects: mid-day meals for school children, Matruvandana, rural development, and health care.

The Mid-day Meal for School Children Scheme aims to eradicate hunger and malnutrition among schoolchildren. Cadila Pharmaceuticals Limited has also ensured 100 percent enrolment and retention of rural children in education institutions through its CSR initiative. They have also contributed to meals for 10863 students from 38 primary schools. These schools are based in Ahmedabad and Gandhinagar.

Another CSR initiative of Cadila Pharmaceuticals Limited is "Matruvandana." The Matruvandana initiative is run in the memory of the chairman and managing director of Cadila Pharmaceuticals Limited, Dr.

Rajiv Modi's mother - Shilaben I. Matruvandana focuses on various aspects, including afforestation, and has planted nearly 94,000 saplings. It also emphasizes rural women's empowerment as well as their socio-economic development. It also takes care of cows, as they are worshipped like the mother in India - by sheltering them (Gaushalas), medicines, and food.

Cadila places emphasis on sustainable development and equal growth of society. Hence, another CSR initiative by Cadila Pharmaceuticals Limited is rural development. Rural development focuses on the economic development in villages near the Ahmedabad and Bharuch districts of Gujarat by promoting infrastructure development, educational growth, skill development, and the mental and physical well-being of the public.





Phyto-Antioxidant of Genomic Era

GENE EXPRESSION STUDY AT UNIVERSITY OF GEORGIA, USA

Validates efficacy of HERBAL C to potentiate stress tolerance, antioxidant defense and to elicit immune response in birds
Kim *et al.*, University of Georgia, USA, 2020



HERBAL-C

Heat stable natural vitamin C

Gene expression of key allosteric effectors of stress, immunity and antioxidant defense in Cobb 500 broilers exposed to cyclic heat stress

STRESS RESPONSE

Heat Shock Protein (HSP 70)

BCL2 Athanogene (BAG3)

Nitric Oxide Synthase (iNOS)

HERBAL C downregulates expression of HSP70, BAG, iNOS and improves stress tolerance in birds

IMMUNE FUNCTION

Interferon Gamma (IFN γ)

Toll Like Receptor 4 (TLR4)

Caspases 1 (CASP1)

HERBAL C modulates gene expression of IFN γ , CASP1, TLR4 and elicits immune response

ANTIOXIDANT MARKERS

Superoxide Dismutase (SOD)

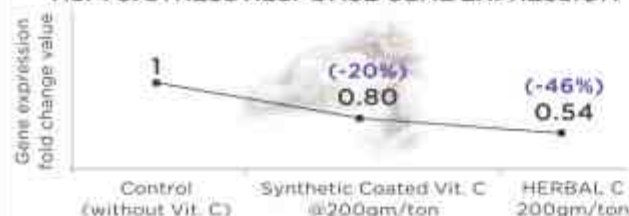
Catalase (CAT)

Glutathione Peroxidase (GPx)

HERBAL C upregulates expression of SOD, CAT, GPx and improves antioxidant defense in birds

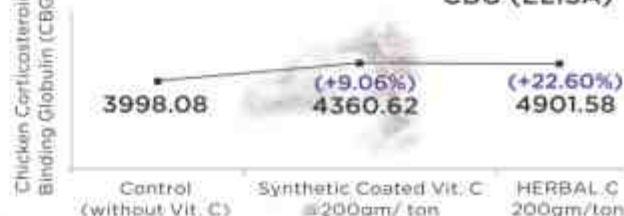
HERBAL C improves stress tolerance and prevents cellular oxidative damage through HSP70 regulation

HSP70: STRESS RESPONSE GENE EXPRESSION



HERBAL C leads to faster cortisol clearance from plasma during stress challenges

CBG (ELISA)



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Danisco Animal Nutrition Announces Name Change



Danisco Animal Nutrition, a business unit of IFF's Health & Biosciences division, has announced it is changing its name to Danisco Animal Nutrition & Health, effective immediately. The move reflects the company's ongoing commitment to expanding its portfolio of science-led animal health solutions across global markets.

"The name change will allow us to present the full scope of our capabilities. Crucially, it recognizes the fact that

nutrition and health are inextricably linked when it comes to animal performance. This principle has long been a driving force within the business and continues to inform our strategic direction", said Pael Fokin, vice president, Danisco Animal Nutrition & Health.

"We are delighted to now have a strong platform that clearly communicates these ambitions and positions us for future growth. It also comes at an exciting time in the development of our health

portfolio, with several exciting new products scheduled for launch later this year," he added.

The company has made significant investments in building its animal health portfolio for poultry, swine and ruminant markets. Its extensive R&D program is focused on providing evidence-based validation - through lab research, field trials and practice - to support the efficacy and value proposition of every productsolution.



SAI KRISHNA POULTRY EQUIPMENTS



Deluxe Drinker
(Standard & Large)



Chick Feeder



Chick Drinker



Deluxe
Jumbo Drinker



Feeder



Jumbo Drinker



Gas Brooder



Parent Feeder
Male & Female



Egg Tray



Chick Feed Tray



Nipple Drinking System

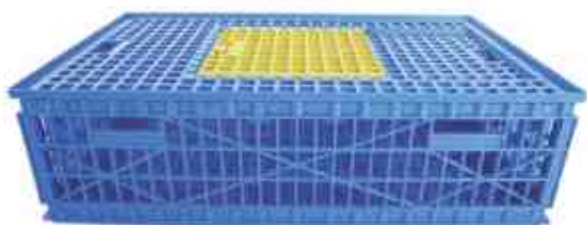
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Manufacturers of Innovative Poultry Equipments

Factory : Behind Petrol Bunk, Padmanagar, Karimnagar - 505002, Tel : 0878 - 6504508, Mobile : 94404 06200

Sales Depot : Plot No : 16, Road No:2, Opp : Nimanthran Function Hall, Mamatanagar Colony, Nagole, HYDERABAD - 68, Telangana

Tel : 040 - 64610508, Mobile : 92466 59508, E-mail : info@saikrishnapoultry.com, Web : www.saikrishnapoultry.com



Bird Transportation Crate



Chick Transportation Crate

Balaji Polymers

Factory : Akkaram Village, Gajwel Mdl, Medak Dist. Regd. Office : Karimnagar : 98490 59508, Hyderabad: 96523 98686
email : balajipolymers.hyd@gmail.com

Proteon Pharmaceuticals Appoints **PAOLO DONCECCHI** as Global Sales Director

Proteon 
 Pharmaceuticals

Mumbai, 27 January 2022:Proteon Pharmaceuticals, a subsidiary of Proteon Pharmaceuticals SA Poland, today announced that it has appointed Paolo Doncecchi as its Global Sales Director as its expansion plans in India and other South-East Region.

Proteon Pharmaceuticals focuses on precision biology for microbiome protection to improve animal and human health, increasing environmental sustainability and eliminating the unnecessary use of antibiotics.

With over 30 years of experience in marketing and sales, Paolo has led several sales and marketing positions at global biotechnology companies such as Pfizer, Zoetis, Biomin and Adisseo in the field of animal health and nutrition. Paolo, an Italian national, has completed his university degree in Veterinary Medicine. He recently became member of Insight Partners, an American venture capital and private equity firm based in New York City that invests in growth-stage technology, software and Internet businesses.

Elaborating on his new role at Proteon Pharmaceuticals Paolo Doncecchi said, "We will focus on getting results through people empowerment. I believe that Proteon's technology is on the edge of a modern and sustainable fight against AMR (Antimicrobial Resistance). Bacteriophages are effective and do not leave residuals in poultry meat, therefore, eventually, safe for us to consume."

Meanwhile, Proteon Pharmaceuticals is further streamlining its R&D investments,

aiming to deliver phages solutions focused on controlling bacterial diseases to let their livestock customers achieve sustainable profit.

Commenting on Paolo's joining, Nipun Gupta COO, Proteon Pharmaceuticals, said, "I am pleased to announce the appointment of Mr Paolo Doncecchi as the Global Head of Sales. Paolo started working as part of Proteon commercial organization from January, 2022. I am excited to welcome him. Paolo brings in wealth of experience from the animal healthcare organisations that will be of benefit for our company's global expansion plans."

About Proteon Pharmaceuticals

Proteon Pharmaceuticals uses precision biology for microbiome protection to improve animal and human health, increasing environmental sustainability and eliminating the unnecessary use of antibiotics. Proteon uses natural, safe and environmentally sustainable solutions developed from patented phage-platform technology. Proteon partners with farmers in the field of animal health, focusing on solutions that improve the economic efficiency of farms, while promoting environmentally sound, natural and sustainable solutions.



**Paolo
Doncecchi**

Contact Persons:

ProteonPharmaceuticals:

Rachel D'costa

Proteon Pharmaceuticals - Spokesperson

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www.proteonpharma.com

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Priyanka Sood

Handset: +9867892554 | Email: priyanka@fortunapr.com

Website: www.fortunapr.com

Hy-Line International Adds Role of President of Operations



Hy-Line International is pleased to announce Eduardo de Souza Pinto will join Hy-Line International in the newly created position of President of Operations effective 1 March 2022. He will have responsibility for all areas of internal production, administration, exports and logistics based in Dallas Center, Iowa, USA.

Jonathan Cade, President of Hy-Line International, will continue to lead all sales activities, customer support, business relations, marketing and technical service efforts. Dr. Danny Lubritz, Director of Research and Development, will continue to focus on research and development of Hy-Line varieties.



Eduardo de Souza Pinto

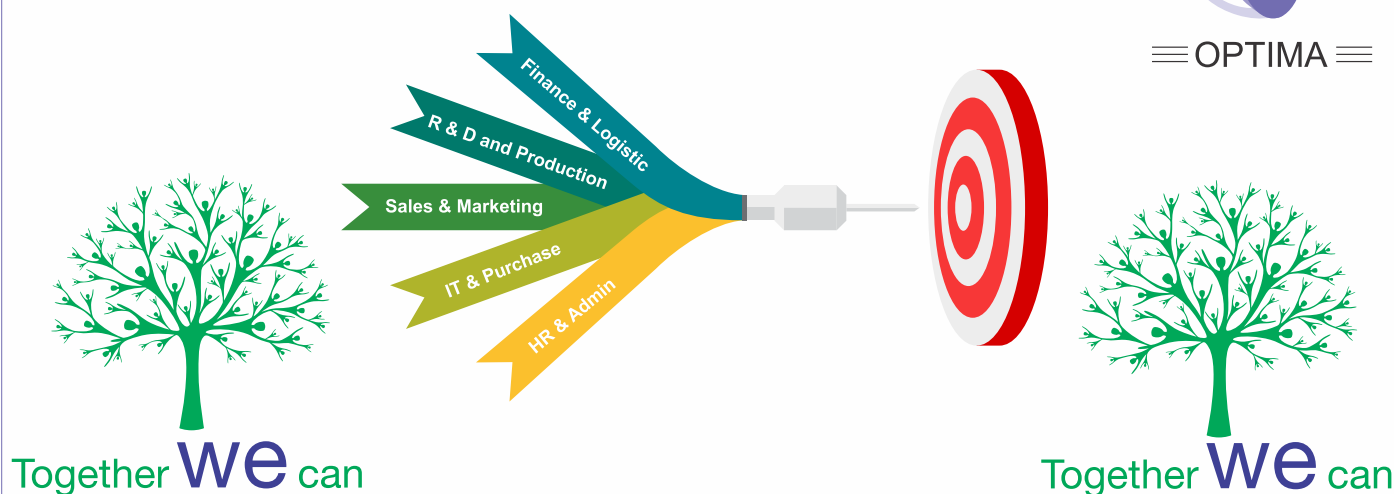
"Eduardo will lead a strong team of specialists in the fields of pedigree and grandparent farm and hatchery management, biosecurity, quality, veterinary, compliance, finance, exports and logistics," said Jonathan Cade, President of Hy-Line International. "This executive position will ensure our layer varieties are supplied to you above and beyond your expectations. shows our commitment to have an even stronger strategic leadership within Hy-Line."

Eduardo comes from Valo Biomedia, a SPF egg business, where he was President for North and South America with a key focus on biosecurity, efficiency and on-time deliveries of SPF eggs to key vaccine manufacturers.

11 Glorious Years of Development, Trust & Growth



≡ OPTIMA ≡



Optima founded on 11th January 2011 is today a leading and fast-growing Indian Multi-national company in the animal health and nutrition sector. Customers around the world trust Optima's products and services. **On 11th January 2022, Optima celebrated 11 Glorious years of Development, Trust and Growth.** Optima was established with a vision to become a leader in animal health and nutrition by providing high-quality innovative products and services. Among all products, OptiBetaine, one of Optima's Flagship products enjoys market leadership in branded Betaine segment.

Animal industry's demand to supply innovative and high-quality products at affordable prices compelled Optima to delve heavily into developing products and services for the demanding conditions. Journey of 11 years was exceptional, inspirational, and rewarding, and this could be possible due to the highest standards of hard-working and passionate People and Products produced in manufacturing facilities certified with FAMI QS, GMP, ISO and HACCP. With a mission of offering quality products as per market need, in 2020, Optima launched the hygiene brand Optisan (logo) which offers skin-friendly hand sanitizers and surface cleaners.

Optimians in Optima Life sciences are grateful to that one person, who holds a great treasure of knowledge, experience, learnings, and execution. He is none other than CEO of the company, **Dr.Dey**.

Dr. Dey has completed 37 years in poultry industry and still counting. He has successfully served various organisations, but he has also helped animal health industry to address and overcome various issues from time to time. May it be an import ban on vaccines and breeds to the recent incidence of LPAI vaccines. In this field, he has worked so hard with great devotion.



Dr.Dey has always been an inspiration to everyone at Optima, because of his dedication, guidance, and mentorship. His abilities and contributions are an important key to the success of future Optima and all Optimians. On the occasion of 11th Foundation Day, Director of the company, Mr. Vinay Kulkarni felicitated Dr. Dey for his overall contribution to poultry industry and to the company.

In the last 11 years of growth, we never forgot our duties towards society. Under the CSR activity, we organized blood donation camp, egg distribution camps, financial helps to Paani Foundation, Educational support to needy students, financial support to Orphanage run by Late Sindhutai Sapkal and also to flood victim for the reconstruction of his home.

On the occasion of the 11th foundation day, Optima continued its CSR activity by offering financial help second time to Dr. Sindhutai Sapkal Orphanage based in Pune.

We are thankful and grateful to all our customers, distributors, partners, suppliers and past and present employees for their continuous support and faith in our products and services.



A Technical Seminars Conducted by Venworld in Ajmer & Kurukshetra



Venworld conducted technical seminars in Ajmer & Kurukshetra on 8th & 14th December 2021. The speakers were **Dr. Prakash Reddy**, DGM, Technical Services-All India, **Dr. Sunil Nadguda** DGM-Technical services ALL India & **Dr. H. K. Rohilla** DGM-Venco Technical Services - North India

Dr. Prakash Reddy highlighted the current disease challenges in poultry and their strategies to control.

He started with the lessons to be learnt by the poultry industry from the COVID-19 pandemic, which includes:

1. The sensitivity of poultry industry to react to rumors, without checking the facts about zoonotic diseases.
2. Biosecurity: Lockdown (curfew), sealing of State and National borders, Quarantine, Masking, Social distancing etc. to reduce the spread of the virus.
3. Age resistance.
4. Susceptible population with comorbidities complicating the disease condition.
5. Importance of the next generation diagnostics with respect to accuracy and speed of diagnosis.
6. Virus variation creating a moving target.
7. Vaccines and vaccination:
 - a. Challenges with the vaccine production and technology.
 - b. Herd immunity by vaccination to reduce the spread of the virus and emergence of variants.
 - c. Vaccine safety and efficacy.



DR. PRAKASH REDDY AJMER LAYER FARMER MEETING

d. Limitations of vaccines in preventing the disease, but not infection.

e. Speed of Vaccination coverage.

Further, correlated the challenges with the poultry corona viruses (Infectious bronchitis virus) variations in India and the novel strategies to control.

A comprehensive approach to control Respiratory disease complexes, specially related to control of Mycoplasmas.

Lastly, Immunosuppressive diseases related to IBD and CAV were thoroughly discussed during the sessions.

Dr. H. K. Rohilla threw light on "How to achieve peak and persistent production in broiler breeders" wherein he highlighted the management/nutritional practical tips to be followed in order to prevent the issues faced in various stages of a broiler breeders life viz. Brooding, Growing, Pre-lay and laying phase like:

1. Tips to maintain proper uniformity of the flock.
2. Importance of precise feed formulations.

3. Intussusception issue in growers and preventive measures to be followed.

4. Precautions to be followed during pre-lay period.

5. Calcium tetany and its remedy/preventive measures.

6. Role of ND & IB vaccination in broiler breeders

Dr. Sunil Nadguda presented on "Optimizing layer nutrition and management for better productivity and profitability"

1. Essential for good egg production like nutrition, management and health.
2. Important nutrient consideration for optimizing layer hen productivity.
3. Regular management practices like feeding, lighting, body weight and uniformity were discussed in detail.
4. Importance of pullet development and their body weight at point of lay.
5. Fulfilling precise nutrient requirement is very essential for optimizing production.

Manufacturing of feed in easy and simple way with Venky's 5% layer composite premix was discussed. Venky's 5% Eggxtra layer composite premix helps to optimize cost and improve overall health and productivity of the laying hens.

Broiler breeder, Layer Customers and technical persons attended the seminar and appreciated the information. Mr. Harjit Padda, DGM, Marketing North Zone welcomed the customers.

Mr. Shashibushan Zonal Manager North Zone 3, gave the vote of thanks .All the technical & other sales r team participated in the meeting.



AJAMER LAYER FARMER MEETING



BREEDER AJAMER



DR. ROHILLA AJMER BREEDER



*BREEDER FARMER MEETING AJMER
-DR. PRAKASH REDDY*



*AJMER BREEDER FARMER
MR. H.S. PADDA*



DR. PRAKASH REDDY AJMER



DR. PRAKASH REDDY KURUSHETRA



DR. PRAKASH REDDY KURUSHETRA O2



DR. SUNIL NADGAUDA KURUSHETRA



Twenty-Five & Going Strong

Kemin Animal Nutrition & Health – South Asia celebrates 25 glorious years

The glorious journey of Kemin Industries South Asia

Sometime in the middle of 1998, at the forefront of an increasingly complex world, we began the journey under the leadership of K P Philip along with a passionate 8-member team, who laid the steppingstone of a successful organization for South Asia region.

As technology progressed, we decided to channel our expertise and experience into new opportunities. The hardworking and passionate 8-member team started

working with a mindset focused on absolute delivery of return on investment to our valued customers.

As the business progressed, we set up a full-fledged new factory and office building at Gummidipoondi in the year 2000 and with further expansion of capacity, Kemin Industries South Asia is now having the manufacturing capacity of more than 4500 Metric Tons of finished products every month.

What started with just 8

employees in 1998 has now led to an exponential growth in each division bringing a total of 500 plus employees in the business unit.

Several path breaking inventions of products and formulations have been carried out to meet the specific needs of customers in this region and with the patronage of our esteemed customers, Kemin South Asia has taken a pole position in most of the product segments.



"The deliverance of products along with services through our well-structured customer support team has always been our guiding principle in business" says R Sureshkumar, President, Kemin Industries South Asia.

Over the last 25 years, the commitment to charitable activities initiated by our founders, RW and Mary Nelson, is deeply embedded in each one of us. We continue to serve the purpose with a strong sense of responsibility, building a better future for communities around the globe.

Kemin Industries South Asia has been continuously growing twice as fast as the market growth under the strong leadership of KP Philip, GS Ramesh, and now with Sureshkumar. Kemin has been awarded three times in row as a "Great Place to Work."

"What drives each of us in Kemin is the vision of transforming the quality of life of people on everyday basis and we take the opportunity to thank our business partners for their unstinted support and reposing of confidence in

products and services of Kemin all through in our journey", reiterates Dr Tanweer Alam, Marketing Director, Kemin Industries South Asia.

Our pursuit and application of science, spirit of innovation, and leadership has driven us to make things better for people, animals, plants, and the planet. As we celebrate the 25 years of successful journey, Kemin puts the future in focus with transformation and sustainability as the ways to improve life, today and tomorrow.

Twenty-Five & Going Strong, indeed!



March 2022

1. Middle East Poultry Asia

Dates: 12 – 13 March, 2022
Venue: Riyadh International Exhibition Centre
City: Riyadh
Country: Saudi Arabia
Website: www.mep-expo.com

2. VIV Russia

Dates: March 15-17, 2022
Venue: Crocus Expo
City: Krasnogorsk, Moscow
Country: Russia
Website: www.meatindustry.ru/en

3. Eurotier Middle East

Dates: March 21- 23, 2022
Venue: Abu Dhabi, National Exhibition Centre (ADNEC),
City: Abu Dhabi
Country: United Arab Emirates
Email: s.karaoglan@dlg.org
Website: www.eurotiermiddleeast.com

April 2022

1. Anuga Food Tec

Dates: 26 -29 April, 2022
Venue: Cologne Trade Fair Center
City: Cologne
Country: Germany
Website: www.anugafoodtec.com

May 2022

1. Fieravicola

Dates: May 04 - 06, 2022
Venue: Cesena Fiera
City: Rimini
Country: Italy
Email: info@fieravicola.com
Website: www.fieravicola.com

2. IFFA / IFFA-DELICAT 2022

Dates: May 14 - 19, 2022
Venue: Exhibition Centre Frankfurt Ludwig
City: Frankfurt
Country: Germany
Email: ingmar.stork@messefrankfurt.com
Website: www.iffa.messefrankfurt.com

3. VIV Europe

Dates: May 31 - June 2, 2022
Venue: Jaarbeurs Exhibition Centre
City: Utrecht
Country: The Netherlands
Website: www.viveurope.nl

August 2022

1. ILDEX Vietnam 2022

Dates: August 3-5, 2022
Venue: SECC, HCM
City: Ho Chi Minh City
Country: Vietnam
Email: panadda@vnusiapacific.com
Website: www.ildexvietnam.com

2. Livestock Asia

Dates: 10 – 12 AUGUST 2022
Venue: MITC Complex
City: Melaka
Country: Malaysia
Email: livestockmalaysiamy@informa.com
Website: www.livestockmalaysia.com

3. Livestock Philippines 2022

Dates: August 23 - 25, 2022
Venue: World Trade Center
City: Pasay city
Country: Philippines
Email: rita.lau@informa.com
Website: www.livestockphilippines.com

September 2022

1. Victam Asia 2022

Dates: 7 - 9 September 2022
Venue: IMPACT Exhibition Center
City: Bangkok
Country: Thailand
Website: www.victamasiasia.com

October 2022

1. Sommet-elevage, France

Dates: 4 - 7 October 2022
Venue: Grande Halle Showgrounds
City: Clermont- Ferrand
Country: France
Website: www.sommet-elevage.fr



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EGG Daily and Monthly Prices of January 2022

Name Of Zone / Day	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	Average	
NECC Prices																																	
Ahmedabad	534	534	534	534	520	510	510	510	510	510	510	510	510	500	500	500	500	500	500	475	465	465	465	465	465	465	465	465	465	468	471	494.68	
Ajmer	503	503	500	480	480	474	474	477	480	480	480	472	472	465	465	470	470	470	465	460	460	462	467	470	470	460	460	456	456	452	452	471.13	
Barwala	502	502	502	483	483	470	470	475	477	477	477	477	471	463	463	467	467	467	467	457	457	460	466	470	470	470	470	458	454	454	454	470.97	
Bengaluru (CC)	515	515	515	515	515	500	480	480	465	470	470	470	470	470	470	470	470	470	455	455	440	440	440	440	440	440	440	440	440	440	455	455	468.06
Brahmapur (OD)	508	508	508	493	493	493	483	483	483	483	483	483	483	473	473	473	466	460	450	450	440	440	433	433	433	433	433	433	433	418	428	433	464.06
Chennai (CC)	520	520	520	520	520	505	490	490	475	475	475	475	475	475	475	475	475	475	465	465	445	445	445	445	445	445	445	445	445	445	460	460	473.87
Chittoor	513	513	513	513	513	498	483	483	468	468	468	468	468	468	468	468	468	468	458	458	438	438	438	438	438	438	438	438	438	438	453	453	466.87
Delhi (CC)	525	525	525	515	505	505	495	495	500	500	500	500	500	495	485	485	490	490	490	490	482	482	485	490	490	490	490	490	490	480	477	477	495.10
E.Godavari	480	480	480	470	470	470	460	460	460	460	460	460	460	452	452	452	445	445	437	437	427	427	420	420	420	420	420	420	420	405	410	415	444.97
Hyderabad	471	471	471	460	450	440	440	440	440	442	442	442	442	435	435	435	435	435	435	425	415	415	405	405	405	405	405	405	405	408	411	416	430.45
Ludhiana	501	501	501	491	481	481	475	475	476	476	476	476	476	470	470	465	465	467	467	459	459	459	459	461	469	469	469	461	461	454	454	454	471.03
Mumbai (CC)	535	535	535	535	525	515	505	505	505	505	505	505	505	500	500	500	500	500	500	490	480	480	470	470	470	470	470	470	470	470	473	476	496.90
Muzaffarpur (CC)	552	552	552	552	538	533	533	529	524	524	524	524	524	524	519	519	519	514	514	510	507	507	507	514	514	514	510	505	495	500	495	520.90	
Mysuru	515	515	515	515	515	500	475	460	460	465	465	465	465	465	465	465	465	460	450	450	435	435	435	435	435	435	435	435	435	435	450	450	463.39
Nagpur	515	515	520	515	500	480	460	480	480	480	480	490	490	480	480	480	470	475	475	465	445	445	445	445	445	445	445	445	435	435	435	435	470.48
Namakkal	505	505	505	505	505	480	480	460	460	460	460	460	460	460	460	460	450	450	450	430	430	430	430	430	430	430	430	430	440	440	460	457.58	
Patna	548	548	543	543	533	529	529	524	519	519	519	519	514	514	514	514	510	505	505	500	500	500	495	495	495	495	486	486	481	481	481	511.10	
Pune	525	527	527	527	520	510	500	505	505	510	510	510	510	500	500	500	500	500	500	490	480	480	475	475	475	475	475	475	475	475	480	497.29	
Ranchi (CC)	552	552	548	548	538	533	533	533	533	533	529	529	529	524	524	524	519	514	514	510	510	510	510	510	505	505	505	505	500	495	495	521.58	
Vijayawada	490	490	490	480	480	480	470	470	470	470	470	470	470	462	462	462	455	455	447	447	437	437	430	430	430	430	430	430	415	420	425	454.97	
Vizag	500	500	500	475	475	475	460	460	460	460	460	460	460	460	460	460	450	450	450	450	435	435	425	425	425	425	425	425	425	425	430	452.42	
W.Godavari	480	480	480	470	470	470	460	460	460	460	460	460	460	452	452	452	445	445	437	437	427	427	420	420	420	420	420	420	405	410	415	444.97	
Warangal	473	473	473	462	452	442	442	442	442	444	444	444	437	437	437	437	437	437	427	417	417	407	407	407	407	407	407	407	410	413	418	432.45	
Prevailing Prices																																	
Allahabad (CC)	538	538	533	524	519	519	509	509	514	514	509	505	500	490	486	486	486	486	486	486	476	471	467	467	467	467	467	467	467	472	476	493.58	
Bhopal	510	510	510	510	500	495	490	480	490	495	495	495	495	495	480	480	480	480	480	460	445	445	445	445	445	445	445	445	450	450	455	475.65	
Hospet	475	475	475	475	475	460	440	440	425	430	430	430	430	430	430	430	430	415	415	400	400	400	400	400	400	400	400	400	415	415	428.06		
Indore (CC)	510	510	510	490	480	490	490	485	490	490	490	490	480	470	465	465	465	465	460	450	450	465	465	440	440	435	435	435	440	445	450	469.19	
Jabalpur	511	511	500	500	492	482	477	477	482	483	483	483	483	473	473	473	473	455	455	445	445	445	445	445	446	446	435	435	437	441	453	468.13	
Kanpur (CC)	529	529	538	519	519	519	519	505	505	505	505	505	505	495	495	495	495	495	495	495	495	476	476	476	476	476	476	476	476	476	476	497.48	
Kolkata (WB)	540	550	550	550	550	540	540	540	530	530	525	525	525	520	520	515	505	505	505	495	490	490	480	480	475	475	475	475	478	488	495	511.65	
Luknow (CC)	560	560	550	550	543	543	543	533	533	533	533	533	527	527	527	527	527	527	527	527	527	520	517	517	517	517	517	517	517	510	507	507	528.81
Raipur	520	520	520	520	500	500	500	490	490	495	495	495	495	485	485	480	480	480	465	465	455	440	440	443	443	443	443	443	443	443	447	476.23	
Surat	535	535	535	535	525	515	515	515	515	515	515	515	515	510	510	510	510	510	500	485	470	470	470	470	470	470	470	470	470	473	476	499.97	
Varanasi (CC)	567	567	567	557	547	547	547	547	533	533	533	533	533	523	517	517	517	517	517	517	507	500	500	500	500	500	500	500	490	500	500	523.65	

Cargill takes a huge step in ai innovation for the poultry market



Cargill, a first-hand innovation organization in the poultry market, has developed technology-oriented solutions to ascertain animal health and its performance. They believe that artificial intelligence technology can accelerate improvement in flocks and animals, understand the subsisting problem and provide a solution.

The two innovative solutions that Cargill has come up with are Galleon and Birdoo. The demonstration of Galleon and Birdoo was scheduled at the International Production & Processing Expo (IPPE) on 26 and 27 January 2022.

Galleon Micro biome Analysis is a comprehensive AI-oriented broiler health assessment tool. The tool provides optimization in the health of the broilers. It provides information that helps broiler producers make informed decisions about raw materials, feeding programs, additives, vaccination programs, and farm management practices that can impact their flock's microbiome. Birdoo is again a hands-free measurement of broiler weight performance through advanced imaging and predictive analysis. This helps the producer make quicker and

more informed decisions while supporting animal health and well-being.

The other solutions innovated by

Cargill include BinSentry, which helps in safer, hands-free measuring of feed bin inventory, and COMPASS by Intelia, which is useful for real-time environmental and broiler performance tracking.

Nutrition advisory centres to be opened in north-eastern district by efeed

The increase in start-ups has taken the country by storm. eFeed, an

Agritech based start-up that focuses on integrating animal culture with the food security value chain, has new plants brewing around. Their plans involve establishing nutrition advisory centres across various north-eastern districts, which will drive sustainable and accountable animal husbandry.

The start-up believes that there is an unexplored scope and a massive opportunity for feed industries in the country's north-eastern provinces.

Kumar Ranjan, CEO & Founder, eFeed having high hopes, has said, "We are the intermediary layer which will help them understand the importance of animal nutrition like we do for humans and then work on their animal culture. Northeast is different geography. What most companies don't realize is that the same feed recipe won't work there and it has to be localized for the state. This is where eFeed has the expertise to localize the nutrition for their farms hence giving them huge cost benefits. They would be able to procure their own raw materials and make their own feed. eFeed is aiming to make Northeast as a success case study given then demographics and climate."



Vetline participated in ETABS 2022

Vetline, A Division of SIMFA Labs Pvt. Ltd. has recently participated in a two-day e-conference “Emerging Trends in Agricultural and Biological Sciences” (ETABS, 2022) organised jointly by “Society for Bioinformatics and Biological Sciences” and “Applied Research for Development organization” on 14th and 15th January 2022. Two research papers in the form of oral presentation were presented by Vetline's Global Technical Manager Dr. Srijit Tripathi. The topic of the first research paper presented was “Effect of Exogenous Supplementation of Nutritional Emulsifiers on Growth and Performance in commercial Broiler Birds” wherein he has highlighted that how addition of emulsifiers in the broiler birds diet leads to significant improvements in the production performance, as well as, discussed about emulsifiers role in reducing the feed cost. He added, Inclusion of a good quality emulsifier can help the farmers and feed millers to increase their overall profitability. Another paper was also presented by Dr. Srijit Tripathi in the conference that highlighted the beneficial effects of one of Vetline's product Bytox BHK in commercial Broiler Chicken. The trial results have shown significant increase in the Body weight of Broiler birds with tremendous decline in medication cost by using Bytox BHK regularly (as per the protocol) in the drinking water of birds.

Dr. Srijit Tripathi said that Vetline is a research-based organization where we are continuously working to develop result oriented and sustainable solutions to its customers. The organisation led by Executive Director Mr. Sumeet Singh Bhatia and Director Mr. Dilraj Singh Bhatia is determined towards achieving its vision and Mission.



Subscription Rates

Time Period

1 Year INR 1000 USD 160

3 Year INR 2500 USD 250

Lifetime INR 8000 USD 800

(Life Time Period 10 Years)

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Company Name : _____

Postal Address : _____

City : _____ State : _____ Mob. No. _____

Postal Code : _____ Country : _____

For more detail, contact:



Pixie Consulting Solutions Ltd.

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Editorial Calendar 2022

No.	Publishing Month	Article Deadline	Advertising Deadline	Focus
1	January	30-Dec-21	3-Jan-22	Disease Prevention
2	February	30-Jan-22	3-Feb-22	Nutrition Management
3	March	30- Feb- 22	3-Mar-22	Vaccination
4	April	30-Mar-22	3-Apr-22	Heat Stress
5	May	30-Apr-22	3-May-22	Cold Chain Management
6	June	30-May-22	3-Jun-22	Feed Production
7	July	30-Jun-22	3-Jul-22	Layers, Cages, Eggs
8	August	30-Jul-22	3-Aug-22	Genetics & Breeding
9	September	30-Aug-22	3-Sep-22	Biosecurity
10	October	30-Sep-22	3-Oct-22	Winter Management
11	November	30-Oct-22	3-Nov-22	Environmental Control System
12	December	30-Nov-22	3-Dec-22	Industry Outlook

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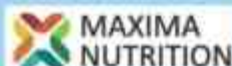
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