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Vol. 24 | No. 06 | June - 2022



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From the Editor's Desk



Production Technologies and Their Impact On The Quality Of Poultry Feed

Animal welfare needs to become the top priority in the commercial poultry sector to detect potential risks and minimize the impact of such risks. The latest technological advancement has given the poultry sector maximum scope to promote welfare through deliberative and efficient poultry feed management.

Technology has opened the door for the greater good and has now delivered its innovation through proper analysis and implication. The health of poultry animals is primarily affected by feed intake. The significant impact has altered the lives of the spread of diseases and prevention of potential risks in poultry animals. The quality has improved considerably due to feeding evaluation and monitoring.

The reason for using high-end technology for poultry feed is simple- high-quality feed helps overcome poultry management challenges. The production technology has largely impacted feed evaluation, thereby providing accurate information on the composition, ingredients, and suitability for poultry animals.

The nutrition requirement is thoroughly analysed, and testing of feed regularly has brought contamination at bay, thereby assuring transparency. Feed evaluation is critical since elements from the same class have nutritional differences, and here is where the technological aspect comes into the picture.

Personnel, machines, and processes are all involved in turning high-quality ingredients into high-quality feeds. If any of these three components are of poor quality, consistent production of high-quality feeds is improbable. However, ensuring that humans, machinery, and procedures are "blended" together toward the objective of efficient production of high-quality feeds is as crucial.

The production technology has impacted the quality of feed to a greater extent as it also delivers the use and development of enzymes and prebiotics in poultry feeding. Feed Additives have also helped reduce the effect of diseases, and the mixes have acted as a stimulator for increasing poultry animals' immunity.

Various aspects of feed manufacturing technologies, like processing and feeding systems, are advancing. The wake of new production techniques has made feed processing easier, and automated methods are progressively being used to manage the whole production system.

Feed producers are now producing bulk produce with high-quality products at fast speeds, which is attributable to automated feed process technology. Automated feed facilities transmit the feed load and procedures, as well as ingredient receipt data, automatically. Improved production rate, inventory monitoring, enhanced efficiency, and higher processing monitoring have paved the way for automated feeding systems.

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- Unpublished material of industrial interest, not submitted elsewhere, is invited.
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- Publisher, Printer Mrs. Bhavana Gupta on behalf of Pixie Publication India (P) Ltd. Karnal Printed at Jaiswal Printing Press, Railway Road, Karnal
- Published at : C/o OmAng Hotel, Namaste Chowk, Near Janta Petrol Pump, KARNAL - 132001 (Haryana) INDIA
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With increasing consumer expectations for animal welfare, broiler production in completely housed system raises questions.

From hatch to harvest, broilers eat, drink, and grow within commercial production systems. The application of biosecurity and responsible animal husbandry is a must regardless of the scale of production.

Commercial broiler chickens have been selected for their rapid rates of growth, high carcass yields, with particular regard to their breast, and ability to thrive in modern production systems. They are often raised at relatively high stocking densities that range from 30 to 40 kg of live weight/m². An ever-present concern under these intensive conditions is the behavior and welfare of birds.

On a worldwide basis, there is an evolving effort to ensure that animals are raised with concern of their natural behavior. A focus on animal welfare is the rule rather than the exception. This desire to improve welfare has led to the establishment of standard processes and practices around such things as stocking density, light regimen, air quality, water hygiene, ammonia emissions, and incidence of footpad dermatitis, to name a few. Interestingly, there is a growing body of scientific and industry evidence that a beneficially balanced intestinal microbiome is associated with an improvement in the well-being of poultry and consequently in their performance.

How can probiotics play a role in behavior?

The capacity of broilers to digest nutrients from their feed requires a healthy intestinal tract. Facing disease challenges, not only to survive, but to thrive under commercial conditions, will be the biggest drivers of performance and economic success. Daily feeding of effective probiotic supports all of those aforementioned capacities. It can improve each of the measured outcomes of poultry production, including, but not limited to, rates of growth, feed efficiency, flock uniformity, mortality, and postharvest condemnation.

In human health, the study of the microbiota-gut-brain axis has advanced greatly in recent years as investigators seek to understand the interaction of probiotic strains and cognitive functions (Bested et al., 2013 ; Carabotti et al., 2015). Interestingly, specific strains of probiotic bacteria, including strains of *Bacillus subtilis*, have been shown to affect patterns of behavior (Hu et al., 2017). In humans and in mice (Ezenwa et al., 2012 ; Foster et al., 2013), supplementation with probiotics – and their action on commensal microbiome – led to a release of neuroendocrine factors that subsequently affected the relative abundance of neurotransmitters, such as serotonin (involved in the feeling of well-being), and neuronal regulators, such as tryptophan, in the gut and in the brain. Tryptophan (essential



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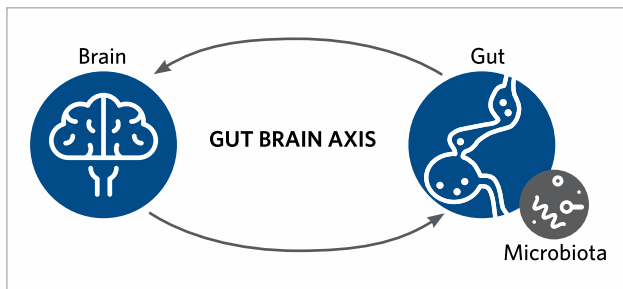
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amino acid) is pre-requested in the biosynthesis for serotonin and melatonin.

Figure 1: Gut brain axis synthetic representation: 90% of Serotonin (molecule of happiness) is produced in the intestine.



In the poultry industry, beside improvements on productivity, the daily feeding of probiotics is assumed to positively influence the welfare of broilers and layers (Yano et al., 2015; Almeida Paz et al., 2019). The cellular mechanisms underlying behavioral changes that impact welfare in avian species may be similar to those described above in mammals.

What can we expect?

A broiler experiment was conducted to determine the effects of a combination of the two most documented probiotic strains, found in GALLIPRO® MS. Two thousand male chicks (Cobb Slow) were randomly assigned to one of four treatment groups (50 birds per rep, 10 reps): 1) a treatment group fed daily with antibiotic growth promoter (Halquinol, HAL), 2) a treatment group fed daily with GALLIPRO® MS at 400 g/T (GPMS), 3) a treatment group fed daily with Probiotic E at 500 g/T (PE) and 4) a negative control group (NC). Halquinol, GALLIPRO® MS and Probiotic E were included in all diets from day 0 till the end of the trial. Zootechnical performance data, such as feed intake, body weight, feed conversion ratio and mortality (%), were collected on a weekly basis. In addition to those data, the effects of treatment on behavior and on plasma concentrations of neurotransmitters were examined using an approximation test at 42 days of age and at 40 days of age, respectively, with the latter test sampling 8% of broilers from each treatment.

Approximation test: evaluation of the relative reactivity of broilers when an assessor enters their pen and attempts to touch them for 3 minutes.

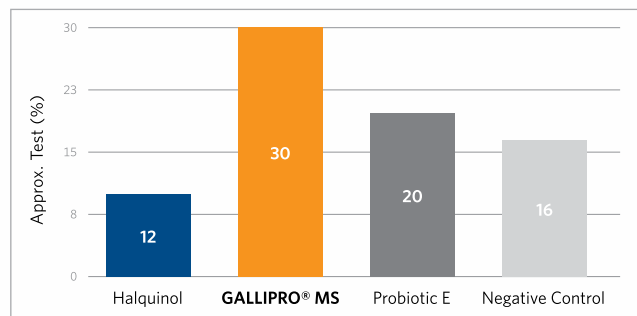
The zootechnical results for the different treatments are summarized in the Table 1 below.

Table 1: Zootechnical performance by treatment group at 42 days of age.

Treatment	BW(g) corr	FCR corr	Mortality (%)
Halquinol	2772 ^b	1,62 ^a	2,6
GALLIPRO® MS	2878 ^a	1,56 ^b	1,9
Probiotic E	2854 ^a	1,58 ^b	3,0
Negative Control	2808 ^b	1,61 ^{ab}	3,2
P value	0,042	0,047	0,768

Daily feeding of GALLIPRO® MS and Probiotic E resulted in significant improvements in final body weight and feed conversion ratio ($p < 0,05$; both corrected on mortality) as compared to the NC and HAL groups. Empirically speaking, the group fed daily with GALLIPRO® MS exhibited the lowest rate of mortality. Regarding behaviors, results obtained with the approximation test are shown in Figure 1.

Figure 1: Evaluation of the relative reactivity of broilers based on the percentage of birds that can be touched by an assessor in 3 min.



Birds in the GALLIPRO® MS group were the least reactive in the Approximation Test, indicative of their relative state of calmness. In contrast, birds fed diets containing antibiotic (HAL) were the most reactive and the least calm. The magnitude of reactivity of the remaining groups was higher when compared to the GALLIPRO® MS group.

Serotonin (5-hydroxytryptamine; 5-HT) is best known as a neuro-transmitter critical for the development and proper function of the central nervous system. Remarkably, 95% of the body's serotonin is produced in the intestine. Several publications report a strong positive correlation between health of the intestinal mucosa and production of serotonin; the healthier the intestinal mucosa, the higher the concentration of serotonin produced by the birds. In parallel to Approximation Test evaluation, Serotonin levels in blood were measured at Day 40 (Figure 2).

Figure 2: Blood circulating serotonin (5-HT) levels in broilers at day 40 $P < 0.05$ significant different from control.

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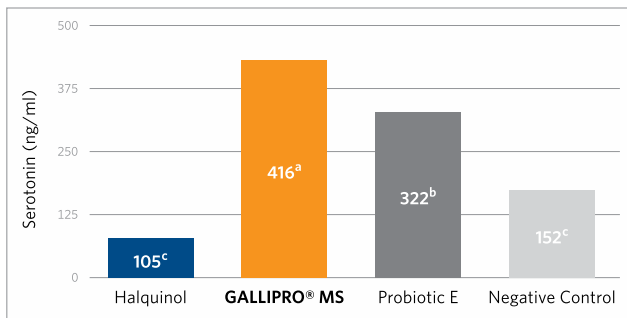
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Combining the outcomes of the Approximation Test with the production of serotonin leads to the conclusion that daily feeding of GALLIPRO® MS, and its actions in the gut and on the microbiome, results in calmer birds at harvest. With increased calmness, fewer injuries and better carcass quality would be expected.

Summary of results

GALLIPRO® MS significantly and positively impacts zootechnical performance

These effects can be explained by several major mechanisms:

- The strain of *Bacillus subtilis* found in GALLIPRO® MS has the ability to form biofilm throughout the intestinal tract (Konieczka et al., 2018). Working collectively in the biofilm, these organisms are able to produce a high concentration of digestive enzymes that can vary with the nutrient sources around them. The action of these enzyme makes more nutrients available to be absorbed by their hosts. In addition, their presence competitively excludes potentially pathogenic organism from attaching to the mucosa.
- At the same time, the specific strain of *Bacillus licheniformis* in GALLIPRO® MS produces the antimicrobial peptide called lichenysin which actively inhibits the growth of *Clostridium* spp. and thereby reduces the risk of dysbacteriosis or enteritis.

GALLIPRO® MS significantly and positively impacts the behavior and welfare of broilers

- Birds fed daily with GALLIPRO® MS were calmer than their peers in other treatment groups. Also they had higher concentrations of serotonin, which is known to positively impact the feeling of well-being in animals. Both results must be seen as an improvement in the welfare of the birds.

All together, these results open a new era for choosing to use probiotics. Daily feeding of GALLIPRO® MS to commercial broilers was shown to be beneficial in terms of performance and animal welfare.

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Cool A Chick

Introduction

Poultry is one of the fastest growing sectors of livestock industry in India. Environmental variation is one of the major factors that affect sustainability of livestock production systems in tropical climate. Heat Stress decline production performance and death of chicken results in adversely affects the return from the enterprise. Heat stress has an adverse effect on egg production, egg weight and shell quality of laying hen. Climatic variables like temperature, humidity and wind speed that directly affect the mechanism of thermoregulation and rates of heat exchange by all animals. Heat stress is a major factor that decreases productivity and reproductive efficiency of livestock due to lower feed intake and negative energy balance. Temperature and relative humidity are two primary environmental factors in that determine the heat stress level in livestock. Heat stress has detrimental effects on egg production, egg quality of laying hen and reduced growth rate in broiler production. Exposure of environmental stress during the growing period of broilers results with undesirable meat quality. Heat stress has adverse effects on behaviour, welfare and immunity of poultry and decreases the egg production resulting in massive economic losses of farmer. The management approaches to minimise the adverse effect of heat stress in poultry production viz., provision of ventilation, density of bird, nutritional manipulation, supplementation of minerals and electrolyte. Controlling the environmental variation is a critical to successful poultry production and welfare. Increase of temperature will lead to increases etiologic bacteria and parasites around the animals in surrounding environment. Climate change influences the emergence of disease and their transmission due to increases vectors, pathogens

Heat stress adversely affects the efficiency of broiler production and

their meat quality. High environmental temperature and lead to reduced feed intake, lower body weight, and lower feed conversion efficiency. Exposure of bird to high solar radiation is coupled with depression of chemical composition and meat quality in broilers industry. Exposure of high temperature during the growing phase of broilers has been related with poor meat characteristics of broiler chicken and loss their quality. Moreover, exposure of heat stress during transportation of birds from production farms to processing centre has been losses meat quality. Exposure of laying hens to climatic stress also results in a significant decrease in egg production and egg quality. Various author reported that reducing egg production in hot weather due to decrease in feed intake, reducing the uptake of available nutrients and decreases digestibility of different components of the diet. So, egg production is inversely correlated with environmental temperature beyond the critical limit. laying flock in high temperature shows disturbances in acid-base balance in the blood as result of hyperventilation, the birds gasp there is excessive loss of CO₂ gas from their lungs.

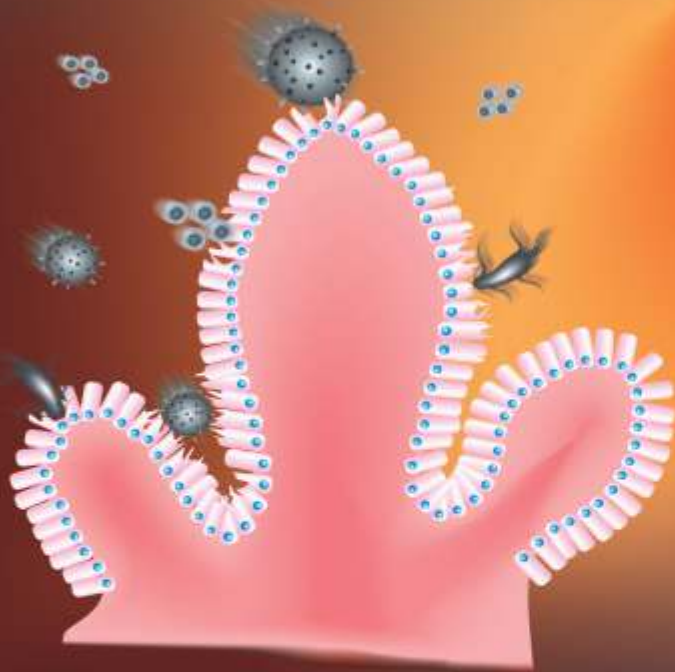
Effect of heat stress on Reproduction

Heat stress has a great impact on the reproductive performance and egg quality of birds. High temperature with high relative humidity has more detrimental effect on reproduction of animal and leads to reproductive failure and poor egg quality

Effect of heat stress on behavioral and physiological responses.

Under high environmental temperature, birds change their behavioural and physiological responses to maintain their body temperature through seeking thermoregulation. Birds are subjected to under heat stress conditions time spend less in feeding, more in drinking, panting, and wings elevation, move towards cooler surfaces.

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Negative effects on Health Status

Heat stress has negative effects on health status of birds leading to changes in physiology, metabolism, hormonal and immune system. High temperature results in lower levels of total circulating antibodies. Inflection of the immune response by the central nervous system (CNS), and is mediated by a complex network of nervous, endocrine and immune systems.

Management approaches to reduce heat stress

To reduce the heat stress in poultry is the multidisciplinary approach.

Modification of surrounding environment,

The surrounding environment is controlled by using various things such as fans, fogger with fan, cooling pads, curtain, static pressure controllers and thermostats. Provision of intermittent light had positive effect that related to lower heat production in poultry. The orientation of building, insulation and roof overhang are influence the temperature inside the poultry house. Air movement inside the house is important for efficient ventilation. Use of sprinkler and fogger with fan reduces the temperature inside the house on hot climatic condition. Environmentally controlled houses used mechanical ventilation systems and air movement is produced by fans and exhaust fan in the building.

Ventilation system

Good ventilation system is essential for heat stress management. It removes the moisture loaded air from the poultry house and enter equal amount of fresh air from outside. Ventilation system should be maximized as the air movement assist removal of ammonia, moisture and carbon dioxide from the poultry house and enter fresh oxygen from outside. Proper ventilation houses can provide consistent airflow patterns. Evaporative cooling pads works on the same cooling principle as foggers, air is cooled inside the house when it passes through the cooling pads. Circulation fans are recommended for proper ventilation in a good ventilated house for maximizes air movement over the birds to increase convective cooling.

Bird density and nutritional management to reduces the heat stress in poultry.

Nutritional management Reduce the heat stress in poultry by nutritional management approaches. Decrease in feed intake and increase water intake of poultry under hot climate to control the body temperature. Feeding of laying hens during the evening period has been found to improve laying rate and egg shell quality through increased calcium intake. Vitamins and mineral supplementation has been determine to decrease mortality and improve growth performance of poultry birds during heat stress as because heat stress increases excretion of mineral from body and decreases the serum and liver concentrations of vitamins and minerals. Addition of fat and reduction of excess fat in poultry ration are recommended to minimise the adverse effect of heat stress. The addition of fat up to 5 % in the diet increases the energy value of feed constituents and decreases the rate of food passage in the GI tract and thus increase nutrient utilisation. Supplementation of minerals like ammonium chloride (NH₄Cl), sodium bicarbonate (NaHCO₃), sodium chloride (NaCl), potassium chloride (KCl) and potassium sulphate (K₂SO₄) in drinking water of poultry are beneficial effect under heat stress condition. Supplementation of vitamin C under high temperature is most effective to reducing mortality rate in broiler and laying hens. Vitamin C acts as antistressor and growth stimulant in commercial broiler production. Supplementation of vitamin E during heat stress is beneficial to laying hens, maintain the biological condition.

Water intake At high temperatures, Chickens consume more water than feed. The reduced water intake is primarily behind the decrease in production.

Symptoms

The signs of heat stress in poultry are

- panting with open mouth, elevated their wings and squatting near to the ground,
- droopy acting,
- slowness and lethargic closed eyes,

- lying down,
- increased water intake,
- decreased appetite,
- drop in egg production,
- reduced egg size,
- poor egg shell quality,
- reduced body weight,
- gasping

Prevention & treatment

Cool-A-Chick is a unique herbal product specially made for chicks to make them cool in summers. It is a powerful coolant with probiotics and aspirin extracted from willow bark fortified with vitamin C stress reliever in summer. Save your Flock with Cool-A-Chick Drops. This is a versatile product and has diversified benefits which are as follows:

Allows to combat heat stress

- Prevents dehydration
- Provides ready source of energy
- Improve Immunity
- Enhances intestinal microflora depleted due to heat stress
- Maintains calcium-magnesium level, essential for egg shell formation
- Prevents mortality due to heat stress
- Maintain performance and production
- Prevents dehydration & panting.

Conclusion

It is concluded that heat stress adversely affects the commercial poultry production through reduced feed intake and high mortalities. The negative effects of heat stress on broilers and laying hens, reduces growth and egg production to deteriorate egg quality. High environmental temperature increases mortality of poultry due to inhibition of immune responses. Feeding management practices such as changes in energy: protein ratio, wet feeding, feeding time, drinker type and height improves performance under high environmental temperature. Influence of varying sources of dietary electrolytes on the performance of broiler reared in a high temperature environment. COOL-A-CHICK is a very effective solution to solve this major problem in summer season.

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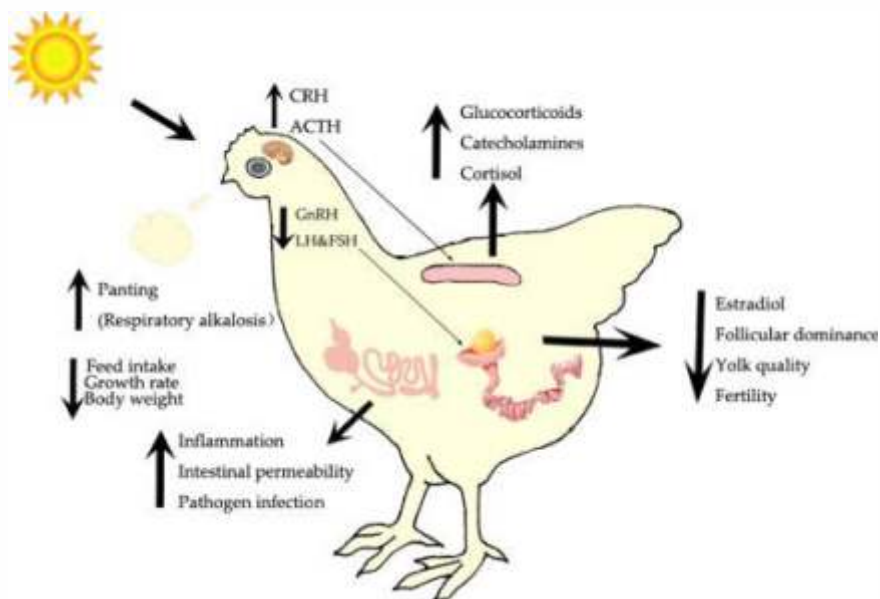
Heat Stress in Poultry

Heat stress is one of the most important environmental stressors challenging poultry production worldwide. It results from a negative balance between the net amount of energy flowing from the bird's body to its surrounding environment and the amount of heat energy produced by the bird.

In this condition there is markedly reduction in growth, reproductive performance, and egg production in poultry birds. Sometimes due to heat stress there is higher mortality seen.



Dr. Gopal Barapatre
Asst. Product Manager,
Biozene, India



Economic impact of heat Stress

Due to heat stress there is serious loss in growth, production & performance. In a recent study, broilers subjected to chronic heat stress had significantly reduced feed intake (16.4%), lower body weight (32.6%), and higher feed conversion ratio (+25.6%) at 42 days of age.

In layers a 12-day heat stress period caused a daily feed intake reduction of 28.58 g/bird, resulting in a 28.8% decrease in egg production, 31.6% reduction in feed conversion rate, egg quality may also decrease.

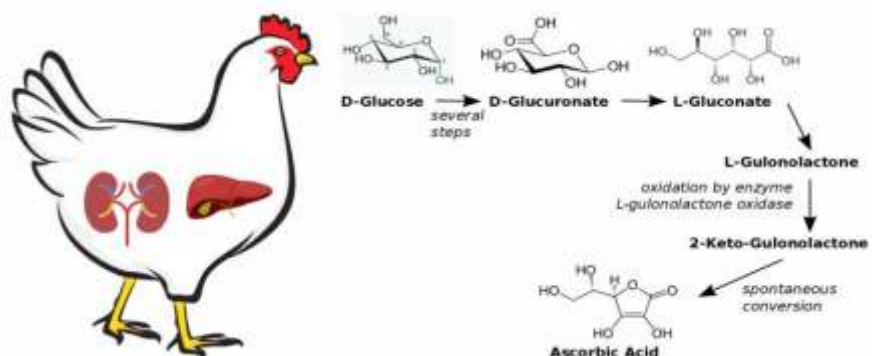
Temperature & Humidity Relationship: Heat Index Chart

Temperature

The thermoneutral zone is the range of environmental temperatures that an organism can maintain their body temperature. For most poultry, the thermoneutral zone is between 60 and 75 F.

Humidity

High humidity decreases poultry heat loss from the lungs, which makes the birds more prone to heat stress.



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Biosynthesis of Vitamin C in Poultry

Poultry birds have the capacity of synthesized Vitamin C in the liver & kidneys in the presence of L-gulonolactone oxidase enzyme. The amount of vitamin C produce depends upon sex, age & physical status, during heat stress biosynthesis of vitamin C affected due to oxidative stress on liver & kidneys, thus endogenous supply of vitamin C not fulfil the requirements to fight against the heat stress.

Natural replacer is the ability to fulfil the requirements because they are activates the biosynthesis of vitamin C by mimicry effect as L-gulonolactone oxidase enzymes & also supports liver & kidney functions.

Role of Vitamin C during HEAT STRESS

- Protects cells from oxidative damages due to heat stress
- Repair cells & tissues damages during heat stress condition
- Prevents immunosuppression due to heat stress
- Protects gut cells from inflammation & prevents summer enteritis
- Strengthen body ability to fight against heat stress
- Provide energy reduces mortality & improves egg & meat quality

Supremacy of Natural Vitamin C over Synthetic Sources

Natural Vitamin C	Synthetic Vitamin C
<ul style="list-style-type: none"> • Highly Stable • Higher bioavailability • Does not affected by gut environment • Fulfil the requirements • Supports vitamin C biosynthesis 	<ul style="list-style-type: none"> • Less stable • Poor bioavailability • Deteriorated by gastric juices • Does not fulfil bodies requirements • No effect on biosynthesis of vitamin C

Prevention Strategies

Housing Management

- Control temperature by insulated roof, proper ventilation, Fogging / spraying
- Regular Humidity monitoring, Use of fan & exhauster
- Proper lighting schedule

Stocking density

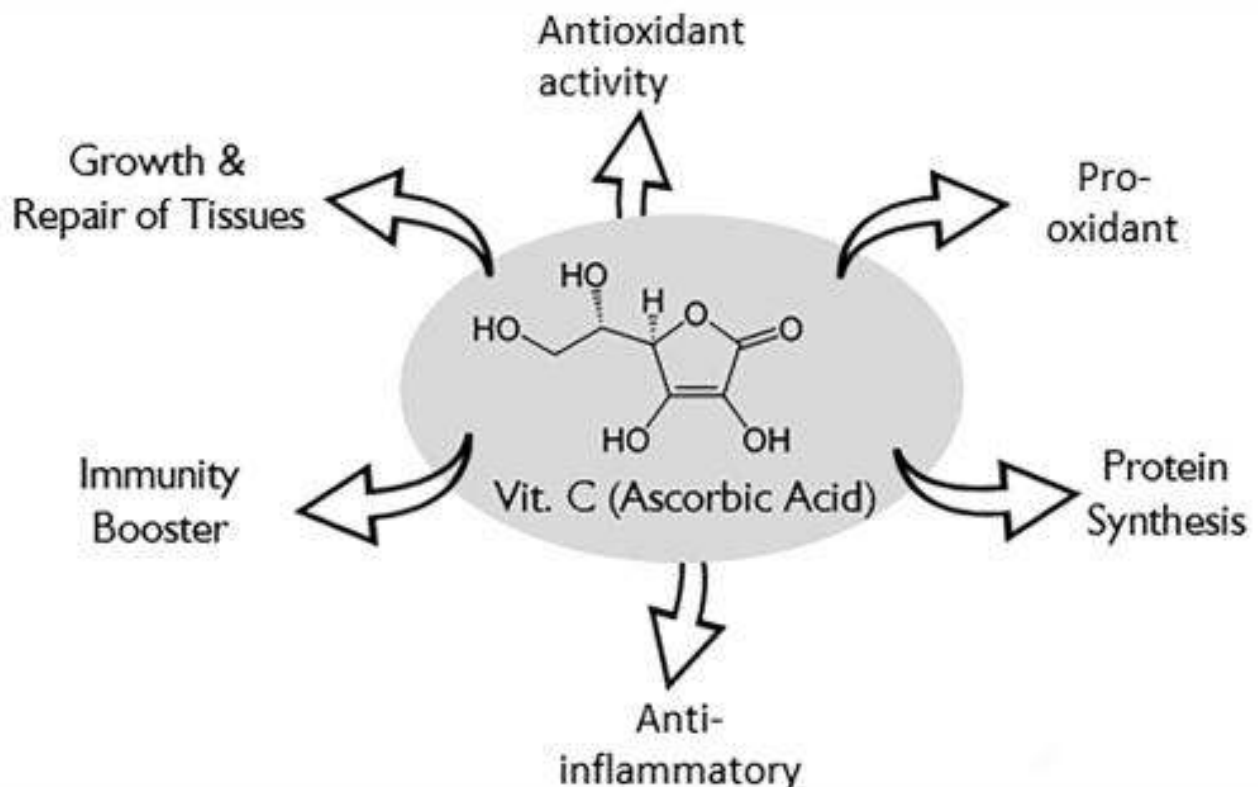
Overcrowding should be avoided & maintain optimum space required for birds

Watering

- Cool water supply, overhead tanks & pipe system should be covered to keep cool water during noon
- Adding electrolyte to drinking water
- Increase number of drinkers

Feeding

- Avoid feeding at hot time, one third of daily ration should be given in the morning & two third in the late afternoon
- Balanced & digestible feed should be given, using feed pellet instead of mash feed
- Supplementing vitamins & minerals prior to summer start, specially Vitamin C which is having capability to protect birds from heat stress



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Extreme heat stress adversely affects production, performance and farm profitability

Modern high performing poultry birds face difficulties in coping with heat and other stressors resulting into thermo-intolerance, reduced feed intake, poor growth, FCR, poor shell quality, reduced egg production, hatchability, increased morbidity and mortality. There is a need to strengthen antioxidant defense of birds by supplementing potential antioxidant.

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Cost Effective Feed Production and Feeding Practices in Layer and Broiler Poultry Production



**Dr. Tapendra Saini,
Dr. Sakshi Vaishnav,
Dr. B.L Saini**

Introduction

Poultry sector in India has seen a paradigm shift in both its structure and operation. Initially due to the religious sentiments of people of India poultry was considered a backyard based activity by a small stratum of society. But with the change of attitude of the masses towards the poultry products, people began to see poultry products as a cheap and readily available source of protein. Poultry industry has emerged as the fastest growing segment not only in the livestock sector but also in the agriculture sector as a whole. The sector further flourished with the development of various high producing lines and strains. The present population of poultry birds in India as per the 20th Livestock Census is 851.81 million that has increased by 16.81% as compared to the previous livestock census. The production of eggs and broilers has been increasing at the rate of 8-10 percent per annum.

Poultry feeding is one of the most important aspects of the poultry industry

and is itself developing as a separate enterprise that is related to exclusively poultry feeding. The reason is that in poultry farming the feed cost accounts for the 65-70 percent of the total farm expenses. Thus constant efforts are being made to reduce this cost so that the poultry production can become more economical and the farmers can get more profit. In this avenue there is a need to further improve the scientific knowledge so that the locally available low cost feed resources can be utilized in the feeding of poultry birds.

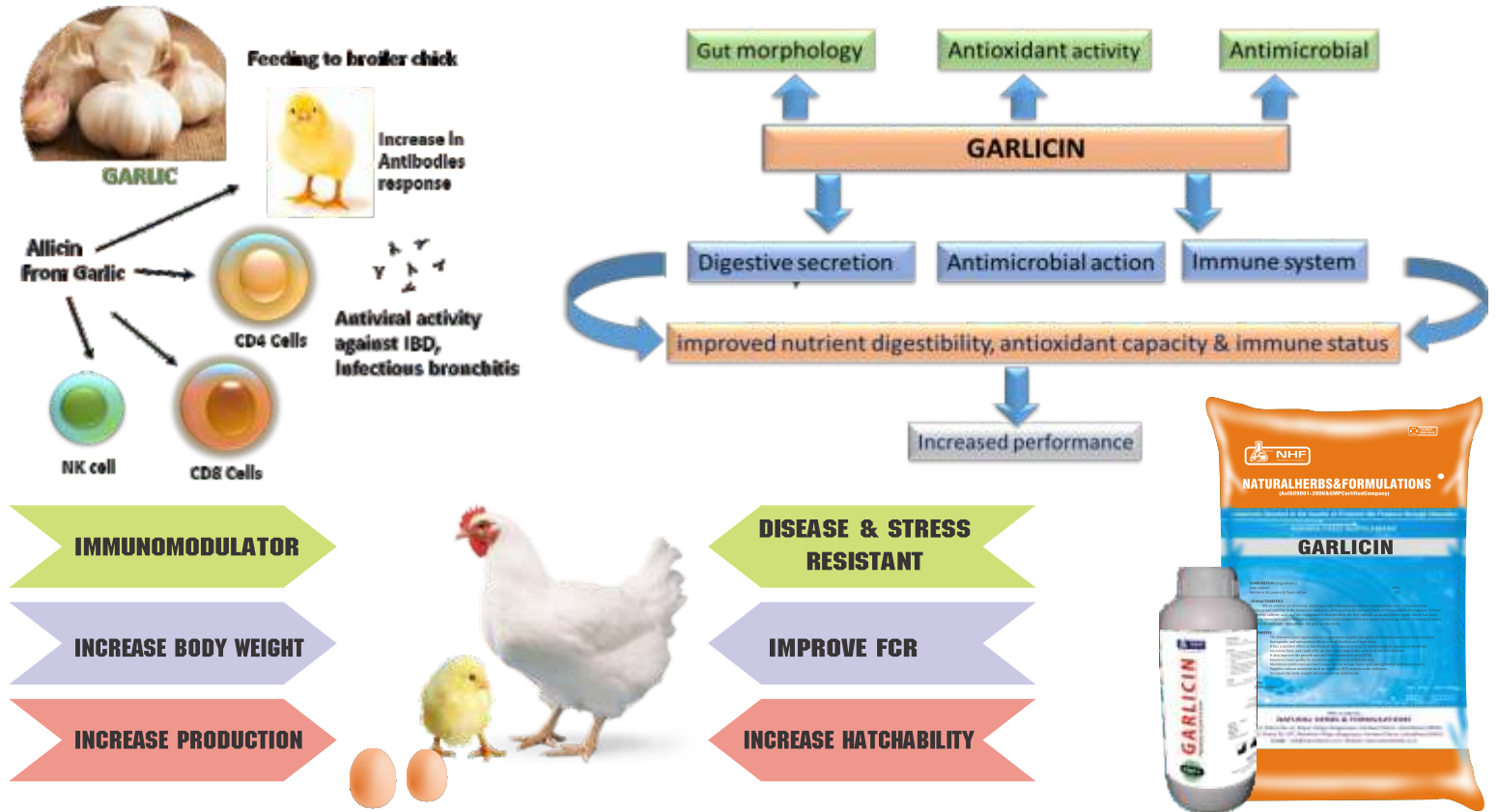
Cost effective feed production

The cost effective feed production will be a boon to the small and marginalised poultry farmers or the backyard poultry farmers. Attempts to use locally available cheap by-products may help end consumers by lowering feed costs, which in turn can lower the total cost of production of meat and eggs, making them more affordable in rural India. The poultry being a monogastric competes directly with the human population in terms of the food resources. Maize and



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soya bean are the major cost determining factor for the poultry feed. With the ever increasing demand of human population for these ingredients the supply of such feed ingredients are not adequate. Current demand for poultry feed in India is estimated between 25 to 29 million tonne in 2020 and is expected to increase to 39 million tonne in 2025 at the current growth rate of about 6% in poultry production. Therefore the search for the low cost alternatives for decreasing the cost of feed has become inevitable.

residual part of the feed can be utilized as a dietary source.

For the formulation of a cost effective feed for the layers and broilers we have to first identify the alternative resources that can be used for the feeding of these birds. The prerequisite of such ingredients is that they should not be a part of human consumption in any form. The other condition to be satisfied is that the ingredient should not possess a harmful effect either in long term or short term on the bird and also no effect

feed enzymes could significantly alleviate these issues.

A large part of feed cost can be reduced if there is a shift from the traditional protein and energy sources to the sources that are produced as by product by humans. The utilization of agro-industrial by-products and unconventional feed stuff can significantly reduce the feed cost. But before incorporation of such ingredients into the commercial broiler and layer feed on a regular basis their effects and influence on the production performance of these ingredients need to be established. If the unconventional feeds have some sort of anti-nutritional factor that pose a threat to the production performance of the birds so a methodology that is economically feasible should be employed to deactivate the anti-nutritional factors. Inactivating such anti-nutritional factors increase the nutrient availability of such ingredients and lead to an efficient utilization of these products. The nutritional value of a number of maize and soybean meal replacers has been investigated, and despite their promise, their use in practical formulations is minimal due to limits imposed by many anti-nutritional, technical, and socioeconomic issues. These limits must be addressed by the feed industry with the assistance of scientists, planners, and policymakers.

Nutrients	Sources
Carbohydrates	Cereals, cereal by-products, animal fats, vegetable oils
Protein	Plant protein (by-products of oilseed crops), animal protein (meat, bone, feather meal, etc.)
Mineral	Calcium supplements (limestone, shell grit), calcium and phosphorous supplements (CaHPO ₄ , bone meal), trace minerals (Cu, Fe, Mn, Zn, Co, I, Mo, etc.), and sodium sources (NaCl, NaHCO ₃)
Vitamins	Vitamin premixes
Amino acids	Lysine, methionine, threonine
Feed additives	Enzymes, antibiotics, etc.

Cost effective feeding practices

A significant improvement in the utilization of feed and thereby reducing the cost of feed is the proper processing of feed. Processing is the treatment of materials during or soon after mixing with the goal of providing a balanced diet suited for poultry feeding. This method generally involves some degree of material grinding, which enhances admixture consistency, gives particles of a size thought to be suitable for the target group, and may make nutrients more available for digestion in the birds. Following that, the feed may be heat treated or pelleted.

As the poultry production systems either layer or broiler are broadly divide into three categories i.e. commercial, semi-commercial and the backyard or scavenging system. There is a wide range of alternative feedstuffs available for the

Feed formulation is key aspect and necessitates a good understanding of the following points:

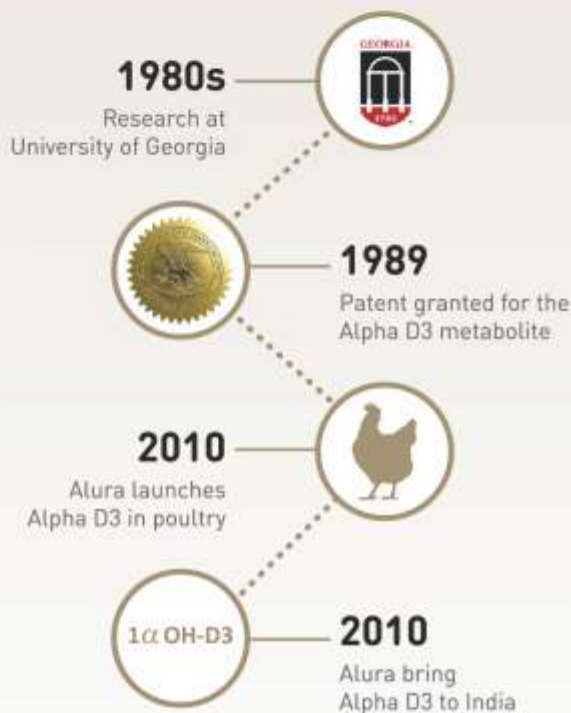
- Dietary nutrient requirements of the class of poultry (layers, broilers, etc.).
- Feed ingredients in terms of nutrient composition.
- Cost of feed ingredients.
- Availability of feed ingredients.

An approach that can be explored is developing specific strains of poultry that have a low feed requirement and that give a faster rate of production. The less the time required by the bird to grow to its full potential the less is the feed requirement. But this approach has its limitation as it cannot reduce the feed cost significantly and the time required by this method is more. So an alternative is to reduce the cost of feed by use of unconventional feed sources or employ such feed processing aid that the

should be observed on the final consumer of the produce. The ingredients should be tested for their effect on the production performance of the bird before their incorporation in the feed formulation.

Due to the large gap of demand and availability of feedstuffs a solution that can be looked upon is by utilization of structural carbohydrates and phytate phosphorous. With the growing demand for the reduction in the cost of feed a shift of focus is required from formulating a new feed formulation to how to utilize the existing formulations efficiently. Many feed components, such as B-glucans, pentosans, mannans, cellulose, lignin, and phytic acid, are indigestible to chickens. These non-digestible feed components typically cause digestive stress in chickens, resulting in decreased nutrient utilisation and moist litter issues. The addition of

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feeding of poultry birds in all three systems. But the greatest potential for utilization of these feedstuffs is in the traditional scavenging and semi-commercial systems. Because just a portion of the feed demand is obtained from commercial compounders under the semi-commercial system, there is room for on-farm mixing or dilution of purchased feeds with locally available, alternative feedstuffs. Alternative feedstuffs, which are locally available, can be utilised to supplement the scavenging feed base in low-input family poultry systems.

The main energy source for the poultry industry is the maize grain. But the production of maize grain has not increased at par with the livestock and poultry sector growth. So as an alternative to reduce the demand of maize in the poultry feed different combinations of maize can be tried with other low cost cereals such as pearl millet, finger millet and sorghum. The incorporation of these grains and oilseed residue has proved to be beneficial for the poultry industry development. Another benefit with the use of these cereals is that they can be safely used as a part or solely as dilution of protein-mineral concentrate used in broiler ration during finishing stage. Other alternatives available at current time that can replace maize as an energy source are broken rice, rice polish, de-oiled rice bran, maize grit, maize germ meal, maize germ cake, under sized wheat, dried distillery grain ghee residue, etc. Along with these edible oils and fats contribute significantly to the replacement of maize as an energy source. Recently emerging energy sources, such as bio fortified maize, may meet the requirements of

limited amino acids of genuine maize grain.

As a protein source the main ingredient in poultry feed is soya bean meal. A significant reduction in the feed cost can be possible with the use of alternative for soya bean meal. Studies have shown that inclusion of rape seed meal and sunflower meal each at 10 percent level replacing soya bean meal have supported optimum production performance and profit margin in broilers. Incorporation of ground nut meal and niger meal in 75:25 ratio was sufficient for economic egg production. The use of these alternatives come with certain drawbacks like for mustard cake (glucosinates, tannins, erucic acid, colour etc.), sunflower cake (high fibre), safflower cake (high fibre, low availability), niger cake (export and cost competitiveness) and ground nut cake (aflatoxin, fibre and cost). The other available options for the replacement of soyabean meal are guar meal, cotton seed meal, sesame meal, rice gluten meal etc. The animal protein sources such as meat cum bone meal, meat meal and blood meal containing the protein in the proportion of 42-55%, 65-75% and 78-82% respectively are also available for poultry feed. The inclusion of fish meal is restricted in poultry feed due to the non-availability of good quality fish

meal. The poultry slaughter house waste can also be used safely at the rate of 5% in diet replacing soya bean.

Conclusion

The faster growth rate of poultry sector in our country and thus rising demand of major poultry feed ingredients such as maize and soya bean meal, major initiative needs to be taken to identify more new feed resource and access their quality and availability. The feed alternatives should be searched at local level as locally available materials are cost efficient. The availability of nutrients and safe level of inclusion of these newer feed sources in the poultry should be accessed and fixed. Identification of the anti-nutritional factor present in these alternatives and an efficient method to detoxify them should be done at all level of research. When the demand for conventional feed ingredients increases, we can switch to unconventional feed components with relatively safe inclusion levels to increase production profit. The main source of concern, however, is the current lack of storage, cold chain, transportation, and processing facilities. High feed costs result in an increase in manufacturing expenses, which translates to higher prices. Another issue is a lack of quality standards, which leaves the country vulnerable to disease outbreaks.



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Managing Summer Stress in Poultry Animals

The combination of summer temperatures and humidity can be dangerous for poultry. Poultry growers should plan ahead for the long, hot summer



Dr. Yogesh Paharia
B.V.Sc ,M.V.Sc(Nutrition)

There are a number of steps growers can take to prepare for the hot weather. Most of these steps work better (for both you and your birds) if done before March & April . Some may require a small expense (such as new fan), but most only require an investment in time. Certain steps are time-consuming or require the fans not to be running. Therefore, they must be done before hot weather arrives and while birds are still small, or in between flocks. Plan ahead and do preventive maintenance projects early. There will be plenty of other issues that require your immediate attention on a daily basis once hot weather arrives.

General guide to the reaction of adult poultry to various temperatures. Heat stress begins when the ambient temperature climbs above 80°F and is readily apparent above 85°F. When a bird begins to pant, physiological changes have already started within its body to dissipate excess heat. Even before the bird reaches this point, anything that you do to help birds remain comfortable will help maintain optimum growth rates, hatchability, egg size, egg shell quality, and egg production.

Air Speed is Critical

Broiler chickens today do not perform well in heat-stress situations. Modern, tunnel-ventilated broiler houses will provide adequate house conditions if they are well maintained and properly managed. 400 feet per minute air speed

down the house that was fine just a few years ago is no longer sufficient. Many modern houses are capable of a minimum 600–700 feet per minute - some may manage 800–1,000 feet per minute - and all of it is needed with today's larger broilers.

Fans, and plenty of them, are what allow 600–700 feet per minute (or greater) air speed. They are the first line of defence against higher summer temperatures. Determining the number of fans based on a lower static pressure will reduce the available air speed. Fan blades and shutters also must be kept clean. Numerous field studies indicate that dirty shutters can reduce airflow by as much as 30 per cent.

Especially when growing larger birds, having enough air speed is critical. But just as important is having a uniform air speed from side-to-side and end-to-end of the house. Only about a third or more of your birds will receive adequate cooling if you have 700 feet per minute air speed down the centre of the house but only 300–400 feet per minute near the side wall. It is better to have 600 feet per minute throughout the house than to have 750 feet per minute in the centre and 350 feet per minute near the sidewalls.

Uniform air speed is critical but during extremely hot weather, you need a second line of defence: the cool cell system. To provide the most benefit, you must maximize the amount of wetted

Temperature	55° to 75°F	65° to 75°F	75° to 85°F	85° to 90°F	90° to 95°F	95° to 100°F	Over 100°F
	Thermal neutral zone. bird does not need to alter its basic metabolic rate or behaviour to maintain its body temperature	Ideal temperature range.	A slight reduction in feed consumption can be expected,. Egg size may be reduced and shell quality may suffer as temperatures reach the top of this range.	Feed consumption falls further. Weight gains are lower. Egg size and shell quality deteriorate. Egg production usually suffers. Cooling procedures should be started before this temperature range is reached	Feed consumption continues to drop. There is some danger of heat prostration(lying down) among layers, especially the heavier birds and those in full production. At these temperatures, cooling procedures must be carried out.	Heat prostration is probable. Emergency measures may be needed. Egg production and feed consumption are severely reduced. Water consumption is very high.	Emergency measures are needed to cool birds. Survival is the concern at these temperatures.



Balance is Important

- Prevention from the heat stress
- Maintain Optimum dEB
- Promote growth & development
- Protect dehydration & stress
- Heat stress makes birds more susceptible to
 - Coccidiosis
 - Mycotoxicosis Disease etc.



ZEACTIVE^{Vet} Electrolyte Powder



Dosage :
1-2 g/Liter of drinking water
or 500g/tonne of feed
(Inclusion may vary as per the environmental condition
or as directed by the veterinarian/nutritionist)



pad surface the air passes through. Dry pad area allows hot air to pass directly into the house and reduces the cooling effect of the wetted pad area (Donald et al., 2002).

Preventive maintenance on the pad system is just as important as fan maintenance. Clogged pads force the fans to work harder, reduce the wind-chill effect, and reduce cooling. The flutes should be free of dust, cobwebs and especially mineral deposits. Mineral build-up over time can eventually ruin a set of pads, and the only solution will be to replace them (Figure 3). Once the pad is wet, it needs to stay wet throughout the day until evaporative cooling is no longer needed at night. Allowing the pad to dry out too often decreases the cooling effect and allows for increased mineral deposition on the pads as the water evaporates and minerals are left behind.

Make sure the holes in the distribution header pipe along the top of the pads remain free of debris. Regularly check them to keep them clean and open. Flush the distribution line before charging the system in the spring to remove any dirt or debris that may have accumulated over the winter.

The flutes (holes) in the pads must be kept open. Flutes in the pads are notorious for collecting dust and cobwebs. Do not make matters worse by blowing grass clippings from your mower or brush hog toward the pads. Always aim the discharge away from the pads to keep clippings from being sucked into the flutes and restricting airflow.

Keeping the flutes open is sometimes just a matter of spraying water on them with a garden hose.

Keeping a reliable clean cool source of water available to poultry is essential to help the birds cope with high temperature. Because the excrete electrolyte during periods of heat stress electrolytes can be added to drinking water to replace those that are lost and to stimulate water consumption avoid placing water pipe near the ceiling where the water will gain extra heat line in which. Line in which water has become warm can be drained to allow cooler water to waterers. A second well or access to an emergency source of water should be

available in case the primary water source fail.

Heat Dissipation and Static Pressure

Birds must be able to dissipate about 12Btu of heat per hour per pound of body weight if they are to maintain their comfort level (Donald et al., 2012). As the air temperature near the bird increases above what is comfortable, its ability to dissipate heat from its body surface is decreased, forcing the bird to rely more on panting to cool itself.

Body Weight (pounds)	Airflow Per Pound of Body Weight (cubic feet per minute)
1 to 6	1.0
6 to 15	0.8
15 to 30	0.7

Panting should be avoided as much as possible. Typically, at a comfortable temperature, birds will lose about 5Btu of heat per pound per hour from their body surface and about 7Btu through breathing. Birds will increase their breathing rate and start panting as the air temperature rises above what is comfortable. If the air temperature reaches such a high level that panting can no longer maintain a normal body temperature, the bird's internal body temperature will rise. This results in severe heat stress and will lead to mortality if the situation cannot be corrected with supplemental cooling (Donald et al., 2012).

Take Advantage of Night-time Cooling

Do not overlook the potential for night-time cooling. Running fewer fans at night may save a little electricity but it is a lost cooling opportunity and could be costing you significant performance losses. One reason for this is relative humidity. Humidity is much higher at night (usually between 80 and 95 per cent). However, even at night, regardless of air temperature, birds rely on evaporation of water off their respiratory system to cool themselves.

High humidity makes it much more difficult for the bird to accomplish significant evaporative heat-loss off the respiratory system because the air it breathes in is almost as saturated as the

air it breathes out. If you maintain high air movement at night by running additional fans, you can increase the amount of heat loss and reduce the bird's need to cool itself (Fairchild and Czarick, 2005).

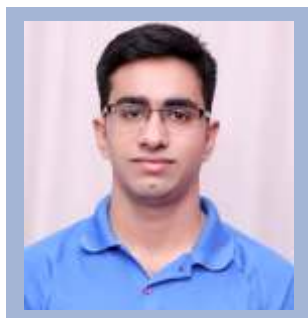
In addition, as the temperature drops at night, there is a larger difference between air temperature and the bird's body temperature. This makes it easier for air movement to pull heat away from the bird and lower its body temperature.

As its body temperature drops at night, the bird will regain the appetite it lost during the hot part of the day. However, increased feed intake will lead to increased heat production and the need to maintain increased air movement late into the night to provide optimum cooling (Fairchild and Czarick, 2005). Obviously, running more fans later into the night will use extra electricity, but the increased bird performance should more than offset the additional power costs.

The value of a summer management should not be underestimated. If the system is operating properly, it can improve litter quality, reduce dust levels, and improve the flock's rate of gain or production level. The key to operating any ventilation system is understanding how it works. In addition, a good maintenance program of cleaning, adjusting, and monitoring controls for the curtains or inlets will maintain system efficiency. Fans in any ventilation system should be cleaned and lubricated frequently, and fan belts should be adjusted periodically, especially during times of heaviest use. If foggers are used, they should be serviced periodically to ensure that they produce a uniform, fine fog.

Take every precaution to ensure that you have done all you can to protect your flocks and maximise potential summertime returns.

The Indian Feed Industry- Prospects and Challenges



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The Indian animal feed industry completed its 57 golden years in 2022. For the last few years the industry is undergoing an exciting phase of growth, and this trend is expected to continue in the coming years as well. This is a sizeable and scalable industry, one which is still quite untapped and hence has a great potential to be evolved on a global commercial level. This article thus aims to highlight the achievements of this industry as well as information about what makes it worth putting resources into for the coming years while not ignoring the hurdles that might be experienced in the process.

This is a well-known fact that the animal feed market in India is classified into three broad categories: Aqua Feed, Poultry Feed and Cattle Feed. The poultry

feed market has mostly been dominating in terms of its share in the animal feed market with almost 44% share globally. But interestingly of late, the aqua feed segment, which has been a late starter, has seen the maximum growth out of the three segments.

Though a major portion of the market is unorganized, the total size of the remaining portion which comprises the organized compound feed industry is INR 306.9 billion by value in India, and growing for the past few years with the growth rate of approximately 8%. Several factors which have been predominantly working towards this growth include the untapped potential of the market, ever increasing livestock population, growth of the end-user industries and the increase in domestic consumption of the



Fig. Mini Feed Processing Unit for Livestock and Poultry



animal products. Also, increase in the purchasing power of the population as well as favorable demographics of the country, from rural areas towards metros, are contributing to the same. The increase in disposable incomes in the metro cities is making people consume more animal products, as dairy products as well as meat, fish and eggs, which in turn, requires more feed of better quality. This is a major factor which will drive growth in the animal feed sector.

India currently has the highest buffalo population, the second highest goat and cow population and the third highest sheep population which is a clear indicator of how important a role feed market has to play in meeting the demand for feed products. Even the government has now realized the need to implement policies and schemes under its 12th Five Year Plan in the effort to improve the status of our animal feed industry and support the future demand.

Different Feed Industry Sectors:

The growth in the poultry industry and increasing demand for chicken per person which is already high in urban areas and now having its impact in rural areas as well. The cheaper availability of chicken is going to drive the poultry feed industry at a faster rate. India's consumption of eggs per person is lower on average than many other developing countries despite India being the third largest egg producer in the world. There is an immense scope for improvement in domestic consumption of eggs with better awareness for its health benefits, through designer eggs and hence a scope for improvement in the poultry feed sector. Also, stable feed prices, entry of more organized players and higher integration in the poultry feed industry will drive its growth.

Cattle Feed

The cattle feed business is currently already growing at a whopping CAGR of more than 30% since the milk producers have now started replacing the traditional feed with more nutritionally balanced compound feed, having realized the tangible benefits in terms of yield improvement. With one of the highest livestock population, India's cattle feed industry is not really tapping the entire potential of manufacturing feed for its animals. India is thus, an

attractive destination for international cattle feed manufacturers to enter and meet the growing feed demand clearly indicating that the sector has high potential for further growth and replacing the huge segment of unorganized players from this market.

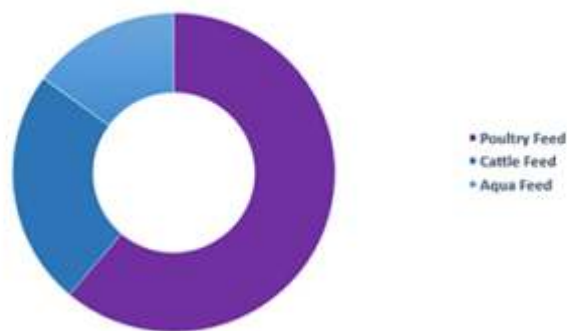
Aqua Feed

The aquaculture industry in India is suddenly thriving with a higher demand in the shrimp market which is leading to a sudden shooting up of growth in the aqua feed industry. There is also an increase in the demand for fish from India both domestically and internationally which requires more effort from the aqua feed market to maintain the demand for high quality fish available in India. The demand for fish is seeing a rise, especially globally, due to its high protein value, and comparatively considered to be a safer. Fish production is yet another huge initiative towards ensuring food security. The only major concern currently is that majority of aquaculture practitioners in India still depend on traditional feed due to its low price and easy availability. This is responsible for a slow transition towards commercial feed in our country. Hence, this is the opportune moment for international aqua feed industries or even new domestic players to come and establish themselves in the market.

consuming a higher proportion of poultry as well as dairy products. A healthy GDP growth and the increasing urbanization are complementing the same. The domestic poultry industry has seen maturation from backyard activity to integrated poultry farming on a large scale along with the acceptance of modern technology. This is currently an ongoing process with the transformation from a fragmented sector to now a more organized one, and is further driving the industry's growth on an overall level. Since most of all the source of carbohydrates in feeds are cereal grains, a fluctuation in the prices of these greatly affects the feed prices and hence the domestic feed market. Over the past few years, feed prices had seen an uptrend backed by high maize prices, continued strong demand from the poultry sector and limited supply. The prices have now been stable and are an important factor in driving its growth. Also poultry meat is preferred over other meats since it is considered more hygienic, more nutritious and is available at relatively cheaper prices than the others due to which the poultry feed industry in particular is seeing good growth. In recent years, processed chicken segment has geared up as well and is expected to grow further. The annual per capita poultry meat consumption in India has

Indian Animal Feed Market

Market Share by Product (%)



Source: www.expertmarketresearch.com

Factors Affecting the Domestic Feed Market and Scope of New Companies

The rising purchasing power of the Indian population, changing food habits with this and an increasing exposure to global cuisines are a major factor affecting the positive growth of the feed industry in India, who are now

seen an increase but it is still one of the lowest on a global level. This is a brilliant opportunity for further integration as well as growth in the industry offering a chance to new companies to enter the market. Similarly the cattle feed industry as well as the aqua feed industry are either largely unorganized or use

traditional feed as their major product. This is a clear indicator of the scope of entry of newer companies to make the markets more organized and bring a shift from traditional feed to better commercial feed. Price, convenience, availability and the quality of feed are major factors that affect the purchasing decision of the farmers and hence affect the domestic feed market.

- **Forces Analyses for the Animal Feed Industry:** Bargaining Power of Buyers: The Bargaining Power of Buyers i.e. the farmers in this industry is relatively low since animal feed consists of a major portion of their costs, nearly 70% of their production costs and is one of the most important inputs needed in their industry for efficient operations and profitability.
- **Bargaining Power of Suppliers:** The suppliers in this industry are the feed millers as well as the big companies that buy from the feed millers and deal with the normal consumers with their final processed products. These companies have a high bargaining power as they decide the prices at which the feed will be sold in resonance with the prices of the cereal grains that are the major ingredients to animal feed. But when we look at the feed millers their bargaining power is suppressed since the prices get decided by the bigger companies and hence they have to accept the prices at which to sell to these companies.
- **Threat of New Entrants:** Animal feed industry has very poor regulatory affairs because of which the entry level barriers are quite low and hence a high threat of new entrants. This industry also has a high scope of getting more organized and imbibing better technology to make use of commercial feed because of which again the threat of new entrants is quite high.
- **Threat of Substitutes:** The only current threat in the industry is of substitution of traditional feed with compounded feed and hence unorganized market might get

substituted by the organized market because of which it can be said that the threat of substitutes is high.

- **Competitive Rivalry:** With many existing players now realizing the need to integrate and go for more commercial feed, the competition is expected to be high among the rivals who will look into reducing their costs and provide high quality feed at the same time with implementation of better technology.

Animal Feed Market in the developed world

Over the years, the top five countries in terms of the proportion of manufactured or industrial feed produced have been responsible for producing nearly half of all the world's manufactured feed where the US and China top the charts. Expenditure on feed is one of the top expenditures for US farm production so much so that they spend almost 20% of their total production expenses on feed. The value of the compound feed produced annually in the US roughly ranges between INR 1798 and 2170 billion. The poultry market, the aqua feed market are all doing well and the global industry is thus benefitting from the improved global market conditions. Countries like the US have a balanced supply-demand situation in the markets because of which companies operating in these markets will benefit from the positive developments. The animal feed market for farm animals in the US has seen an average growth rate of 3.7% per year over the last five years and is expected to continue growing as the demand for meat from the consumers rises.

China, their feed industry seems to have consolidated at a faster pace than the rest of the world in terms of integrations and acquisitions. With increased demand for meat and meat products, especially pork, China's animal feed market is expected to grow at a CAGR of almost 16% in the next five years, almost double the rate in India. Though the number of feed mills in China has gone down, the overall production capacity is expected to rise to match the growing demand.

Challenges

The recent changes in the industry can alter how livestock producers and feed manufacturers operate in the market. Feed quality optimization and handling more feed material with expansion in the feed market need to be looked at immediately. Food contamination due to pathogens is one of the main concerns for consumers and ensuring good quality requires commitment and transparency by all the parties involved in food production. Misuse and overuse of antibiotics is creating resistance among the consumers towards meat, and hence this needs to be looked into. Where evolution of science and technology on one hand have made tasks for us easier giving us improved results, on the other hand they are also leading to biodiversity loss and climate change. To curb this, researchers say that the global agriculture must be transformed from a source of emission of greenhouse gases to a net carbon sink which can help reduce the risk of climate change. Limited access to the water resources and increasing competition especially from the energy sector, to gain access to the same is another major challenge to the industry. Another major concern is that of animal welfare since animals reared in poor living conditions will not be able to provide maximum genetic potential which will result in a lower quality of output for human consumption too. The increasing costs of raw materials and hence the pressure to reduce feed costs needs to be checked. Increased use of enzymes in this regard to improve nutrient absorption and ingredient digestibility will allow higher flexibility in using feedstuffs and also reduce feed costs while also keeping a check on the quality.

Overall looking at the industry in India, a few things that need to be looked out for include the ability to adopt the global technology to suit the local environment and getting access to the right kind of human resource in order to support the farmer who is currently burdened with the task of handling everything without proper awareness and transparency about the potential of the industry.



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Challenges Faced by Poultry Industry in Cold Chain Management & Solutions to overcome

Introduction

Meat is a perishable product with a short shelf life and therefore short selling times. In contrast to fresh fruit and vegetables, packaged meat has to be declared with a `use by` date. The maintenance of the cold chain is also one of the main principles and basic requirements of European Union (EU) legislation on food hygiene. Raw materials, ingredients, intermediate products and finished products that are likely to support the growth of pathogenic microorganisms and/or spoilage bacteria, are to be kept at temperatures that do not result in a risk to health. The cold chain should not be interrupted at all times along the meat distribution chain. It is known that shelf life of chilled fresh meat can be extended by various packaging solutions, such as vacuum or modified atmosphere packaging (MAP). However, a freshness of chilled meat is strongly influenced by temperature. Inadequate storage, distribution and retail temperatures can lead to a significant reduction in shelf life and early spoilage of meat and meat products. More than 60% of broiler birds produced in India are produced in 6 states (Andhra Pradesh, Telangana Karnataka, Maharashtra, Punjab and), similarly more than 60% of eggs produced in India are produced in 6 states (Andhra Pradesh, Telangana Haryana, Maharashtra, Punjab and Tamil Nadu). Birds are currently transported alive between the states,

which causes them to be transported in inhumane and sometimes unhygienic conditions. Many birds are killed during transport. Lack of dry processing and cold chain facilities make it a logistical nightmare to be transporting good quality poultry produce within India. Poultry produce neither are transported using refrigerated trucks nor are specialized equipment used for packing or transporting poultry produce.

Latest expertise in the field of cold chain can be of immense benefit to the Indian poultry farmer. Therefore, cold chain management in meat supply is of utmost importance for the maintenance of quality and safety of meat/poultry products. Raw meat/meat products are likely to support the growth of pathogenic microorganisms and /or spoilage bacteria, and should be kept at temperatures that do not result in a risk to health. The cold chain should not be interrupted at all times along



the meat distribution chain.

The complexity of global meat supply chain, with frequently long distribution chains associated with



transportation of the product within one country, from one to another country and from one to another continent, makes the solutions for the chilling and freezing regimes, as well as monitoring of time-temperature profiles, very important for the overall success in delivery of product which will be accepted by consumer for its freshness and safety levels.

Fig- 1 Components of cold chain logistics

Transportation guidelines of Meat & Poultry for cold chain maintenance

During Meat distribution (transportation) route to the final user – wholesale cold storage and/or display at retail, the cold chain must be maintained vigorously. Industrial and/or truck chambers have different characteristics and performances. Its size, initial temperature of incoming meat, targeted temperature during transportation, mechanical characteristics (e.g. power of compressors, ventilation and insulation), as well as energy/cost matters are issues of first priority when considering the meat distribution/transportation. In general, the vehicle must be provided with a good refrigerated system capable to maintain the required temperature of meat/offal at all times during distribution.

During much of the time from slaughter of an animal to consumption meat is in transit between distribution points in the marketing channel. It is the responsibility of the transportation industry to deliver meat to areas where demanded. During transportation and storage of meat & poultry, the challenge is to maintain proper refrigeration temperatures. Meat should be transported in a correct manner, to make sure no contamination takes

place nor bacteria can grow on the product.

There are three types of meat products produced as a result of slaughter:

- fresh meat products
- processed meat products
- frozen meat products

The transportation of each of these products has different guidelines:

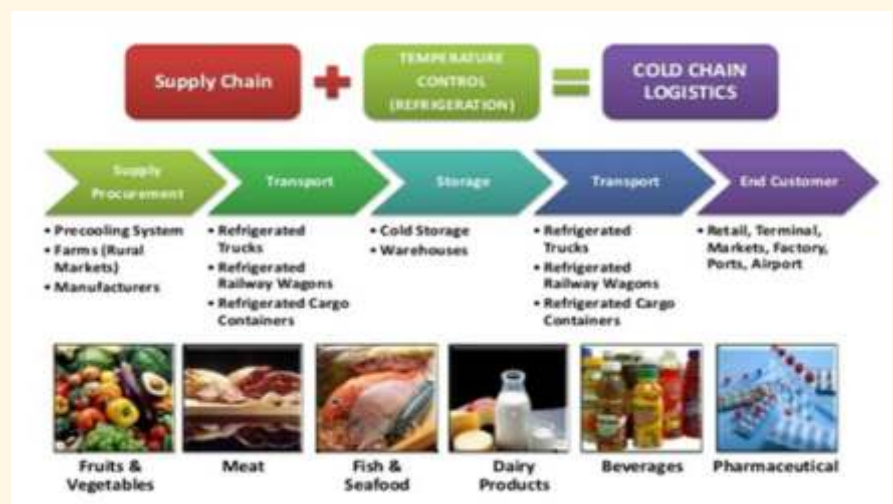
- Frozen meat products for example can be transported all over the world. If a product is processed, the meat is transported from the slaughter house to the meat processing manufacturer and then to retailers and super markets.
- Fresh meat products have a limited shelf life and therefore have to be in the supermarket within two days. Fresh meat products are therefore not transported long distances typically. Fresh meat products are transported with trucks from the slaughter house to the retailers and the super market.
- Processed meat products can either be fresh or frozen. With this being said, trucks are therefore the most common transportation method, especially concerning fresh meats.
- To guarantee a healthy fresh

product, the time of transportation from producer to consumer must be as short as possible. Not only time is important to guarantee a fresh product.

The following actions are further taken to ensure food safety during the transportation of fresh meat products:

- Before transportation poultry meat should be and kept at temperatures below 4°C or 40°F.
- The meat and meat products should be packaged and checked for leakers, temperature, packaging etc. before transportation.
- Meat is put in packages, boxes or crates when transported.
- Human contact should be limited with the products.

During distribution of fresh meat to wholesale or distribution outlets, temperature may increase abruptly with little opportunity to re-cool. Temperatures within the container sometimes vary 15 to 20 degrees. Transportation Equipment, although probably capable of maintaining a cool environment, must be opened and closed frequently for deliveries. Training of personnel responsible for distribution of fresh meat to wholesale or to retail outlets is vital if temperature increases are to be kept to a minimum.



Intra Aerosol: Cold-soluble, cool-acting and easy dosing

Intra Aerosol's innovative formulation saves time and energy

By Cheng Lee DVM & Lonneke Jansen MSc
Product Managers Intracare



Cheng Lee



Lonneke Jansen

While commercial drinking water-oil based products often require a presolution step with warm water before dosing in the drinking lines, Intra Aerosol is enriched with supporting elements making it possible to use it directly even at low water temperatures. There is therefore no need to use warm water to achieve a homogenous pre-mixture. Although solubility is an important factor in the application of the product in poultry and pig farms, the homogenous dispersion and the behaviour of the product when it requires continuous dosing in either a dosing system or in the bulk water tank is not often discussed.

Nutritional supplements aim to ensure continuous intake of feed additives at supranutritional levels meaning that there is a longer application time. It is therefore important to not only ensure that the product is well soluble, therefore saving time and labour, but it is also equally important to ensure that the product can be used in a practical situation and disperses well in the drinking water to prevent biofilm build-up and the clogging of drinking nipples.

With this knowledge in hand, Intra Aerosol has therefore been optimally formulated to be fully soluble in water and is also very well dispersed in on-farm conditions. The product is immediately solubilized in water upon addition or injection, and is fully homogenous in solution.

If added to a bulk tank, minimal stirring is required and does not require much external energy inputs such as a mechanical mixer. Neither does the product require the use of warm or hot water to be fully solubilized, as this is oftentimes not practical on the farm. Being completely soluble and consistently dispersed in water, it has less risk of encouraging biofilm growth and the risk of drinking nipple blockages is also very much reduced.

Intra Aerosol has long been used in livestock farming not only to help alleviate the severity and duration of respiratory problems, but also to help keep animals cool during thermal challenges. With its highly soluble and homogenous dispersion properties, it helps farmers to:

1 Reduce labour

Intra Aerosol can be directly dosed to the drinking system and doesn't require warm water and/or a pre-solution step. This valuable time can then be used by the farmer for other important management practices.

2 Equal distribution in the drinking water and reaches all animals in the house equally

Homogeneity and uniformity of the flock is an important factor for producers. Therefore, it is equally important that supplementation is also homogenous and uniformly dispersed in the drinking water, reducing the risks of stragglers and nonuniform growth.

3 High quality, well soluble and stable in solution to prevent biofilm

Intra Aerosol is not only well soluble but should also stay stable in solution. This not only helps to prevent biofilm formation, and the animals consume a continuous,



consistent dose thus reducing risks of taste-aversion and decrease in water consumption.

solution to not only be functional, but also have well soluble properties with good homogenous dispersal at farm



Figure 1: left- Intra Aerosol dispersed fully in water (20°C), right – competitor product with obvious clump forming after dosing in water (20°C)

A lab-scale comparison was conducted to determine the solubility and dispersion aspects of Intra Aerosol in room temperature water of 20°C. Intra Aerosol and competitor products were dropped into tap water at the advised dosages according to the labels. It was observed that Intra Aerosol had perfect dispersion and did not form clumps or sediments when compared to other competitor products. Even gentle stirring did not manage to completely break the clumps of competitor products and in a drinking line. This could surely lead to nipple blockage and uneven dosing causing an eventual headache for the farmer.

In conclusion, it is important for a drinking-water based nutritional

conditions. Visit our website to watch the full video of the lab-scale comparison of the solubility and dispersion of Intra Aerosol and a competitor product.

Intra Aerosol: respiratory relief to refresh, reduce, recover

Intra Aerosol contains an exceptional high concentration of natural eucalyptus oil, peppermint oil and menthol crystals. With its unique blend of essential oils Intra Aerosol provides comfort and helps to ease breathing during these challenging periods and has an additional cooling effect, that provides thermal comfort during heat stress.

The respiratory system is essential to the animal’s performance. In times of respiratory distress and discomfort, animals spend less time eating and drinking. Intra Aerosol is important not only for oxygen transport, but also for removal of metabolic waste and by-products. Due to its highly efficient

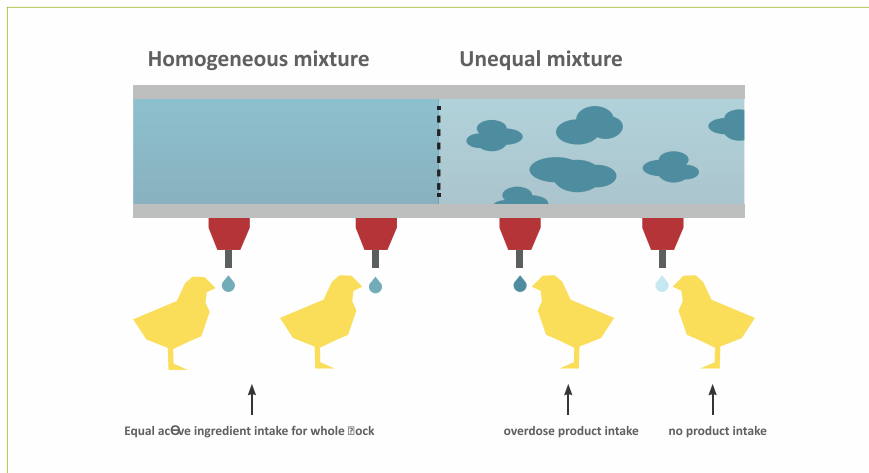


nature and exposure to the external environment, it is easily susceptible to a range of diseases and problems which can insidiously affect the genetic potential of performance livestock.



A fine balance between active ingredients and supporting elements

When a group of animals require treatment, drinking water application is a responsible and useful option on the condition that the drinking water, the system and the products are of good quality. Products from the Intra Nutrient portfolio are carefully formulated to meet an optimal balance between solubility, stability and bioavailability. The active ingredients are well soluble and highly available to the animal. The supporting elements in our formulations help to create a homogenous mixture.



Summer Management in Poultry



Dr. Milind, D. Rainchwar
technical servicemanager-
Novus South Central Asia

In the summer season, as the temperature increases, poultry suffers from the condition called heat stress, also known as summer stress. This is a condition of imbalance between heat generation and heat loss in the body. This condition not only brings poor performance in birds but is also responsible for huge economic losses in terms of poor growth, lowered production, and higher mortality. This condition becomes a greater challenge when coupled with a high humidity environment, making the birds even more vulnerable. According to research, poultry is most comfortable in an environmental temperature around 22-28°C (known as their thermoneutral zone). Once the temperature rises beyond this point, poultry show symptoms of heat stress: reduction in feed intake, poor growth, poor production, and increased mortality.

In general, birds are susceptible to high environmental temperature due to an absence of sweat glands, their full body of feathers, their higher body temperature, and the fatty nature of the birds. This heat or summer stress not only brings lowered performance in poultry but also leads to immunosuppression issues, which can result in disease outbreaks and cause heavy mortality. This is mainly due to an absence of sweat glands in poultry making it impossible for them to dissipate heat. In this, males are found to be more prone to heat stress than females.

Ultimately, heat stress causes acid-base disequilibrium, or the inability to cool the body to maintain normal body temperature. Panting allows birds to release heat through an evaporative cooling kind of method, but high humidity coupled with high temperature causes insufficient panting to control body temperature resulting in heat stress.

Behavioural, neuroendocrinal, and physiological changes are observed in

birds during heat stress. Behavioural changes can include decreased feed intake, increased water intake, panting, less walking, and elevated wings. Physiological changes include oxidative stress, acid-base imbalance, and respiratory alkalosis. Internally the bird may experience decreased protein digestion and absorption, increased metabolic disorders, increased chances of disease prevalence, and fertility issues. Production challenges can include reduced feed intake, poor feed conversion ratio, reduced body weight, impaired meat, and egg quality, and, as mentioned before, increased mortality.

Summer poultry management

The following steps can help birds combat heat stress

1. Housing management
2. Water management
3. Feed management
4. General management

Water management is crucial in heat stress management. In summer, water consumption goes up 3-4 times feed intake. So, a good quality water supply is essential. A water hygiene process must be followed because bad bacteria can prevail rapidly under poor conditions, which will lead to disease conditions. Water pipelines must be cleaned well and flushed with organic acids or hydrogen peroxide periodically. Treat water with a quality water acidifier and sanitizer. In general, try to make the water pH in acidic conditions (5.5-6). As feed intake is less during times of increased temperatures, nutritional water acidifiers should be used to help combat heat stress.

Housing management can be divided into two parts, inside shed management, and outside shed management.

1. Thatching of the roof with green grass or agricultural waste can help reduce shed temperature. Paddy



- straw can be used for this purpose.
- Whitewashing the roof with lime helps mitigate the temperature inside the shed.
 - Applying sprinklers above the shed.
 - The use of gunny bags on the side walls (grill) of the shed over which drip water is set.
 - Allowing trees to grow near the shed to provide shade on the shed.
 - Prohibit wild birds, which can carry diseases like Avian Influenza, from entering the shed.
 - Provide 4-6 feet of roof overhang to protect birds from direct sunlight.
 - Provide ridge ventilation to help remove hot air from inside the shed.

Inside the shed

- Use of fans
- Use of a fogger
- Provide a continuous supply of cool water (if not possible, periodically flush the water to provide cooler water for birds)
- Reduce litter thickness (ideally around 400-450 grams per square foot)

Feeding Management

Research shows feed intake is reduced by 1.25% with every 1° rise in temperature. Further, it is observed that there is a decline in feed intake by almost 5% with every degree rise in temperature from 32-38° C. Knowing this it's best practice to feed a good quality feed during times when heat stress can occur.

- Feeding should be done during the cooler hours of the morning or evening but too much gap in feeding time is not advisable.
- Increase the number of feeders and drinkers during feeding time to reduce competition among birds.
- Adding antioxidants is shown to be helpful to reduce stress and improve feed consumption while maintaining or improving body weight gain. (Vitamin E, Vitamin C, Selenium).

- A high-energy diet should be provided during summer because birds lose more energy while panting.
- Energy in feed should be supplemented with oil rather than grain because fat has the lowest heat increment value compared to carbohydrates and protein.
- Feed consumption is reduced in summer. To overcome nutritional and productive losses it is suggested to supplement the diet with 10-15% more amino acids, vitamins, and minerals rather than increasing the protein level directly.
- Increase calcium and phosphorus levels to overcome thin eggshells more often seen during summer due to respiratory alkalosis (more carbon dioxide is lost due to panting).
- Instances of viral challenges increase during this time as immunosuppression is common. Fumaric acid is shown to have good antiviral properties and can help to reduce viral challenges. A combination of coated benzoic acid and fumaric acid as an acidifier (as AVIMATRIX® feed supplement) can help to reduce stress and improve the performance of the flock.
- MINTREX® chelated trace minerals, a supplement of organic trace minerals zinc, copper, or manganese, and methionine source HMTBa are shown to help heat stress conditions. HMTBa molecules undergo absorption through diffusion, which doesn't require energy. Thus, using minerals with HMTBa can reduce heat stress during summer and help improve performance.
- Essential oils have a broad range of action from being immunomodulators to performance enhancers. Adding essential oils - especially thymol and carvacrol - to the diet can help mitigate summer stress challenges and improve meat yield and overall performance.
- Use of MOS and B Glucans during

heat stress conditions is convincing due to the possibility to reverse or compensate physiological alterations induced by heat stress and by restoring immune function and promoting robust inflammatory responses.

- The addition of ammonium chloride, potassium chloride, and/or sodium bicarbonate has shown improved performance in broilers by improving water quality and feed intake.
- Probiotics can be used to help control the corticosterone level and the excessive release of pro-inflammatory agents. Lactobacillus-based probiotics enhance goblet cell count in the duodenum and jejunum of heat-stressed broilers thereby improving the feed conversion ratio.
- Since a hot humid climate favors the growth of mould/fungi in feed the consistent use of an antifungal is recommended.

General Management

- The depth of litter should be 2-3 inches on the floor.
- 10% extra floor space should be provided in summer. Bird overcrowding only contributed to heat stress and must be avoided.
- Shifting, transportation, debeaking, and vaccination should take place during the night or cool hours in the morning.
- Birds severely heat stressed may be dipped in cold water for 2-3 minutes to provide relief. Be sure to keep their head and neck above the water level.
- Use foggers in the shed, which can reduce the shed temperature up to 5-10°C depending on the quality of the fogger.

The house should be situated away from other buildings to facilitate the free movement of air.

"Summer management is crucial not only to improve the performance but to gain profit in adverse conditions. So, effective use of feeding, Water, shed management brings the good health of birds and thereby profit to the farmer".

Restricted Feeding: For Broiler Breeder Birds



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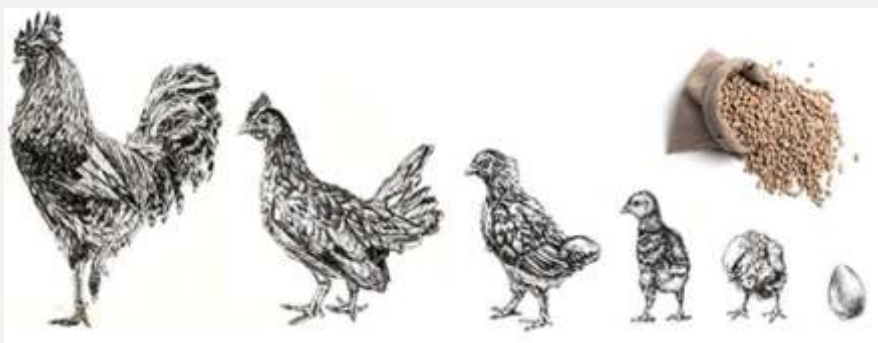
Introduction

It is a method of feeding where time, duration and amount of feed are limited. There actual reduction of nutrient intake below minimum requirement. Several types of feed restriction programmers can be followed during the growing period of breeders specially broiler breeders, usually from 6- 20 weeks of age. Some of the common methods are: restriction on quantity i.e. Feed intake, restriction of feeding time, restriction of a nutrient, like protein or energy, skip-a-day programme and, alternate day feeding programme.

- Phase feeding-followed during lying phase.

Restricted feeding

It is the method of feeding where time, duration and amount of feed are limited. There actual reduction of nutrient intake below minimum requirement. Allowing birds an unlimited supply of feed may result in heavy over consumption. The birds are liable to consume too much energy and this will be converted into body fat which in turns leads to a higher maintenance requirement. Restricted feeding is necessary if the birds are going to be used



Different feeding systems for feeding of poultry are

- Ad Libitum Feeding-this system is also called free choice feeding. In this system feed is always available and the bird can eat at will.
- Forced feeding- forced feeding may be employed if feed and water are denied for more than 36 hours to prevent body dehydration.

as breeder stock. The obesity severely limits the numbers of eggs laid and the fertility of eggs, mortality may be increased. Not practiced during disease.

There are two types of restricted feeding.

- Quantitative feed restriction- In which the amount of feed is reduced below the normal requirement of birds. This can be done on day-to-day basis or skip-a-day programme or skip-two

days in a week programme. But this restriction depends on the matching of the flock average body weight with standard body weight provided by the breeder. Quantitative feed restriction is usually followed in commercial breeders.

- **Qualitative feed restriction**-In which the quality of the feed is reduced below the standard requirement of the bird. This can be done by including unconventional feeds or lesser nutrient feed ingredients in place of high protein or high energy diet. Here the quantity of allotment to the bird is not restricted.

Ways for restricted feeding

- **Water Restriction**- with broiler breeder pullets and cockerels on restricted feeding programs, water should be turned on and available for one hour prior to feeding and turned off or removed one hour after all feed is consumed. If a skip-a-day feeding program is used, water should also be available for approximately two hours on the non-feed day.
- **Physical Feed Restriction:** Supply a calculated amount of feed per bird, which is often just enough to meet maintenance requirements. It is necessary to provide sufficient feeder space in order to prevent competition among restricted birds and to prevent unequal growth of birds within a flock.
- **Diet Dilution:** In this method diets are mixed with non-digestible ingredients such as fiber and so are of reduce nutrient density. Dilution with rice hulls in order to retard early growth. Reduced body fat deposition.
- **Lighting Programs:** Birds are very sensitive to light .Light intensity, color and the photoperiodic regime can affect the physical activity of pattern within a flock. Poultry under different reduced lighting programs will reduce their feed.

Benefits of Feed Restriction:

1. Restricting feed intake of growing birds will delay the onset of sexual maturity from a few days to 3 or 4 weeks, depending on the severity of restriction.
2. Feed restriction of a flock will reduce the body weight of the birds at sexual maturity, usually by reducing the amount of body fat.
3. Mortality during the growing period is

reduced when feed is restricted.

4. Restricting feed intake reduces the cost of growing pullets to sexual maturity, even though it may take three additional weeks before first eggs are laid.
5. Restricting the feed intake during the growing period produces better livability during egg production.
6. Egg weight is regulated by the age of the bird. Therefore, birds reared using feed restriction will produce larger first eggs because they are older.

Pullet feed program

The breeder starter should be fed the first 2 to 3 weeks. It is to be full fed the first 2 weeks, then restricted during the third and fourth weeks, but fed every day. on the average, full-fed broiler breeder pullets should be eating about (4 kg) of feed per 100 pullets per day at 14 days of age.

Restricted feeding program breeder cockerels

Meat-type cockerels, to be used as broiler breeders, have standard weekly weights, and it is just as important that male weights be maintained as the weights of the growing pullets. To get these weights, the cockerel-growing feed must be restricted. At 24 weeks of age the males should average about 35% heavier than the females.

There are four broiler breeder rearing and feeding programs

1. Cockerels separate upto 28 to 42 days.
2. Cockerels separate upto 10 weeks.
3. Cockerels separate upto 20 to 22 weeks.
4. Feeding in blackout houses.

Cockerels separate upto 4-6 weeks

Coming from small eggs, small meat-line cockerel chicks should be started within guards under separate brooders using the same feed and feeding program for the cockerels and pullets. The earliest that

cockerels should be mixed with pullets is 28 days and the cockerels should be at least 40% heavier than the pullets. Broiler breeder males should not be fed low-protein diets to reduce weight, particularly before 8 weeks of age, as such a practice reduces fertility later.

Cockerels separate upto 20 to 22 weeks

In this program was the best of all growing programs; growth rate of each sex could be accurately controlled by feed allocation. Male aggression can be quite high using this program and so it is advisable to place some a-frame perches in each pen to allow the males to escape. at 20 to 22 weeks of age, move the cockerels with the pullets to the production house.

Feeding in blackout houses

With this program the sexes are generally raised in separate houses that are environmentally controlled with forced-air ventilation, cooled, and capable of being fully blacked out. Full feed males an 18 to 20% protein starter for four weeks. The males should continue on a starter diet until they are 6 weeks of age but a skip-a-day program should be started during the 5th week. Males should be fed a pullet grower diet at 6 weeks of age. This program will induce chicks hatched out of season to come into egg production earlier, resulting in smaller eggs at the start of production.

Conclusion

Among all these methods which can be followed in the birds which are being reared. Each method has certain advantages and disadvantages and none can be regarded as best suited under all conditions. The choice of a feeding system would depend upon the age of the birds, relative cost of mash and grains the amount of time and labor available. Several advantages like reduced cost of feeding, delayed sexual maturity, better egg production curve, reduction in the number of small eggs laid, have been claimed for this method.



Top 3 Computer Applications For Feed Manufacturing

Feed composition and management have long been a source of worry for feed manufacturers, livestock farmers, and veterinarians worldwide.

From many viewpoints, the feed sub-sector is fundamental for all livestock commodities and is a vital pillar of livestock development and transformation.

Feed formulation software estimates the **number of feed components** that must be blended to provide a single uniform diet that meets all of an animal's nutritional needs. Because **healthy levels** differ depending on the animal and its age, it's necessary to keep preparing feed at different periods of the animal's life. This is a time-consuming task to complete manually, but software can quickly execute a variety of computations. Listed below are the top 3 computer applications for feed manufacturing:



1. BESTMIX

BESTMIX is an ideal tool for managing nutrition in feed and delivering top-quality feed recipes at the lowest cost. It helps manage nutritional values, manufacturing characteristics, and recipe requirements with ease. This is one 'go to' computer application for various feed manufacturing units.

2. Management software Super Modulodac

The Super Modulodac is the first touchscreen. With a simple push of the finger on the screen, you can pilot the stations and adjust the quantities of a cow or an entire lot. One can see the number of cows and the entire herd and monitor their feed management.

3. Management software RDV-4-F

The top-grossing management software RDV-4-F is usually for developing a ratio that matches your farm's needs and requirements. It accurately calculates feeding intake data and calculates milk records for milking animals. It transmits data thoroughly and imports valuable feed analysis.

Futuristic feed composition software will be able to link feed formulations to animal care and progress in ways that no person could. **Feed manufacturing companies will have to rely on computer applications to understand the current and future situation to respond safely and efficiently to the constant and growing demand for feed supply.**



The World's Top Animal Feed Technology Research Centres

Animal feed technology requires continuous and dynamic research. Feed production needs to be continuously balanced to deliver proper nutrition for animals to grow, develop, and reproduce. **Animal feed is essential in the global food market since it helps ensure the long-term growth of animal products.**

The world's leading animal feed technology research centres are listed below that have contributed drastically to animal welfare.

1. Cargill

The United States-based Cargill Inc has become the world's top animal feed technology centre that employs cutting-edge genomics approaches to identify genes in animals that alter outcomes like weight gain and feed conversion. Their objective is to enable consistent nutrient intake as it is one of our creative nutrient solutions delivered by Cargill. Cargill has been continuously trying to deliver nutritious feed solutions through its molecular biology, microbiology, immunology, bioinformatics, modelling and processing for better animal health.



2. Archer Daniels Midland

Archer Daniels Midland is a well-known institution dedicated to committing persuasive research and offering feeds and supplements across various livestock. Archer Daniels Midland has



collaborated with many ventures to develop breakthrough animal feed products, ingredients, and services. ADM had constantly worked on determining nutrient content, related feeding value, and appropriate application for liquid and dry components, as well as associated ingredient blends, using sophisticated in-situ and in-vitro methodologies and individual feeding experiments.

3. University of Saskatchewan

The University of Saskatchewan is a Canadian Feed research Centre and has undertaken various multi-lateral research. One of its groundbreaking research catered around the processing of low-value crops into high-value feed products, bioprocessing and bio-fuels co-products and innovative feed additives. They have also provided batch manufacturing services for feed utilised in animal feeding and nutrition research studies and research on the effects of equipment, process conditions and techniques, and diverse components on feed product prices and nutritional value.



It is impossible to ignore the importance of appropriate nutrition in livestock productivity. The general health and yield performance of animals is determined by the food they eat, and it's no wonder that immense research is brought into the picture for quality assurance.



Manure Management Methods In The Poultry Farm



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Introduction

Knowledge of the amounts and compositions of manure and litter produced under different poultry production practices is essential for efficient and environmentally responsible management of by-products as fertilizer, animal feed components or fuel. Fortunately, chicken manure is among the most prized of manures. Fresh chicken manure is considered a "hot" manure, which is unsuitable for immediate use. "Hot" manures are high in nitrogen, and they need time to mellow. "Cold" manures, such as from horses, are lower in nitrogen and are generally safe to use at all times. Check out the table for a look at manure composition levels in different animals. The first number indicates Nitrogen (N), the second number indicates Phosphorous (P), and the third number indicates Potash (K).

manure, goose manure, quail manure, poultry manure. Poultry litter contains carbon, nitrogen, phosphorous, chlorine, calcium, magnesium, and sodium, manganese, ferrous, copper and arsenic. It is used as a very good source of fertilizer.

Manure quantity

Manure quantity and characteristics are influenced by the species, age, diet and health of the birds and by farm management practices. Estimates of the manure excreted by 1000 birds per day (based on average daily live weights during the birds' production cycle) are approximately 120 kg for layer chickens, 80 kg for meat chickens, 200 to 350 kg for turkeys (grower females and grower heavy males, respectively), and 150 kg for ducks. Many Indiana poultry operations generate large volumes of manure. For example, 30,000 layers



Chicken Manure

Chicken manure is a relatively high quality organic fertilizer, of which the content of pure nitrogen, phosphorus (P₂O₅) and potassium (K₂O) are about 1.63%, 1.54% and 0.085%. In addition to chicken manure, our equipment can also handle other poultry manure, such as chicken manure, pigeon manure, duck

produce 40 tons of manure a month or nearly 500 tons a year.

Harmful effects

In general, for each kg of feed consumed, a chicken approximately produces 1 kg of fresh manure with variable water content, while a commercial layer produces about 20 kg waste per year. The





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risk of nutrients, organic material, and pathogens contaminating water bodies and public water supplies will greatly increase if manure is spread adjacent to streams, waterways, and lakes. High nitrogen content in the poultry manure gives rise to the problem of nitrate leaching and contamination of ground water which in turn effects sources of drinking water with subsequent impact on the health of human beings particularly children.

Methane gas produced from poultry litter is converted into electricity using a patented technology. Altogether, poultry wastes can be effectively utilized if properly treated to reduce the ill effects and a range of value added products like fertilizer, biodiesel, animal feed, electricity, bone meal and biodegradable plastic can be produced. Caked litter also increases house ammonia levels. Negative effects of ammonia on broiler health, welfare, performance, and carcass quality have been well documented by numerous researchers. Poultry are most susceptible to elevated ammonia levels at one to 21 days of age, which is the early brooding period.

Manure microorganisms and veterinary pharmaceuticals

Poultry manure and litter contain populations of naturally occurring microorganisms, many of which are environmentally beneficial and play important roles in the ecological nutrient cycles associated with carbon, nitrogen, phosphorus, sulphur and other elements in poultry by-products. However, depending on management and environmental conditions, poultry

manure and litter can also contain harmful pathogenic microorganisms that affect human health. Chemical residues in the form of veterinary pharmaceuticals (antibiotics, coccidiostats and larvicides) may also be contained in poultry manure and litter.

Types of waste management at poultry farm

Poultry manure	Hatchery waste disposal	Dead bird disposal
a. Drying	a. Power generation	a. Burying
b. Heaping	b. Rendering	b. Pit disposal
c. Poultry manure as organic fertilizer	c. Autoclaved and extruded	c. Incineration
d. Biogas / Electricity generation from poultry litter	d. Boiling	d. Septic tank disposal
e. Composting	e. Ensiling	e. Composting
f. Pond disposal	f. Composting	f. Rendering
g. Aeration	g. Anaerobic digestion systems	

Soil amendment

Application of poultry manure

improve water holding capacity of soil and increase lateral water movement, therefore improving irrigation potentiality and decreasing the dryness of soils. It increases the number and diversity of soil microorganisms, particularly in sandy conditions.

As fertilizer

The manure is stored in most of the farms before disposal, at least for a period of one month and this leads to loss of nearly 40% N which reduces the value of the manure. In one study chicken manure was added for sweet potato culture and it was suggested that small-scale farmers should avoid use of high levels of chicken manure because higher levels of manure would increase vegetative growth at the expense of tuber formation.

Livestock feeding

Poultry litter has been used in diets for poultry, lambs, ewes, swine, lactating cows, wintering

cattle and brood cows. Poultry litter/manure is used as livestock





feed. Drying of poultry manure is perhaps the oldest procedure of processing waste for refeeding. It was stated that amino acid nitrogen of cage layer waste ranges from 37 to 40% of total nitrogen and that about 40 to 60% of total nitrogen in poultry excreta is present in the form of non-protein nitrogen (NPN). When it is given to ruminants as feed, uric acid which is the major NPN source in poultry is degraded to ammonia by rumen microbes.

- **Drying of poultry manure**

Drying is affected by several factors which alter its property. Thin layer (1-3 cm) drying of poultry manure is effective at temperatures within the range provided by solar heaters (40-60°C). Greater nitrogen losses (44-55%) is observed at the deeper manure layer and higher temperature which resulted in a reduction in N:P:K from the initial value of 4.58:1.29:1 to final values in the range 2.07:1.30:1-2.57:1.28:1. Drying is helpful in reducing the presence and offensiveness of odor by 65.3 and 69.3%, respectively, reduction in bacteria (65.6-99.8%), yeast and mold (74.1-99.6%) and E. coli (99.97%). Dried poultry manure has high nitrogen, phosphorus and potassium contents which are essential for plant growth.

- **Bioenergy production**

Biogas is a source of energy; it can be used as a fuel for engines, generation of electricity and other energy consuming purposes. Anaerobically processed products are very much acceptable for land treatment and feed supplement. This technique is

not much popular yet as it is costly, need operational feasibility and produce less biogas from poultry litter system.

- **Management of feathers**

Feathers are also used in animal feed, organic fertilizers and feed supplements, as it is made up of >90% protein and is rich in cystine, arginine and threonine. The nonwoven textile materials prepared by chicken feathers are very versatile and have a wide application in the field of technical textiles. Poultry feathers are also converted into biodegradable plastics by a process called polymerization. In this process, feathers which contain keratin protein are pulverized into fine dust.

- **Management of poultry offal**

Poultry offals are solid by-products, wastes of poultry slaughterhouse or poultry processing plant. It includes parts and/or whole poultry carcass, undeveloped eggs, waste produced in broiler farming and slaughter house. Offal consists of 5.3% of total Kjeldahl nitrogen, 32% proteins, 54% lipids and 0.6 to 0.9% methane production potential.

- **Recycling poultry waste**

Poultry waste has high water content and there is a need to develop suitable and economical processing technology to remove excessive moisture and destroy harmful pathogens from the organic waste. It is high in fibre and low in metabolizable energy.

- **Drying**

Probably the oldest method of processing waste for refeeding is the drying of poultry manure in natural

air conditions under sunlight. Drying the manure with heat has also been attempted. The manure may be dried at temperatures ranging from 149-385°C. Drying with heat results in a highly significant loss of energy and significant loss of nitrogen. The faster the manure is dried, the higher is the nitrogen value.

- **Heaping**

Deep stacking of poultry waste produces considerable heat and has been shown to destroy coliforms. The maximum temperature was reportedly attained in 4-8 days. When litter from the broiler house is placed in a heap, the heat which subsequently develops is sufficient to destroy the pathogenic organisms that are present.

- **Composting**

Collecting poultry manure in pits under cages or slat or wire floors is gaining favour as a practical and economical way to handle poultry waste. The manure may be allowed to accumulate for several years through the process of composting. Aerobic bacterial action occurs. Many compost pits have been in operation for several years without manure removal. The top foot is composed of fresh manure, the bottom foot is in an anaerobic condition and the central portion is undergoing composting.

- **Pond disposal**

Fresh poultry manure may be flushed into an open, shallow pond. Bacterial action reduces the waste material to a smaller volume. As bacterial growth occurs only during the warm months, the use of ponds is seasonal. The resulting solution may be spread in its liquid state on farmland.

- **Aeration**

The addition of oxygen by the paddles increases the activity of aerobic bacteria, greatly reducing the incidence of any odours. After 4-6 months, the material is removed in liquid form and usually spread on the land. The material is practically odourless.

Water-Powered Dosing Pump for Disinfection and Water Treatment



Kaushik Shetty
Dosatron International

The Dosatron water powered dosing pump is a simple and ingenious system that has demonstrated its worth since many decades in about a hundred countries.

Installed directly in the water supply line, the water powered dosing pump operates without electricity; it uses the flow of water as the power source. The water activates the dosing pump, which takes up the required percentage of concentrate and injects it into the water. Inside the dosing pump, the concentrate is mixed with the water, and the water pressure forces the solution downstream with a homogeneous mixing. Once adjusted, the dispenser requires no action or external control.

For more than 45 years, DOSATRON has contributed to improving the zootechnical performance of livestock farms by guaranteeing the control of the dosage of various vaccines, medications, anti-inflammatory, antiparasitic, organic acids, essential oils, probiotics, supplements or concentrated biocides administered via drinking water. The Dosatron dosing pumps is used for disinfection and water treatment too.

Our response to your needs is the result of regular collaboration with many farms, laboratories and specialized institutes, equipment manufacturers and installers and specialists in water treatment or biosecurity.

With our partners, we also provide numerous technical seminars on good practices around the world and the development of specialized tools (calculation tools available on the Dosatron website or on our Dosatron App, after-sales service videos, etc.) for farmers, technicians and veterinarians.

Drinking water treatment has long proven its flexibility, speed, safety and efficiency. The current evolution of antibiotic legislation, the continuous improvement of the solubility of treatments (oral powders), the ease of administration of certain vaccines via drinking water, the development of new supplements and additives (organic acids, pro-biotics, essential oils, minerals, etc.) and the growing diversity of products intended for water disinfection and hygiene are evidence of the renewal in favour of this technique.



Suguna Foods – A Step Towards Eradicating Malnutrition

In their CSR journey Suguna Foods has dedicated its social commitment to extensive communities to create a positive difference in society. To create an educated, healthy, sustainable, and culturally vibrant community they have undertaken projects for eradicating hunger, poverty, and malnutrition, including preventive health care.

The project included various activities, including the supply of free eggs & milk to orphanages and school kids, freemilk to lactating mothers, energy drinks like buttermilk and kabasara kudineer, etc. Supply of free eggs & milk was provided to orphanages and primary schools to eradicate malnutrition for economically backward classes and those who cannot afford nutritious food and milk.

The main motive behind the project was to spread awareness as to the importance of milk and poultry products in rural areas so that adequate nutrients are met in growing children's. It also highlighted the importance of proteins in meals with the aim of reducing malnutrition in young blood.

The projects of eradicating hunger, poverty, and malnutrition, including preventive health care, were implemented directly by the company in some domains and through "Suguna Foundation,"



with its registered office in Udumalpet, Tamil Nadu.

They aim to benefit society at large and direct a next-level vision for the ensuing health and wealth of poultry and dairy farmers in rural areas.

Suguna Foods has developed a symbiotic relationship with its corporate social responsibility. Their efforts for the society through such activities are indeed inspiring.



Eggoz Journey

EGGOZ

NUTRITION



Eggoz Nutrition, a consumer-oriented and integrated farmer egg brand established in Gurgaon in 2017, has made its highlight in the market by delivering India's first UV-sanitized eggs in the stores. Eggoz has claimed to provide eggs with the most natural and highest bioavailable protein, free from chemicals, steroids and hormones.

Eggoz was Co-founded by Abhishek Negi, Uttam Kumar, and Aditya Singh, who were IIT Kharagpur alumni and Pankaj Pandey, an electrical engineer, to assist farmers in rural North India in increasing their output and revenue.

Eggoz has guaranteed to offer a nutritionally balanced, pure vegetable and herbal diet for healthier birds, and to meet that expectation, they have been using exclusive, one-of-a-kind technology, which is an essential component of agricultural operations.

The team has also assured that their farmers are enrolled in a simplified programme in which they receive technical and veterinary advice help and IOT devices to increase productivity. The eggs delivered by the company goes through 11 quality check with the sole intention of a 'no compromise in quality' agenda.

Eggoz also recognized the increasing demands for UV-sanitized eggs in India and launched a campaign called "Extra In The Ordinary" to present the Eggoz brand proposition and build awareness. 'Some Place Nice' created the campaign, released online with a mix of static and video assets to reach the target audience and raise brand recognition.

Eggoz, a startup focused on eggs, has secured \$3.5 million in a

EGGOZ NUTRITION

Series A fundraising round headed by Nabventures. The round was also attended by Avaana Capital, Rebright Partners Bellerive Capital, and angel investors SanjivRangrass and IndreshSaluja.

In the previous fiscal year, the brand generated Rs.32 crore in yearly sales, which is predicted to double by the end of March 2023. Eggoz Nutrition sells over two lakh eggs per day and over sixty lakh eggs per month through physical and online retail channels.

The startup intends to use the newly invested funds to expand its brand, introduce additional egg-based value-added products, and expand into other areas. The business promises to operate in places like Allahabad, Bhopal, Chandigarh, Indore, Patna, Ranchi and Delhi-NCR.

Eggoz is currently concentrating on expanding its markets in the eastern and southern part of India, in states having high consumption of poultry products. The team also believes that local farmers will also be encouraged and assisted in upgrading their lifestyles due to this growth. The eggs are currently available in major cities and across various ecommerce sites like BigBasket, Instamart, Zepto, Blinkit, and others.

Their vision lies around making Eggos the "Amul" for eggs. Eggoz is currently working on both the supply, the farmer's end and demand, which is the consumer's end. Eggoz has a solid integration architecture in place on the supply side that allows egg producers to increase production and visibility. On the demand side, Eggoz as a brand guarantees farm-fresh, chemical-free eggs and now has a ubiquitous sales channel in 9 cities in North India, with plans to expand to PAN India in the next two years.



Carus holds its Annual Day at the Omang Hotel in Karnal



The annual day for Carus Laboratories' head office was held at the Omang Hotel Karnal. Every member of the head office staff was present and participated in this event. Cultural dance, singing competitions, multiple indoor games, and prize distribution for various categories are all part of the event, which is followed by cake cutting.

Mr. Jitender Pilani (Director) and Dr. Arun Pilani (Managing Director) were also present.

About Carus: Carus Laboratories is a company that specializes in animal health. The company sells a variety of effective animal feed additives and supplements.







Technical Seminar at Rajahmundry for East Godavari (AP) Layer Poultry Farmers



Vaksindo Animal Health Pvt. Ltd. hosted a Poultry Technical Seminar at Manjeera Sarovar Premiere on May 1, 2022. "Respiratory Disease Control with Special Reference to ND, IB, and Infectious Coryza" was the topic of this seminar.

The meeting was attended by 50 progressive poultry farmers of Anaparthi, East Godavari district, Andhra Pradesh. Mr. Subba Reddy-Dhanalxmi poultry farms, Mr. Sachnarayan Reddy-SKR Poultries while Dr. Krishna Reddy and Dr. S.S. Prasad-Srinivasa farms – graced the technical seminar with their special attendance.

Mr. B. Ranga Rao, Director-Vaksindo India, and Dr. Ganesh Darban, Technical Service Manager, discussed Vaksindo Animal Health's efforts over the last two years to monitor disease in all poultry belts of India, with a focus on Andhra Pradesh, disease control strategies, and making research-based services and solutions for poultry available.

Vaksindo's legacy of manufacturing antigenically matching vaccines with high antigen mass would help to –

- 1. Minimize cost of disease control in India
- 2. Minimizing disease threats in the minds of the farmers
- 3. Improve the performance of progressive farmers

Dr. V. Gowthaman, PhD, from Namakkal, was an expert speaker who discussed the relevance of disease control measures for respiratory disorders. He opined that minimising predisposing factors of various diseases should be prioritised. Indian layer farmers are experiencing a reduction in egg output, which necessitates a thorough examination. Infectious Coryza produced by variation B serovars, Velogenic Viscerotropic ND caused by Genotype VII or Genotype XIII, LPAI, and variant IBV serotypes are the most common causes of respiratory disease in chicken. The strategy to disease control in poultry should be better vaccinations and a suitable immunisation schedule.

www.vaksindo-india.com







The Alltech ONE Conference closes with themes of innovation and resilience



Dr. Mark Lyons was joined on the ONE Mainstage for the closing session by Mick Ebeling, founder and CEO of Not Impossible Labs, and world-class blind adventurer Erik Weihenmayer.

The Alltech ONE Conference (ONE) wrapped up today in Lexington, Kentucky, after a robust agenda of in-person and virtual activities and presentations. ONE welcomed nearly 2,000 international delegates in person, with an additional 5,000 participating virtually. Now in its 38th year, this world-class event brought inspiring keynote speakers and more than 100 industry leaders to the stage, sharing valuable insights in live workshops and focus tracks and uncovering the challenges and opportunities in agriculture, business, health and wellness, and professional development.

“We must unify and take action, today, for the future of agriculture and our planet,” said Dr. Mark Lyons, president and CEO of Alltech. “Together, we have the collective courage and impact to work together for a Planet of Plenty™.”

Lyons was joined on the ONE Mainstage for the closing session by Mick Ebeling, founder and CEO of Not Impossible Labs, and world-class blind adventurer Erik Weihenmayer.

Ebeling was recently named by Fortune Magazine as one of the Top 50 World’s Greatest Leaders. He is a recipient of the Muhammad Ali Humanitarian of the Year Award and is listed as one of the world’s most influential creative people by The Creativity 50s. Ebeling has sparked a movement of pragmatic, inspirational innovation, and as a career producer and filmmaker, he harvests the power of technology and storytelling to change the world.



“What we do is, we start by telling the story of one person,” said Ebeling. “And then, telling the story of that one person, that’s what scales us to help many people.”

Despite losing his vision at age 14, Weihenmayer is an accomplished climber, paraglider, skier and kayaker who never allows blindness to interfere with his passion for pursuing an exhilarating and fulfilling life. In 2001, he became the first blind person in history to reach the summit of Mount Everest. In 2008, he completed his quest to climb the Seven Summits, the highest mountains on each continent. Additionally, he has ascended dozens of major peaks, rock walls and ice climbs around the planet, including the first blind ascent of the 3,000-foot Nose of El Capitan in Yosemite National Park and the ascent of a rarely climbed 3,000-foot frozen waterfall in Nepal.

“We could all stand on this stage and talk about our accomplishments, but what doesn’t get talked about enough are our struggles,” said Weihenmayer.



During the closing session, Lyons presented the Alltech Humanitarian Award, an award that is bestowed annually to someone of strong character who uses their platform to positively influence and inspire those around them, to both Ebeling and Weihenmayer.



“We are pleased to present friends and first-time double Alltech Humanitarian Awards to Mick Ebeling and Erik Weihenmayer at the Alltech ONE Conference,” said Lyons.

Previous award winners have included Muhammad Ali, Steve Wozniak, Bear Grylls and late Alltech founder and Mark’s father, Dr. Pearse Lyons.

As Lyons closed, he noted a mantra often repeated by his father.

“Don’t get it right. Get it going, ’ ... And he was right! It’s not about perfectionism, it’s about progress. If we change the lens and the way we look at things, we can change the way we think.”



The Alltech ONE Conference returns May 21–23, 2023. For more information, visit one.alltech.com.

Glimpses of ONE



ONE Weekend Community Concert



Beer Yoga



ONE Fun Run



Alltech Street Science



Dr. Karl Dawson (Vice President and Chief Scientific Officer-Alltech Research) receiving Alltech Medal of Excellence



Heather White (Author, Founder and CEO, OneGreenThing), ONE keynote speaker addressing the gathering



Track Sessions



Alltech ONE Kentucky Night



International Night Dinner



About Alltech:

Founded in 1980 by Irish entrepreneur and scientist Dr. Pearse Lyons, Alltech delivers smarter, more sustainable solutions for agriculture. Our products improve the health and performance of plants and animals, resulting in better nutrition for consumers and a decreased environmental impact.

We are a global leader in the animal health industry, producing specialty ingredients, premix supplements, feed and complete feed. Strengthened by more than 40 years of scientific research, we carry forward a legacy of innovation and a unique culture that views challenges through an entrepreneurial lens.

Our more than 5,000 talented team members worldwide share our vision for a Planet of Plenty™. We believe agriculture has the greatest potential to shape the future of our planet, but it will take all of us working together, led by science, technology and a shared will to make a difference.

Alltech is a private, family-owned company, which allows us to adapt quickly to our customers' needs and maintain focus on advanced innovation. Headquartered just outside of Lexington, Kentucky, USA, Alltech has a strong presence in all regions of the world. For more information, visit alltech.com, or join the conversation on Facebook, Twitter and LinkedIn.

Ceva India introduces the **Cevac IBird** in several Gujarat districts

The Ceva India team successfully launched the "Cevac IBird Launch Program" in Anand and Mahua, Gujarat.

Cevac IBird's features, advantages, and benefits when combined with Cevac Vitabron L were highlighted in a new approach to "Control IB Disease."

Because the current standard vaccination programme is insufficient to control the IB variant strain, a combination of standard Mass strain vaccination and IB variant strain vaccination must be used to resolve the problem. This combination provides immediate, broad, and long-term protection against the majority of IB strains found in India.

The meeting's overall goals were to showcase Ceva's innovative offerings, secure and achieve additional business by introducing Cevac IBird – India's first IB variant vaccine – and develop relationships with customers who have decision-making or influencing power within their respective businesses.

Ceva Santé Animale is a global veterinary health company that specialises in the research, development, manufacturing, and marketing of pharmaceuticals and vaccines for companion animals, livestock, swine, and poultry.





Suguna Feeds Introduces Layer Feed in Rajasthan

Suguna Feeds is extremely proud to announce the launch of its Layer feed range in Rajasthan, which will allow the company to expand its nationwide operations. With a strong and capable team of expert poultry nutritionists and veterinary experts working around the clock to provide the best feed for layer birds at various stages of life, the company ensures that premium quality feed is delivered at reasonable prices to meet the needs of commercial layer farmers across the country.

Non-vegetarian foods are consumed by 65 percent of the population. Rajasthan ranks 14th in egg production and contributes 10% of meat production in India. Ajmer district ranks first in the state with 45 percent of poultry population and 95 percent of egg production. Poultry production and egg processing industries have exploded in response to a steady increase in purchasing power among poor and marginal farmers, as well as increased acceptance of eggs. Increased awareness and lower production costs, to name a couple of factors, have resulted in this phenomenal growth.

Rajasthan's layer bird population is estimated to be around 47 lakhs. The total feed requirement is approximately 1,81,200 MT per year. However, layer farmers face challenges such as decreased egg production due to a lack of quality feed, poor farm management, and so on. While feed accounts for 75-80% of total production costs, commercial feed producers are critical to producing high-quality feed at reasonable prices.

On the 10th of May 2022, Suguna Feeds officially launched their Layer feed range at Hotel Lake Vinora Ajmer. Along with its nationwide operations in poultry and cattle feeds, the brand has expanded its layer feed operations in North India. Suguna Layer

feed focuses on the overall health of the birds and helps farmers achieve the performance goals of layers at every stage of their lives. The event was a huge success thanks to an overwhelming response from more than 70 farmers and business partners.

Layer Chick Crumble feed is recommended from 0- 8 weeks which helps in gut development and strives to improve growth rate and weight gain. Enhancing the immunity of the flock, this highly nutritive formulation aims to reduce early chick mortality (ECM) and consequently improves the livability of the flock.

Layer Grower Crumble feed is recommended from 9 – 17 weeks. It helps to maintain the skeletal body frame and organs development. This nutritious feed has been meticulously formulated to reduce pullet mortality and ensure flock uniformity.

Layer Crumble feed has been formulated for two phases, based on the stage of the birds. Phase 1 is recommended between 18- 52 weeks while Phase 2 can be used from 53 weeks onwards. At both the stages, this wholesome feed aids in maintaining peak egg production and helps in achieving optimum egg weight and ensure strong egg shells.

Suguna Feeds is confident in its ability to assist farmers in achieving the performance goals of layers at every stage of their lives with its comprehensive line of highly nutritious layer feeds.

Dr. Asif Hossain Joins Optima Lifesciences as Bangladesh Country Manager



Moving On

Dr. Asif Hossain is the new Country Manager for Bangladesh at Optima Lifesciences.

Bangladesh Agricultural University awarded him a master's degree in Veterinary Microbiology and Immunobiology. He brings ruminant experience from his previous positions as Assistant Manager at Eon Animal Health and Deputy Manager at Provet Resources.

He is an experienced sales professional with degrees in Veterinary Medicine, Veterinary Public Health, Veterinary Surgery, Veterinary Nursing, and Veterinary Pathology.

About Optima: Optima Life Sciences Pvt. Ltd. is a market leader in the animal health and nutrition sector. A company committed to providing the highest quality products and services to the livestock industry on a consistent basis.



Glocrest Pharmaceuticals welcomes Dr. Ramdas S. Kambale as CEO and Board Member

GLOCREST Pharmaceutical Pvt Ltd, a Krishna Group global Animal Health venture, is pleased to announce the appointment of Dr. Ramdas S. Kambale as the CEO and Board Member.

Dr. Kambale has over 20 years of experience in the animal health industry, having held senior leadership positions with national and international companies such as Wockhardt/ Bayer/ Chembond/ Proteon Pharmaceuticals. Dr Kambale will lead this organisation to the top of the pyramid as a qualified nutritionist with experience in techno-commercial and P&L activities.

Dr Ramdas said, "This is a new position as CEO and Board Member of GLOCREST Pharmaceutical Pvt Ltd, where I will be responsible for leading the company's Animal Health and Nutrition business globally.

"This is a global venture of the great Krishna group of companies, headquartered in Karnataka, India, and specialising in poultry and animal nutrition" he added.



Carus Laboratories Appoints Avinash Kharat as a General Manager of Poultry and Aqua Division

A graphic announcement for Carus Laboratories. On the left, the Carus logo (a stylized bird/plant) is above the text: "CARUS LABORATORIES Appointment AVINASH KHARAT General Manager Poultry and Aqua Division". On the right, there is a circular portrait of Avinash Kharat, a man with a beard and mustache, wearing a blue shirt, standing in front of green foliage. The background of the graphic is white with teal and orange decorative shapes.

Carus Laboratories' Poultry & Aqua Division has chosen Avinash Kharat as its new General Manager.

His 17 years of poultry farming knowledge, which includes chicken feed, chicks, medicine sales, and marketing, will help the company expand its market.



New management in the Animal Nutrition division at Alzchem



Andreas Oebbeke

Andreas Oebbeke has been appointed as the new head of the Animal Nutrition division at Alzchem Group AG in Trostberg, effective May 1, 2022.

"We are delighted to welcome Andreas Oebbeke, a renowned and experienced expert, to lead our Animal Nutrition business," said Dr. Georg Weichselbaumer, a member of the Alzchem Management Board. "After the first very successful years of building it up, he will take our Creamino® business to the next level and now drive our global growth strategy."

Andreas Oebbeke has been in the industry for decades: after training as a farmer, he earned a degree in agricultural science from the University of Bonn with a focus on animal production and animal nutrition. Over the next 30 years, he held senior positions at major German and international feed/feed additives companies, most recently as Sales Director at a global leader in animal nutrition. This exceptional blend of scientific knowledge, practical know-how, and a direct, hands-on approach will now benefit Alzchem's customers: "Our top priority is to create added value for the customer," Oebbeke emphasises. "Improving animal production efficiency will play an important role in global food security."

And with Creamino®, we have an innovative and thus already proven technology that allows us to do so to a significant extent: we help feed the world – that is our mission."



Evaristo Macalino, an Industry Expert, Joins Royal Pas Reform in the Philippines



Royal Pas Reform has expanded and strengthened its presence in the Philippines' hatchery industry with the appointment of **Dr Evaristo Macalino** as **country manager**, who has over 30 years of specialist experience in the country's poultry and livestock industries.

Since 2019, Dr. Macalino has been assisting Filtration Solutions, Inc. (FSI), Royal Pas Reform's representative in the Philippines. FSI, a subsidiary of ERA Trading based in Pasig City, east of Manila, provides turnkey solutions to customers in the poultry sector.

Dr. Macalino is well-versed in the poultry and pig industries in the majority of South and Southeast Asian countries, having worked in poultry and livestock integration, sales, marketing, management, and administration, as well as poultry and swine breeding and veterinary health.

Dr. Macalino graduated as a Doctor of Veterinary Medicine in 1987 and began working in the poultry industry in 1988. His first senior position was with Purefoods Corporation in Natatas, Batangas province, as Breeder Farm Manager. He was the General Manager for Production at Pt. Santa Maju Abadi Breeding Farm in Jakarta, Indonesia, from 1992 to 1997.

After two years as Technical Manager Asia for Dutch poultry company Euribrid, he was appointed manager of Manila-based Hybro's South Asia, Southeast Asia, and China operations.

From 2004 to 2020, he worked for Hendrix Genetics in Boxmeer, the Netherlands, and established distributorships for Hypor, the world's second largest swine genetics company, in South Korea, the Philippines, and Vietnam.

Dr. Macalino most recently served as President of HiBig Poultry and Livestock Trading and Consultancy Services Inc., a firm that facilitates the importation of poultry and livestock genetic material into the Philippines.

"Royal Pas Reform is the world's leading single-source supplier of Integrated Hatchery Solutions, and I am looking forward to working closely with FSI and its dedicated project management and service teams to continue to build on the significant growth potential here," Dr. Macalino says of his appointment.

According to Bas Kanters, Royal Pas Reform's Asia sales director, "this is a very exciting market, and we warmly welcome Dr Macalino into our family." His extensive knowledge, contacts, and expertise will significantly boost our presence and reputation in the Philippines."



Dr. Nigel E. Horrox

1952 - 2022

13 May 2022, we lost Dr. Nigel E. Horrox, Founder and Managing Director, Positive Action Publications Ltd., UK.
 International Hatchery Practice
 International Dairy Topics
 International Pig Topics
 International Poultry Production
 International Food & Meat Topics are internationally renowned magazines of the livestock industry.

It was always a pleasure to meet him during the numerous trade shows and seminars we visited. His frugal but honest advice impacted my writing in a big way. we lost a valuable person of the livestock industry. My deepest sympathies are with his family, friends, and team. May God give them the strength to bear this loss.



Mr. Khoram Zorabian

1946 - 2022

We lost Khoram Zorabian on 5 June 2022. He founded Zorabian Chicken in 1983, and it is now one of India's leading poultry brands, with a presence in 15 states and over 21 cities. On May 5, 1946, Khoram Zorabian was born. He was a fearless entrepreneur, a great mentor to his team, and a person who improved the lives of everyone he met.



Dr. Sanjay Dronwat

On 8 June 2022, we lost Dr. Sanjay Dronawat, Owner, Yarana Feeds. He was one of Hubli's ethical feed manufacturers. He previously worked for Jubilant Pharmaceuticals and the Suguna Group. Dr. Sanjay Dronawat was an amazing person who will always be remembered in our hearts. We are deeply saddened by your loss.

For FY23, Godrej Agrovet intends to invest 500 crore



Godrej Agrovet (GAVL), a diversified agribusiness company, plans to invest heavily in Astec Lifesciences, its agrochemical active ingredients subsidiary, in the current financial year, doubling its capital expenditure to over 500 crore. In recent years, the company has been spending between 200 and 250 crores on capital expenditures.

More than 300 crore of the 500 crore capex planned for the year will be invested in scaling up Astec Lifesciences, where we see significant growth opportunity, said Balram Singh Yadav, Managing Director, GAVL. The remainder will be used to expand marginal capacity in other businesses.

In August 2015, GAVL acquired Astec LifeSciences, a manufacturer of fungicides, insecticides, herbicides, and intermediates for global customers.

GAVL reported an 18.5% increase in net profits to 408.5 crore for FY22, while revenue increased 32.7 percent to 8,306.1 crore.

During FY22, Astec LifeSciences reported a 22% increase in revenue to 676.6 crore, aided by higher export realisations, a favourable product mix, and operational efficiencies. Exports accounted for 57.7% of Astec's revenue and increased by 44.4% year on year.

TARGAN secures \$35 million in Series C funding to commercialise a novel vaccine delivery system for the poultry industry



TARGAN (formerly Applied LifeSciences & Systems (ALSS)) announced the closing of a \$35 million Series C equity financing round. Mountain Group Partners and NovaQuest Capital Management co-led the financing.

Merck Animal Health and Oval Park Capital, both existing investors, also participated in the round. TARGAN is currently developing a system for the commercial poultry industry that incorporates its proprietary technologies such as high-speed imaging, feature recognition, artificial intelligence, robotics, and microfluidics.

This system can vaccinate up to 100,000 chicks per hour individually and accurately against diseases such as coccidiosis, infectious bronchitis, and Newcastle disease. Furthermore, TARGAN has created a one-of-a-kind, fully automated system for determining the gender of individual chicks, allowing poultry producers to rear separate sexes.

With the Series C investment, TARGAN will be able to accelerate the commercialization of its automated and personalised poultry vaccination and gender identification systems.

About TARGAN

TARGAN, headquartered in Morrisville, North Carolina, is a Biotechnology Systems company poised to transform the animal protein production industries around the world by bringing affordable, individualised care technologies to market. By 2050, global meat

consumption is expected to double. Meat consumption is increasing due to the world's growing population and the popularity of animal protein.

Bühler establishes an Insect Technology Center to assist customers in the feed and food industries.



The Bühler Group is proud to announce the official opening of its world-class Insect Technology Center (ITC). The facility, located in Uzwil, Switzerland, brings together Bühler's expertise and the best infrastructure to help the industry grow. Bühler and its customers can use the ITC to conduct larvae growth trials with different feedstock, develop product samples, evaluate breed solutions, and run trainings. The ITC is already in operation after receiving funding from Switzerland's Federal Office for the Environment (FOEN) for its contribution to a more sustainable food system.

At the heart of the Center are two insect growth chambers that can simulate industrial production conditions. These chambers have a sophisticated climate control system and numerous sensors that provide valuable process insights. Based on the collected data, the appropriate parameters and practises can be determined to ensure efficient insect production on an industrial scale. Working with the two most important insect species for industrial production, black soldier flies and mealworms, is possible at the ITC.

"The opening of the Insect Technology Center is a significant step forward in our journey." We have gained expertise and maturity over the years to provide the most appropriate and dependable solutions to various customers in the insect industry. "With our new facility, we expand our services and can even better support our customers in installing an industrial insect plant," says Andreas Baumann, Bühler's Head of Market Segment Insect Technology.

August 2022

- 1. The Poultry Expo
@ The Livestock & Agri Expo**
Dates: August 3-5, 2022
Venue: India Expo Center & Mart
City: Greater Noida
Country: India
Email: info@pixieexpomedia.com
Website: www.pixieexpomedia.com
- 2. 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
- 3. Livestock Asia**
Dates: 10 – 12 AUGUST 2022
Venue: MITC Complex
City: Melaka
Country: Malaysia
Email: livestockmalaysiamy@informa.com
Website: www.livestockmalaysia.com
- 4. Livestock Philippines 2022**
Dates: August 23 - 25, 2022
Venue: World Trade Center
City: Pasay city
Country: Phillipines
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.victamasias.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
- 2. VIETSTOCK 2022**
Dates: 12 - 14 October 2022
Venue: Saigon Exhibition & Convention Center (SECC)
City: Ho Chi Minh City
Country: Vietnam
Website: www.vietstock.org/en-us

November 2022

- 1. EuroTier**
Dates: 15 - 18 November 2022
Venue: Deutsche Messe AG
City: Hannover
Country: Germany
Website: www.eurotier.com/de

December 2022

- 1. Agri Livestock**
Dates: 02 - 04 December 2022
Venue: Myanmar Expo Hall
City: Yangon
Country: Myanmar
Website: www.agrilivestock.net

EGG Daily and Monthly Prices of May 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 SUGGESTED EGG PRICES																																
Ahmedabad	390	390	390	390	390	392	394	396	398	400	402	405	410	420	435	455	470	470	470	475	475	475	430	430	435	440	445	450	455	460	460	428.94
Ajmer	300	300	300	303	310	315	318	325	343	343	356	380	380	385	411	425	425	401	401	380	380	360	370	401	415	415	420	426	426	411	411	372.13
Barwala	287	287	287	295	301	305	308	316	328	335	350	377	382	388	410	422	422	385	377	377	355	365	390	407	407	412	420	420	420	407	366.58	
Bengaluru (CC)	390	390	390	390	390	370	370	370	375	380	385	395	405	415	440	460	465	470	480	485	485	485	465	465	465	470	475	480	485	490	495	434.68
Brahmapur (OD)	340	340	340	340	340	345	345	352	360	372	382	402	425	445	465	495	495	495	495	495	495	450	430	460	462	468	475	480	485	485	427.19	
Chennai (CC)	410	410	410	410	410	390	390	390	390	390	390	405	420	440	460	460	480	480	490	505	505	505	505	480	480	480	495	495	505	505	505	451.29
Chittoor	403	403	403	403	403	383	383	383	383	383	383	398	413	433	453	453	473	473	483	498	498	498	498	473	473	473	488	488	498	498	498	444.29
Delhi (CC)	305	310	310	310	315	322	327	327	338	355	357	375	400	400	406	435	448	448	448	405	405	400	385	400	425	430	430	435	445	445	386.65	
E. Godavari	315	315	315	315	315	315	315	320	325	335	345	365	385	405	430	455	460	465	470	470	470	430	430	440	440	445	450	455	460	460	399.19	
Hyderabad	320	320	320	320	323	326	329	332	335	340	350	360	385	411	431	445	450	455	460	460	460	420	420	425	430	435	440	445	450	453	456	396.97
Ludhiana	291	291	291	291	296	302	304	306	317	328	336	351	377	379	389	411	422	422	422	396	386	377	366	370	396	405	405	418	420	420	408	364.29
Mumbai (CC)	385	385	385	385	385	388	391	394	397	400	405	415	425	445	470	490	505	510	515	520	520	520	490	480	485	490	495	500	505	510	513	454.94
Muzaffarpur (CC)	352	352	352	352	362	362	362	376	381	390	400	424	438	429	461	486	486	486	476	457	443	443	433	443	467	467	471	476	481	481	476	427.90
Mysuru	394	394	394	394	390	370	370	370	377	383	388	400	410	420	445	465	470	475	485	490	490	490	465	465	465	472	480	485	490	495	497	438.00
Nagpur	350	350	335	335	330	340	340	340	340	360	370	380	390	410	410	470	470	470	475	475	450	425	425	425	445	470	470	465	480	480	480	411.45
Namakkal	380	380	380	380	360	360	360	360	365	365	365	390	390	415	415	450	450	450	475	475	475	475	445	445	445	460	460	470	470	480	480	421.61
Patna	343	343	343	343	352	357	362	362	376	381	400	414	429	429	452	467	467	467	457	448	438	438	429	438	462	462	471	471	476	471	467	419.84
Pune	380	380	380	380	380	380	382	384	387	390	395	405	415	440	465	485	500	500	500	500	500	500	480	480	490	500	505	510	515	520	520	449.94
Ranchi (CC)	352	357	357	357	367	367	371	371	381	390	400	429	438	442	452	490	490	490	476	462	452	452	452	452	476	476	481	481	486	486	481	432.71
Vijayawada	315	315	315	315	315	315	315	320	325	335	345	365	385	405	430	455	460	465	470	470	470	430	430	440	440	445	450	455	460	460	460	399.19
Vizag	375	375	375	375	375	375	375	375	375	375	400	410	420	450	500	500	500	500	500	500	500	475	450	450	450	450	450	455	460	460	460	429.52
W. Godavari	315	315	315	315	315	315	315	320	325	335	345	365	385	405	430	455	460	465	470	470	470	430	430	440	440	445	450	455	460	460	460	399.19
Warangal	322	322	322	322	325	328	331	334	337	342	352	362	387	413	433	447	452	457	462	462	462	422	422	427	432	437	442	447	452	455	458	398.97
Prevailing Prices																																
Allahabad (CC)	352	352	352	352	352	352	352	352	357	381	386	400	414	424	448	462	467	467	467	452	452	443	443	438	452	457	457	457	457	457	452	416.32
Bhopal	345	330	325	325	325	325	325	335	335	340	345	365	385	405	405	445	447	445	445	445	405	405	405	410	425	435	440	445	445	450	450	392.16
Hospet	350	350	350	350	350	330	330	330	335	340	345	355	365	375	400	420	425	430	440	445	445	445	425	425	425	430	435	440	445	450	455	394.68
Indore (CC)	325	330	330	335	335	340	340	340	340	365	375	390	400	400	400	440	440	440	405	405	385	400	425	440	440	445	450	430	430	430	391.94	
Jabalpur	320	325	327	327	330	333	336	340	344	355	365	380	385	395	425	450	455	457	450	430	410	410	410	421	438	440	443	447	460	465	465	398.00
Kanpur (CC)	357	357	357	343	343	343	343	367	362	362	362	386	390	390	405	419	419	419	405	405	390	390	390	405	424	424	433	443	443	443	443	392.32
Kolkata (WB)	385	370	370	370	375	385	400	405	410	420	430	455	470	485	510	530	535	535	535	535	535	480	500	510	510	515	520	525	525	525	525	470.32
Luknow (CC)	380	367	367	367	367	357	357	367	377	390	390	400	410	410	413	427	427	427	427	427	427	427	427	433	450	450	460	467	467	476	476	413.35
Raipur	343	320	320	320	325	325	328	335	335	355	360	380	400	415	415	455	460	460	460	440	440	440	440	460	460	445	450	453	456	460	460	403.71
Surat	400	400	400	400	400	400	400	400	400	400	400	405	410	425	435	460	475	485	485	485	485	485	445	445	450	455	460	465	470	475	475	437.90
Varanasi (CC)	343	343	343	350	360	363	367	373	383	393	400	420	433	433	450	467	467	457	440	433	433	433	433	443	457	463	473	476	476	476	421.19	

Editorial Calendar 2022

Publishing Month: January Article Deadline : 30th, Dec. 2021 Advertising Deadline : 3rd, Jan. 2022 Focus : Disease Prevention	Publishing Month: February Article Deadline : 30th, Jan. 2022 Advertising Deadline : 3rd, Feb. 2022 Focus : Nutrition Management	Publishing Month: March Article Deadline : 28th, Feb. 2022 Advertising Deadline : 3rd, March 2022 Focus : Vaccination	Publishing Month: April Article Deadline : 30th, March 2022 Advertising Deadline : 3rd, April 2022 Focus : Heat Stress
Publishing Month: May Article Deadline : 30th, April 2022 Advertising Deadline : 3rd, May 2022 Focus : Cold Chain Mgmt.	Publishing Month: June Article Deadline : 30th, May 2022 Advertising Deadline : 3rd, June 2022 Focus : Feed Production	Publishing Month: July Article Deadline : 30th, June 2022 Advertising Deadline : 3rd, July 2022 Focus : Layers, Cages, Eggs	Publishing Month: August Article Deadline : 30th, July 2022 Advertising Deadline : 3rd, August 2022 Focus : Genetics & Breeding
Publishing Month: September Article Deadline : 30th, August 2022 Advertising Deadline : 3rd, September 2022 Focus : Biosecurity	Publishing Month: October Article Deadline : 30th, September 2022 Advertising Deadline : 3rd, October 2022 Focus : Winter Management	Publishing Month: November Article Deadline : 30th, October 2022 Advertising Deadline : 3rd, November 2022 Focus : Environment Control	Publishing Month: December Article Deadline : 30th, November 2022 Advertising Deadline : 3rd, December 2022 Focus : Industry Outlook

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(Life Time Period 10 Years)

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For more detail, contact:



Pixie Consulting Solutions Ltd.
 C/o OmAng Hotel, Namaste Chowk, Near Janta Petrol Pump,
 KARNAL - 132001 (Haryana) INDIA
 Email : poultry.pcsl@gmail.com | info@pixie.co.in
 Website : www.pixie.co.in
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 Bank address: Opp. Mahavir Dal Hospital
 Account Type: Current
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 Account Number: 01958730000179
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