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THE MAGAZINE OF INDIAN POULTRY INDUSTRY | APRIL 2024

COVER

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ARTICLE

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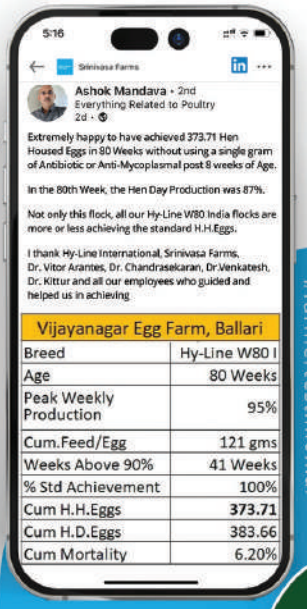

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6 Batches Taken Till Now

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Achieved 238 HHE in 60 Weeks With 106 g Feed Intake/Day (Laying Period)

Peak Weekly Production	92%
Weeks Above 90%	19
Cum Feed / Egg	125
% Achievement	92%
Feed Cost / Egg @ Rs. 26/KG	Rs. 3.25

4 Batch Taken Till Now

S.A.K Poultry Farm, Ranga Reddy District, Telangana

Achieved 234 HHE in 60 Weeks With 105 g Feed Intake/Day (Laying Period)

Mr. Sohaib Ahmed Khan

Peak Weekly Production	94%
Weeks Above 90%	33
Cum Feed / Egg	125
% Achievement	91%
Feed Cost / Egg @ Rs. 25/KG	Rs. 3.13

10 Batches Taken Till Now

Divya Farms, Namakkal Dist, Tamil Nadu

Achieved 121 HHE in 40 Weeks With 101 g Feed Intake/Day (Laying Period)

Mr. Vivek Kaliannan

Peak Weekly Production	94%
Weeks Above 90%	14
Cum Feed / Egg	127
% Achievement	93%
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26/03/2024

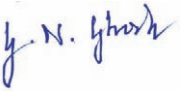
The Edit

OUR UNSUNG HEROES

I recall Matelab, a poultry worker who toiled alongside me in my first poultry venture on the outskirts of Kolkata. At just 28 years of age, his weary eyes were always tinged red, his speech slurry with exhaustion. Can you fathom the challenges faced by those immersed in the dusty environs of deep litter poultry houses, tirelessly attending to over a thousand layer birds, day and night, ensuring their sustenance and safety from predators? Yet, these poultry workers seldom find mention beyond our routine poultry discussions.

In our nation, poultry farming remains stigmatised as a polluting endeavour, met with disdain. My recent research led me to the districts of Midnapore and Bankura in West Bengal where I witnessed and documented much. Despite being critical, the labour of poultry workers continues to be undercompensated, falling within the realms of unorganised and informal employment. It dawned on me that many poultry workers resort to substance abuse to cope with the noxious odours emanating from the accumulated poultry litter and deceased birds, perpetually endangering their health.

Amidst the scorching temperatures and oppressive humidity of the previous summer, as I collected narratives on poultry farming, I stumbled upon rare tales of resilience and heroism. A poultry worker from South Bengal remarked, " We waged a battle against the blistering sun and unforgiving elements – akin to an army. The labour is getting gruelling, yet we never faltered – we served tirelessly day and night to ensure the wellbeing of the birds." Through such candid exchanges, I gleaned the overlooked yet vital nature of their contributions. Here's to honouring our poultry farmers and workers!



G. N. Ghosh
Managing Editor

Indian Research

Phenotypic Characterization of Indigenous Chicken of Belgaum Division of Karnataka State

By
B.G.Veeranna Gowda*, Jayanaik and C.S.Nagaraja, B.M.Vceregowda., T.N. Krishnamurthy, R. Jayashree, A.M. Kotresh, Mahadcvappa D.Gouri and D.M. Basavarajaiah
Veterinary College. Shivamogga Karnataka Veterinary. Animal and Fisheries Sciences University Bidar. Karnataka.

The study was undertaken to characterize the indigenous chicken of Belgaum division of Karnataka State, based on some phenotypic trails. The study included two parts I. Survey study and II. Evaluation under farm conditions. In the survey study a total of eight hundred and ten birds (810). 270 males and 540 females, mature indigenous chicken were randomly sampled from the study area and in the evaluation under farm conditions a total of one hundred and sixty birds (160). 24 males and 136 females from each district were selected for morphological characterization. The study covered three districts (Bijapur, Belgaum and Dharawad). The parameters included feather morphology, feather distribution, plumage colour. primary plumage pattern, secondary plumage pattern, skin colour, shank colour, ear lobe colour, comb type and colour and eye colour as per NBAGK proforma. The most predominant feather type, plumage colour, skin colour, shank colour, comb type, ear lobe colour were normal feather (94.44 %), brown plumage (29.26%), yellow skin (95.45%)., yellow shank (88.69 %), single comb (73.42 %), brown eye colour (56.10 %) and red ear lobe (100%) in field conditions and in farm conditions it was normal feather (92.l5%), brown plumage (34.44%), yellow skin (93.87%), yellow shank (87.37%), single comb (83.28%), brown eye colour (57.55%) and red ear lobe (100%). The study revealed that most of the parameters measured revealed distinctive variations among the birds of three districts of Belgaum division, providing the basis for further characterization of indigenous chicken; therefore further study can be concentrated towards selection for qualitative traits of interest and conservation of these breeds for future poultry development.

Evaluation of Performance of Layer Crosses Developed for Rural Poultry Farming Under Intensive System

By
K.S. Rajaravindra, T.K. Bhatacharya, U. Rajkumar, L.L.L. Prince and M. Niranjan, Santosh Haunshi, S. Jayakumar, S. K. Bhanja and R. N. Chatterjee
ICAR-Directorate of Poultry Research, Rajendra Nagar, Hyderabad

Rural poultry farming is widely accepted and adopted as a profitable and sustainable means of livelihood and nutritional security in our country. The rural population have a preference for multicolour plumage birds laying brown eggs with better agility and speed to escape from predators. The improved chicken varieties available in the country have a potential to produce 150-160 brown eggs annually under the field conditions. The present study was aimed at developing chicken varieties capable of producing more than 200 brown eggs under the field environment with minimum intervention. One three way cross viz., DKH (PD-3 x (KxH) and four two way crosses viz. CxH (PD-1 x IWH), VxH (PD-2 x IWH0, DRxH PD-3 x IWH) and KxH (Kadaknath X IWH) were produced and evaluated up to 52 weeks. The fitness traits like fertility and hatchability were within normal range and did not differ considerably between the five crosses. The body weight at juvenile and adult was significantly low in the DKH and KxH birds compared to other crosses weight at juvenile and adult significantly low in the DKLH and KxH birds compared to other crosses. The ASM was 148.2+0.92, 142.4+0.92, 142.4+0.090, 145.5+0.042 and 158.2+0.83 days, respectively, in DKH, CxH, VxH, DRxH and KxH crosses. The respective egg weight at 28 weeks was 50.98+0.1, 51.47+0.33, 52.61+0.33, 53.23+0.33 and 45.11+0.926 g. The 40 week egg production was significantly lower in CxHDRxH and KxH crosses was 1685s+14.4, 2283+30.3, 23101+22.5, 1838+27.2 and 1634+24.00g, respectively, with egg weight of 56.15+0.38, 57.58+0.52, 56.80+0.47, 58.17+0.37 and 50.18+0.29g, respectively. The egg production up to 52 weeks of age was 154.+1.7, 120.4+3.1, 156.3+2.9, 165.1+3.2 and 158.6+2.3 eggs, respectively. For DKH, CxH, VXH, DrXH and KxH crosses. The DKH birds flaunt multiple plumage colours over the other four crosses which exhibit white body with specks of colour dispersed all over the body and thus have added preference for rural poultry. Further information on annual egg production, field evaluation, adaptability, farmer's preference and marketing opportunities will decide the acceptance.

Effect of Vitamin E and Selenium Feed Supplements on Production Performance and Egg Quality in WL Layers

By
T. Susmita, C. A. Kumar, K. Nagaraja Kumari, M. N. Swaroop and B. Ganguly.
N TR College of Veterinary Science. Gannavaram. Sri Venkaleswara Veterinary University, Andhra Pradesh

The impact of herbal products on feed consumption, egg production, and profitability were examined in a study of 500 layers who were 55 weeks old. The five groups of live replicates and 20 birds each were formed by randomly dividing the experimental layers, which were kept in identical management and environmental settings. Dietary treatments comprised of a standard layer ration (TI) (CTRL), and addition of AV/VSP/15 @200-250 g/ton (T2). brand-A@ 150-250 g/ton of feed (T3). brand-B @ 100 g/ton of feed (T4), brand-C @ 150-250 g/ton of feed (T5) in the basal diet. During the observation period of 55 to 65 weeks, feed consumption, egg production, and mortality were noted. Feed per dozen eggs produced and egg quality were calculated. A better% Hen Day Egg Production at 65 wks(72.1 vs 80.8). Feed Efficiency Per-Dozen Eggs Produced (2.0 Vs 1.75) egg quality, storage quality and increased tocopherol and selenium content of egg were observed in vitamin E and selenium supplemented groups compared to control. The results show that adding herbal vitamin E and selenium to layer diets during the post-peak production period improves WL layer performance.

Source: XXXVII Indian Poultry Science Association Conference, November 2022

Research Abroad

The Nutritional Importance of Milk Thistle (Silybum marianum) and its Beneficial Influence on Poultry

*Shaaban S. Elnesr©', Hamada A. M. Elwanb, Mohamed I. El Sabryc and Abdelrazeq M. Shehatad**

Summary
In recent years, many countries have prioritised on using innovative supplements in poultry nutrition. Natural substances can be fed in poultry production with a better level of safety and specific impacts. The majority of these impacts are reflected in final products with added value that are healthy, functional, and free of any antibiotic residue. This review article intends to highlight the nutritional uses and favourable health features of milk thistle (Silybum marianum) and its influence on poultry production. In this regard, milk thistle is abundant in chemical bioactive substances, such as silymarin and has a variety of biological properties, including immuno-stimulating and antioxidant activities. The inclusion of milk thistle in poultry diets increases their growth and productivity. Milk thistle components can improve immune response, antioxidant indices, kidney and liver function, blood haematology, lipid profile and then the physiological status of birds. Thus, milk thistle and its derivatives as feed supplements can meet the desires of producers for augmented poultry performance and the consumer demands to produce poultry under environmentally friendly conditions. Finally, the present review study concluded that supplementation of milk thistle as natural feed additive may affect the antioxidant, immunity, blood biochemistry, and productive performance in poultry.

Conclusion
The review highlights the potential of milk thistle to be used in poultry feed. Milk thistle has an affirmative impact as an immunomodulatory, antioxidant, and growth enhancer. Milk thistle and its derivatives as natural constituents can be added to poultry diets to boost some physiological functions of birds that have the most significant influence on the productive performance, and immune responses, leading to improved bird welfare and production of healthy products.

Source : World's Poultry Science Journal

Emergence of Hemp as Feed for Poultry

F. Shariatmadari

Summary
Hemp is an annual herbaceous flowering plant belonging to Cannabaceae family, traditionally cultivated for seed and fibre production. Hempseed is rich in nutrient composition; it contains 25% crude protein (with high-quality digestible amino acids), functional oils (rich in valuable polyunsaturated fatty acid), a high amount of minerals, vitamins (tocopherols) and beneficial phenolic compounds. Up to recent years, hemp cultivation has been prohibited due to its high cannabinoid compounds, of which delta 9-tetrahydrocannabinol is the psychoactive agent. The cultivation of newly developed low 'industrial hemp' (that contains less than 0.3% delta 9-THC) is also restricted. Hempseed products (hempseed, hempseed meal and hempseed oil) are not registered (approved) as 'safe' feed ingredients for poultry due to their possible adverse effects on animal health and efficiency.

On the other hand, with the possible move to legalise industrial hemp cultivation in recent years, several experiments were conducted to assess the 'safety and efficiency' of hemp seed on poultry performances. The published results indicate that diet containing up to 12% hempseed, 10% hempseed meal and 5% hempseed oil improve the overall performance of broiler chicken. With respect to layer chicken, the inclusion of up to 25% hempseed, 15% hempseed meal and 7% hempseed oil had no adverse effect on egg production and its quality. HSP proved to enrich meat and egg with polyunsaturated fatty acids.

There are now enough evidence to declare hemp usage 'safe' and with no adverse effect on poultry product quality (taste and smell). Despite these findings, research on hemp is still in its infancy stage and has a long way to go to clarify many aspects of its effectiveness as poultry feed.

Conclusion, future consideration and recommendation
This review shows no adverse effect of high HSM levels on overall performances of poultry, egg production or quality, suggests that HSM does not contain substances that interfere with the production of broiler and laying chicken and that the nutrients contained by the meal are available to the hens. From ample evidence available, it could be concluded the usage of hempseed up to 15% (10% hempseed meal, 4% HSO) in broiler diet and 22% in layer chicken diet is beneficial for poultry production. There are also indications that higher levels of HS (i.e. 30%) can be well tolerated by the hens, but an early adaptation of birds to hemp-derived products during the rearing period may be required.

A major factor affecting the results of these studies is the small sample size, leading to possible standard error or biased estimates. There is also little in-depth elaboration of the mechanism involved leading to such results reviewed here. Further experiments with larger number of replicates to reconfirm present results, together with more physiological in-depth studies such as digestive tract morphology and microbiology to allow a better understanding of the mechanisms involved, is needed.

While there are many biological activity attributes are given to HSO. There has been little advancement on HSO as regard with poultry. A promising research area are that exploration of HS (oil) on pharmacological, antimicrobial, immunomodulatory, antioxidative, antihypertensive and mineral binding characteristics.

Overall, the outlook of future research to assess various aspects of HSP's effect on poultry performances is bright and exciting and will certainly engage many researchers throughout the world for years (if not decades) to come.

Source : World's Poultry Science Journal

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Article

Holistic Nutritional Management Approach for Mitigating Heat Stress

Dr. Pothanna J
Technical Manager
Trouw Nutrition South Asia

In India's major poultry-producing areas, the scorching temperatures during the months of April to June pose significant challenges. Heat stress during this period leads to increased mortality rates, reduced egg production, and slower growth in young pullets. To mitigate these effects, an effective heat stress management system is imperative.

Heat stress in poultry arises from a combination of factors. Primarily, the absence of sweat glands leaves birds reliant on alternative cooling mechanisms. Environmental conditions play a significant role, with high temperatures, humidity, and inadequate ventilation exacerbating the heat stress. Additionally, suboptimal management practices such as irregular feeding schedules and poor litter conditions further compound the issue.

Heat stress Index (HSI)- The Heat Stress Index (HSI) in poultry is the sum of ambient temperature (^{0}F) and relative humidity (%), indicating the combined impact of these factors on bird welfare.

Normal Body Temperature	41.2 °C to 42.2 °C
	106 °F to 107 °F
Ideal Temperature Range	65 °F to 75°F
	18.3 ^{0}C to 23.9^{0}C
Thermoneutral Zone	55°F to 75°F

Thumb rule - When the HSI surpasses 160, it is more probable that heat stress will occur, leading to adverse effects on flock performance. Comfort zone (<140 HSI).

In the thermoneutral zone, birds lose heat using clear methods such as radiation, convection, and conduction. They also lose unconscious heat through evaporation, which is especially noticeable during summer. High temperatures cause the hypothalamus to activate the adrenocortical axis, which increases corticosteroid release. This increases physiological load in birds and worsens heat stress. Long-term exposure to high temperatures and humidity causes panting, which may be insufficient to regulate body temperature, and the birds suffer from heat stress.

Panting allows the bird to control its body temperature by draining water from its respiratory surfaces and air-sacs. Long-term exposure to high temperatures and humidity produces panting, which may not be sufficient to regulate body temperature, and the birds experience heat stress. Hot, humid weather is more demanding than hot, dry weather. Panting causes heat loss as moisture evaporates from the airways, a tenfold increase in respiratory rate, and an alteration in the blood's acid-base balance, leading to respiratory alkalosis. Carbon dioxide (CO_2) loss raises plasma pH and mineral deficiency, such as potassium (K) leads to decreased growth rate, excessive humidity, and warmth limit evaporative heat loss and, in severe cases, cause death.

Mitigation strategies:

- Water Management
- Feed management.
- Health Management
- General Management

Feed Management

Birds require more energy to cool down in hot weather, so their energy needs increase. Surprisingly, when temperatures rise over 21^{0}C, animals require slightly less energy for fundamental processes. However, it is still a good idea to increase their energy intake by 10% to assist them cope with the heat. Adding a small amount of fat or oil to their diet, up to 5%, can also be beneficial because lipids give a lot of energy and release less heat during digestion. They also slow down the digestive process, allowing animals to absorb more nutrients. Some fats like soybean, canola, walnut, flaxseed, and fish oils, include omega-3 and omega-6 fatty acids, known as polyunsaturated fatty acids (PUFAs), which are beneficial to health.

Hot weather affects animal protein metabolism, leading to decreased synthesis and increased breakdown. To prevent coccidian growth, it's crucial to balance diets with specific amino acids and protein-rich ingredients. This balance prevents excessive liver fat accumulation and improves heat stress coping. Heat stress also reduces arginine absorption, leading to protein breakdown. To counteract this, feed formulations should focus on vegetable proteins like soy,

sesame, and sunflower.

Poultry farmers face challenges during summer due to increased feed intake. To ensure birds' health and survival, they restrict feeding before peak temperatures. Broilers receive a protein-rich diet during cooler times and an energy-rich diet during warmer periods. Laying birds receive once-a-day feeding in the evening to maintain calcium reserves and eggshell quality. Pelletized feed reduces energy expenditure, improving efficiency. High-quality pellets are crucial for optimal feed conversion. Wet mash feeding is recommended in regions with high temperatures and humidity for better bird performance.

Feeding birds at the right time of day is crucial to help them cope with heat stress. Late afternoon can cause significant body temperature rise, potentially leading to bird mortality. To avoid unnecessary heat load, feed should be withdrawn 8 hours before peak temperature. One-third of the daily feed ration should be given in the morning and two-thirds in late afternoon. Calcium is available during night formation, improving shell quality and preventing depletion of bone calcium. Midnight snacks can provide extra feeding time in cooler parts of the night. Feed stimulation can help raise feed consumption and stimulate intake. Practices include wet mash feeding, pellet or crumble feed, low-calcium diets, frequent feeding and stirring, adding fat or molasses, running feeder chains more frequently, emptying feeders, and running feeders empty at least once a day. To ensure optimal nutrient intake in summer, increase the nutrient density of the ration by adding nutrients, vitamins, and minerals to compensate for reduced intake.

During summer heat stress, poultry may experience increased excretion of minerals, leading to lower levels of essential nutrients in their bloodstream and liver. Antioxidant minerals such as chromium are crucial for aiding glucose clearance through insulin receptors, promoting glucose uptake into cells. Zinc, found in various proteins and enzymes, plays a vital role in immune function, cellular growth, and defence against free radicals. Selenium, when present in higher concentrations, has been shown to enhance antibody levels, counteracting the negative effects of heat stress. Summer heat can also reduce calcium intake and the conversion of vitamin D3 to its active form. However, excessive dietary calcium can decrease feed intake and palatability. Therefore, it's recommended to provide calcium separately, such as through oyster shell grit or limestone chips, during the afternoon. Additionally, excessive phosphorus can inhibit the release of bone calcium and the formation of calcium carbonate in the shell gland, compromising shell quality. Proper management of these minerals is crucial for maintaining poultry health and productivity during summer heat stress.

Feed Additives

Vitamin C: Vitamin C, also known as ascorbic acid, is crucial for poultry nutrition, especially during heat stress. Its antioxidant properties combat oxidative stress and protect cells and tissues from damage, promoting overall health and resilience in poultry. Its primary role is in scavenging free radicals.

Vitamin C is crucial for collagen synthesis, a structural protein essential for connective tissue, bone, and blood vessel integrity. It supports tissue repair and maintenance during heat stress, aiding in the recovery of damaged tissues in poultry. Vitamin C enhances the immune response in poultry by supporting the activity of immune cells and cytokines, thereby strengthening the immune system's ability to combat infections and diseases, particularly during environmental stress.

Vitamin C serves as a cofactor in the conversion of inactive vitamin D to its active form in poultry. This process occurs primarily in the liver and kidneys, where 25-hydroxyvitamin D is formed, the major circulating form. This vitamin D is then further hydroxylated in the kidneys by enzyme 1-alpha-hydroxylase, resulting in the biologically active form 1, 25-dihydroxy vitamin D. This active form regulates calcium and phosphorus metabolism, bone health, and immune function in poultry. Vitamin C's role in this enzymatic reaction enhances vitamin D's biological activity.

Betaine: Betaine is a versatile compound with several critical roles in biology, functioning as both a methyl donor and an osmo-regulator. Originally discovered in sugar beet juice, betaine is derived from the amino acid glycine and has a neutral, bipolar structure known as a zwitterion. This unique structure as shown in Fig.1 allows it to participate in various biological processes while protecting cells from environmental stress.

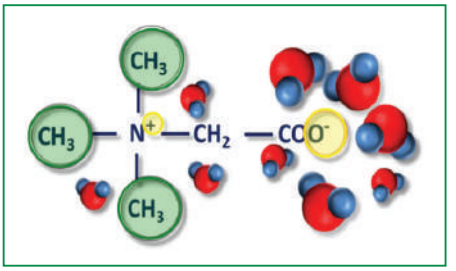


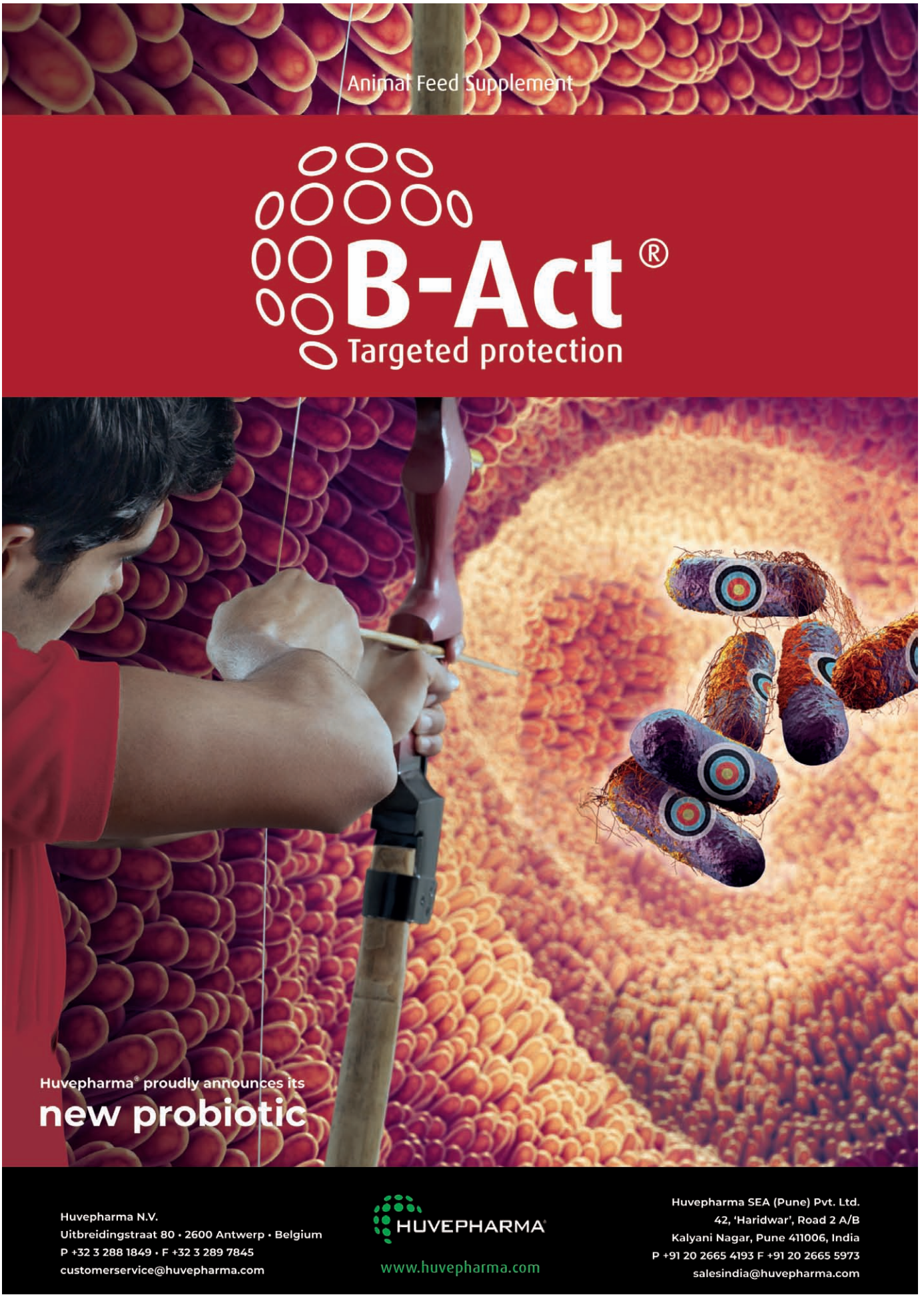
Fig. 1: Chemical structure of Betaine

Chromium: Chromium is a vital mineral in poultry feed, particularly during the summer, when heat stress can impact bird health and metabolism. Its primary role involves supporting glucose metabolism by enhancing insulin sensitivity. Chromium interacts with chromodulin, a peptide that strengthens the bond between insulin and its receptor, facilitating improved glucose uptake into cells. This improved insulin function helps maintain stable blood glucose levels, ensuring efficient energy use, which is crucial when heat stress elevates energy demands. By reducing metabolic stress through efficient glucose clearance, chromium can help mitigate the adverse effects of heat stress.

Additionally, chromium contributes to improved immunity and reduced cortisol levels, further aiding poultry health during summer. By enhancing insulin sensitivity, chromium indirectly supports stronger immune responses, offering birds better protection against diseases exacerbated by heat stress. Moreover, by stabilizing glucose levels, chromium helps lower cortisol, a stress-related hormone that can hinder growth and immune function. The combination of these effects allows poultry to maintain better health and productivity during high temperatures, making chromium a valuable addition to summer feed formulations.

Conclusion

Farmers can adopt a comprehensive approach to mitigate summer heat stress in chickens by combining environmental controls, feed and water management, and stress-reducing treatments. Trouw Nutrition's Maxcare AHS(Anti-Heat Stress) is an important product to consider because it contains Betaine, Vitamin C, and Chromium, which are known for their anti-stress and antioxidant effects. These substances assist broilers and layers stay healthy and perform well in high temperatures. The Maxcare AHS dosing rate ranges from 0.5 kg to 1 kilogramme per tonne of feed. Implementing such solutions, combined with typical management approaches, can considerably lessen the impact of heat stress, leading to lower death rates, improved egg production, and faster growth rates in young pullets.



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Article

Keeping Flocks Healthy, Productive and Profitable Through Gut Management

Wouter Van Der Veken
Global Product Manager Probiotics
Huvepharma

The relationship between a healthy gut and optimal performance is undeniable and managing the gut efficiently can contribute to a greater overall production profitability.

As such, the gut and its microbiota can be seen as the motor of performance, which has to be fed, maintained and protected throughout the production cycle. In recent years, the use of alternative feed additives to support exactly this has increased.

This ties in with the rise of probiotics: beneficial micro¬organisms incorporated into feed or drinking water to balance and enhance the gut microbiota, resulting in a health and/or performance benefit.

The current probiotic market offers multiple options and there are plenty of products to choose from. However, three questions should be considered before the right choice can be made.

- **First of all, what is the intended benefit?** Some probiotics are more focused on digestion, whilst others eliminate pathogens more effectively. Keeping the intended benefit in mind when choosing a probiotic is essential, as probiotics also have their limitations.

- Secondly, is the probiotic stable and, as such, can it be used in standard feed processing? There are great differences in stability amongst probiotic products, most noticeably between spore formers and nonspore formers. It is this spore-forming capacity which makes a probiotic more adept to deal with feed processing, whilst it also protects the micro-organism throughout the digestive process until it reaches its location of action.

- Thirdly, are multiple probiotics used in the same product or not? Multi-strain products inherently introduce a certain aspect of competition, especially if the strains used are part of the same genus (Bacillus for example). Due to their similarities they are expected to compete for similar requirements, such as nutrients, potentially diminishing the intended effect.

Products of Choice

With regard to these three questions and their answers, spore-forming and single strain probiotics are often the preferred products of choice. B-Act, with spores of Bacillus licheniformis (DSM 28710) as an active component, is a good example.

It ensures healthy, productive and profitable flocks by supporting the birds' gut microflora, both directly and indirectly. The micro-organism has genes coding for multiple digestive enzymes and as such improves digestibility and availability of nutrients, whilst it also produces potent bioactive substances aimed at pathogen control. In particular, Clostridium perfringens, the pathogen responsible for the development of necrotic enteritis and a major player in dysbacteriosis (two major production diseases in poultry), is actively and efficiently controlled by B-Act.

The combination of these two modes of action results in healthier, more productive birds, leading to a better profitability in the end. To put this into numbers a statistical analysis was done on 11 recent performance studies, looking at general improvements in feed conversion rates (FCR) and final body weights (BW).

On average, B-Act supplementation led to 3% heavier birds compared to control flocks, whilst the FCR dropped with similar percentages. These numbers were even higher for flocks under a necrotic enteritis challenge, where adding B-Act to the feed or drinking water (WSP formulation) improved technical performance greatly.

Compared to the challenged control flocks, an average FCR improvement of 13% was achieved for challenged birds supplemented with B-Act, with higher BW of up to 26%. As such, supporting a healthy gut leads to productive and profitable poultry. With an average return on investment (ROI) of 8.3, B-Act offers an interesting solution to achieve this. The above confirms the interest in probiotics as alternative feed additives, combining economics with health standards in the most rewarding way.

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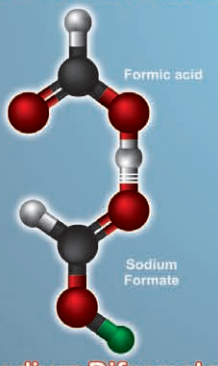

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COVER

BSFL: A Boon to the Poultry Industry

Food futurists acknowledge that sustainability focused humanity will increasingly incorporate insects as an alternative source of protein. However, the most researched and reared species may not always be sustainable, palatable or widely accepted. **Anupa Velusamy, founder of KovaiBSF and business strategist** in wet waste management with end to end operational excellence in BSF farming, writes for IPR to show how specialised Black Soldier Fly (Hermetia illucens) farming and post -harvest processing can be used as a sustainable feed option for the pet, aqua and poultry industry

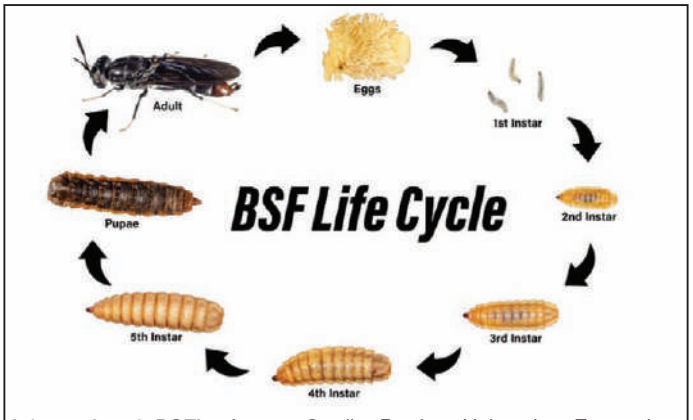
BSFL, or Black Soldier Fly Larvae, may sound exotic, but they're common in poultry units. While their name might intrigue, many recognize them as familiar farm residents, often found in manure. Most of the time poultry farmers comment "oh this worm, it's there in our unit, we thought it's a pest or harmful"

BSFL larvae. *Image Credit: Purdue University, Entomology*

BSF. *Photo credit: John Obermeyer, Purdue Entomology*

So, understanding BSFL and leveraging their potential is key in the poultry industry. Personally, I see BSFL as a significant asset to any poultry unit, a conviction shared by small farmers worldwide.

Let's have a brief introduction to Black Soldier Fly (BSF). It is basically a fly, whose larvae stage (BSFL) is used as feed and also used to process wet waste. These insects are holometabolous, meaning these insects undergo complete metamorphosis, starting as eggs that hatch into larvae, then pupate before emerging as flies. The scientific name of BSFL is Hermetia illucans; there is no known subspecies. However, specific strains adaptable to various terrains can be developed and enhanced. Nature has endowed these larvae with the role of ultimate scavengers, efficiently consuming organic matter and returning nutrients to the soil, aided by symbiotic relationships with certain bacteria.



Life cycle of BSFL. *Image Credit: Purdue University, Entomology. Graphic Credit: Bransen Shidler*

BSFL is not considered a pest; it has been in nature for thousands of years and it never turns out to be a pest or exploded in huge population in nature. This is because, unlike houseflies or greenflies, from my understanding and observation, the percentage of larvae that become fly in nature is very small. BSFL have a low rate of development into adult flies in the wild. Thus, they rarely become noticeable outside controlled environments like BSFL farms. While spotting adult black soldier flies is uncommon, encountering their larvae in manure or compost is a regular occurrence.

One notable observation I would like to record in this article is the varying stages at which different insects infect organic matter; houseflies start before decay, fruit flies join during overripening or at initial stage of fermentation, greenflies intervene during early decay, and BSFL naturally infest once significant degradation has occurred. There is an established symbiotic relationship between BSFL and microbes. This late-stage infestation by BSFL reduces the risk of disease transmission, as the food is no longer suitable for consumption by animals or humans. Moreover, BSFL typically have minimal interaction with humans.

Yet another beauty about BSFL is, once the decaying matter is taken over by BSFL, none of the other insects can survive or infect the biomass. This prevents cross contamination. Additionally, the gut microbes of BSFL play a vital role in neutralizing harmful bacteria such as Salmonella and E. coli, providing significant benefits to both humans and animals.

With this backdrop, lets understand that waste management often takes a back seat to primary business operations in many industries. However, the importance of proper waste handling is gaining traction due to its potential to mitigate significant environmental challenges. Additionally, effective waste management can generate revenue streams or offset certain expenses for industries. Poultry is one such potential industry.

From our experience gained by closely working with poultry units, we've identified significant poultry industrial waste that demands attention and challenges the industry in terms of proper disposal. Most of the time, only the ground level staff know the pain of disposing the waste. This can be converted into potential gain with the help of BSFL. When waste is not handled properly, it becomes a huge challenge for day-to-day operations of the poultry unit.

1) Beginning with the hatchery unit, the primary waste consists of eggshells and unhatched eggs:, as high as 20% of eggs goes as waste. This waste is rich in bioactive compounds, emitting strong odours during aerobic decomposition. This, when upscaled, can be a good source of nutrition.

Hatchery Waste. *Image Credit: Agritech TNAU*

2) Moving on to the growout and layer units, these facilities face challenges in disposing of waste, particularly due to regular mortalities caused by various factors. Chicken manure, a significant source of ammonia, poses a particularly difficult problem. Despite providing high-protein nutrition to our birds, digestibility and bio-absorption remain low, resulting in faecal residue with high protein levels and consequent ammonia production. Given the intensive nature and large scale of these units, it's inevitable to mitigate this issue. This often leads to infestations of houseflies, which thrive in the ideal environment created, causing significant fly problems and odours in the vicinity. Traditional chemical sprays face resistance, making biological methods preferred for control.

Regular Mortality. Image credit: https://weanimalsmedia.org/

Layer Manure Collection. *Image Credit: https://lpelc.org/*

3) From large-scale processing units to street slaughter houses, the disposal of fouls and leachate presents a significant waste management challenge. The volume of waste generated is considerable, and while rendering units offer some assistance, they are not a viable solution for smaller players.

Slaugter house waste. *Image credit: https://cleanindiajournal.com/*

4) Transit mortality and spoiled feed represent additional sources of waste that can be repurposed into valuable nutrition.
5) The government's policy to boost ethanol production will result in a significant increase in the production of Distillers Dried Grains with Solubles (DDGS). This surplus or spoiled DDGS will need to be safely upscaled, ensuring its integration into the feed industry.

DDGS. *Image credit: https://en.engormix.com/*

In all these scenarios, BSFL can serve as a solution to mitigate waste-related challenges and be upscaled into a nutritious protein source. These tiny larvae possess the remarkable ability to consume twice their body weight daily, efficiently processing various types of waste without any wastage in BSFL units.

Now, let's delve into the nutritional aspects of BSFL as a feed component. For poultry, BSFL can be utilized as live feed, dried larvae, or incorporated into feed formulations as defatted BSFL meal. Additionally, BSFL oil can be added as an energy source in formulated poultry feeds.

1) Live BSFL 2) Dried BSFL 3) Defatted Meal 4) BSFL oil
Image credit: KovaiBSF

The biomolecular richness of BSFL makes it to be seen as more than just an alternative protein source; BSFL also functions as an immunity booster for chickens. The presence of antimicrobial peptides (AMP), chitin content, and Lauric fatty acid make BSFL supplementation in poultry feed a valuable means of enhancing overall health.

Live feeding of BSFL in Vitenam free range poultry farm.
Image Credit: kimmyfarm.com

Hence, more exploration of poultry sector to make use of BSFL both in their waste processing and also as a feed ingredient is highly recommended and beneficial for the industry and to the environment.

Article

Incredible Dairy India: A Surreal Saga

SHRIDHAR speaks

Tarun Shridhar
Former Secretary, Ministry of Fisheries, Animal Husbandry and Dairying, Govt. of India

We proclaim with great pride the prosperity of ancient India by describing it as a land where rivers of milk used to flow. Why dwell into ancient times and dig into history to verify the truth; let us recognise that if there are rivers of milk flowing anywhere in the world, it is in India.

"I am in the business of empowerment. Milk is just a tool in that." This simple statement of Dr.Verghese Kurien captures the essence of the White Revolution, a movement that catapulted a woefully milk deficit India into a global leader. A paltry trickle of 17 million metric tonnes (mmt) with a per capita per day availability of 130 grams in the year 1950-51, early years of our independence, has grown into a flood of 230.6 million tonnes constituting one fourth of the global milk production. The number two country behind us is the USA, but then it is a distant second with production not even half of ours. Isn't it a sterling achievement! To add to the crowning glory is our share in the global production of ghee and butter which stands at 40%. Per capita per day availability stands at 459 grams, higher by 137 grams over the global average of 322. The total value of our dairy produce in the year 2021-22, at current prices, was a staggering Rs. 9,95,215 crore, higher than the combined value of wheat and paddy during the corresponding period which stood at Rs. 6,01,313 crore (Rs. 2,31,722+3,69,591 respectively).

The Green Revolution had been a strong precursor to serve as a model but fortunately this model was not adopted for milk, so good happened. Over the decades, agriculture growth has been an unimpressive two percent or thereabouts and so have been the farm prices leading to agrarian distress in several parts of the country. In contrast, milk production has consistently grown at over six percent annually ever since the White Revolution, under the impressively named scheme Operation Flood, was launched. What was the difference? The Green Revolution was technology centric, and infusion of technology and better farming practices did increase production substantially, especially of foodgrains. But did it also increase farmer well-being? Not necessarily. On the other hand, from its beginning, the White Revolution has been farmer focused, thus ensuring sustainable growth. The centrepiece of this model of growth has been the Gujarat Cooperative Milk Marketing Federation Limited (GCMMF), known popularly as Amul.

The relentless assault of the lethal Corona Virus had led to extended periods of lockdown and caused massive disruptions in the production and supply chains. However, if there is one agricultural commodity that withstood this unprecedented crisis, it was milk. If there were any disruptions in milk supply, they were confined to short periods of time in a few isolated geographical pockets. On the whole, this essential food item remained readily available throughout the country. The role of dairy cooperatives deserves enormous credit for ensuring uninterrupted supply while safeguarding the producer interests. During the long lockdown, GCMMF procured an additional 3.5 million litres of milk per day, an increase of 15% over their average. There was a significant fall in demand with restaurants, tea and *halwai* shops closed all over the country for extended periods of time. Most private dairies either stopped collection or drastically slashed both the quantity collected and procurement price. However, GCMMF, its member unions, as also cooperatives all across the country, by and large, continued paying the regular procurement price, which is inevitably higher than the market, and collected every single drop of milk offered by the farmers. This is the demonstration of the strength and resilience of cooperatives in a crisis, but more importantly a reinforcement of trust of its members in their institution. It is this trust that forms the backbone of cooperatives.

India's Dairy Revolution is an unusual saga, as riveting as it is inspiring. The first seed was sown in 1946 in Anand, a small dusty town in Kaira district of Gujarat. The rural economy, at that time, was heavily dependent upon milk but the milk producers, many of whom were marginal or landless farmers, were prone to exploitation by groups of brokers and *dudhiyas*, the

middlemen who were often accused of engaging in unfair and manipulative trade practices. The consumer market was dominated by Polson Dairy, owned and managed by a shrewd Parsi businessman named Pestonjee Edulji whose influence extended to the higher echelons of power. In fact, Polson Dairy enjoyed an unrestricted monopoly across the value chain, in procurement, processing and marketing. No wonder, the price to the farmers as also the quantity to be procured was solely this dairy's discretion through its network of local cartels. The modus operandi was simple, yet merciless- refuse to buy in the flush season and question the quality during scarcity.

In 1946, the desperate farmers resorted to a strike pouring their milk onto the roads. Milk became a symbol of protest against exploitation, but beyond protesting on the streets, the farmers remained clueless. They approached Sardar Vallabhbhai Patel to seek his support. His advice was as visionary as it was simple. Get rid of the middlemen, take affairs in your hands and form a cooperative which should control the entire operation from procurement to marketing. The Sardar entrusted the task of guiding the farmers to Morarji Desai and thereafter was born the Kaira District Cooperative Milk Producers' Union Limited under the apolitical leadership of Tribhuvandas Patel, the epitome of honesty, simplicity and diehard commitment to the spirit of cooperation. The beginning was humble, including only two village milk cooperative societies handling a meagre 247 litres a day.

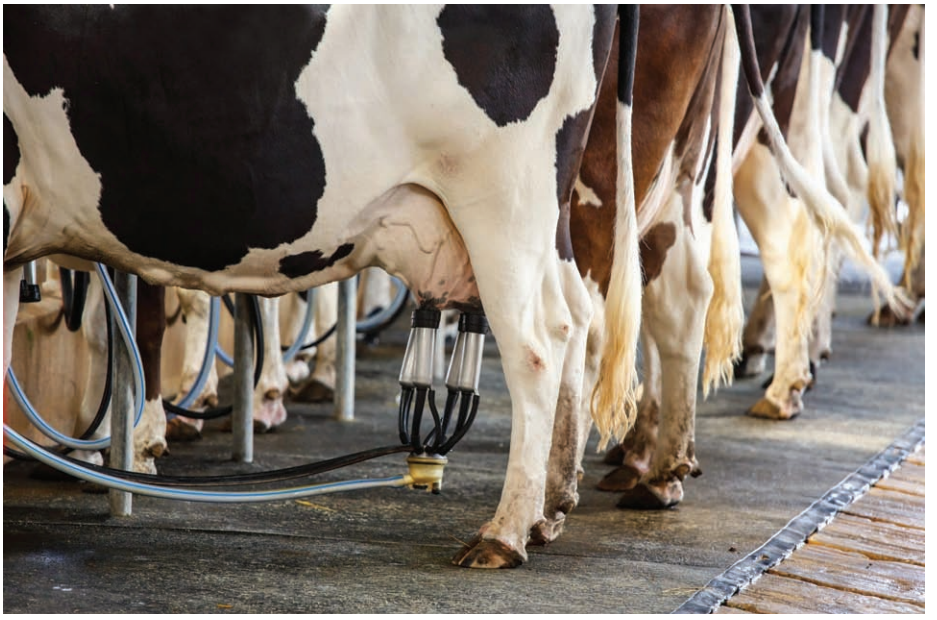
Over the next several years the cooperative kept growing slowly but surely. And then a reluctant young engineer arrived in Anand to work in the government creamery, the price to be paid for the scholarship he had obtained to study in the USA. Dr.Verghese Kurien was born in a prominent Syrian Christian family of Calicut (now Kozhikode), Kerala. Though he was eager to quit both Anand and the government after serving the term of the bond, he began helping the nascent cooperative with technical issues. After he had talked Tribhuvandas Patel into investing in a new dairy plant, he was getting ready to leave Anand for a job in Bombay. Tribhuvandas Patel learned he was about to depart and went to him saying, "You talked us into a major investment and now you're going to leave". He persuaded Dr. Kurien to stay back until the new dairy was commissioned and arranged to pay him Rs 500 per month, the princely sum that Dr. Kurien had been offered to work for a multinational in Bombay. Dr. Kurien

later recalled it as an emotional moment, "I could not go when he (Tribhuvandas Patel) said: Anand needs you". And, as he often said, "I never left."

The diagnosis of what ailed dairying in Gujarat was simple. The entire spectrum of dairy viz procurement, processing and marketing was highly disorganised. In consequence, the returns remained low and provided little incentive for farmers to increase the herd or improve productivity. Dr. Kurien believed that "India's place in the sun would come from the partnership between wisdom of its rural people and skill of its professionals." Such a strong and unmatched partnership became the cornerstone of Kaira District Cooperative Milk Union. Later, as other unions emerged with Kaira Union's help, Dr. Kurien brought them together to create the Gujarat Cooperative Milk Marketing Federation Ltd.

> Operation Flood, launched in 1970, remains one of the world's largest rural livelihood and development programmes

Operation Flood, launched in 1970, remains one of the world's largest rural livelihood and development programmes. It has enabled dairy farmers to direct their own development, placing control of the resources they create in their own hands. A National Milk Grid links milk producers throughout India with consumers in nearly 1000 towns and cities, reducing seasonal and regional price variations while ensuring that the producer gets fair market prices in a transparent manner on a regular basis. The bedrock of Operation Flood has been village milk producers' cooperatives, which procure milk and provide inputs and services, making modern management and technology available to members. The foundation of this mega programme was laid in October 1964 when the then Prime Minister Late Lal Bahadur Shastri visited Anand for the inauguration of Amul's cattle feed factory. The Prime Minister recognised that Amul's success rested on cooperation and in a letter to Chief Ministers stressed the importance of replicating the Anand experiment in other parts of the country. Prime Minister Shastri said that "expecting to find a land of milk and honey" in Kaira District, he observed that it was "as dry as other parts of our country" and dairy animals no better than elsewhere but "certainly not as fine as the Murrah buffalo of Punjab." Recognising that what had made the difference was the cooperative, he set into motion the creation of the National Dairy Development Board (NDDB) to support viable and profitable dairying in rural India through cooperatives and farmer controlled organisations. The inspiration was and remains the Amul model.



The two villages and 247 litres milk per day cooperative has grown into a state milk marketing federation that today handles 30 million litres a day, a contribution of 3.6 million farmers. Registering a growth of an impressive 17%, GCMMF (Amul) has recorded a turnover of Rs. 72,000 crore in the financial year gone by, making it one of the top ten global dairy companies. This global brand, associated with quality dairy products, is owned not by any corporate entity or any big business house, but by these lakhs of farmers, some as small as contributing only half to one litre a day, but an equal partner in the stakes of the cooperative. Adoption of the Amul model has created a unique dairy cooperative model in the country comprising more than 18 million milk producers in a network of more than 2 lakh village milk societies affiliated to 222 district milk unions and 28 state milk federations.

The four strong pillars supporting the edifice of the milk cooperatives illustrated by the GCMMF and acted out in Operation Flood and the subsequent National Dairy Plan programmes are (a) ownership of farmers; (b) management by democratically chosen representatives of farmers; (c) operation by trained professionals; and above all (d) culture and values of responsiveness and trust. As in mature corporate businesses, the ownership and professional management roles have been clearly separated, thus keeping vested interests at bay. This explains why and how Amul is not just a dairy brand but has grown into a vibrant and kicking movement giving the dairy sector a successful model of economic freedom and hope.

India's journey of global ascendancy in milk production is not simply about producing more and managing the produce efficiently despite the immense complexities of the country; it is about equity, empowerment, gender balance, and above all uncompromising ethics. How did dairy farming become a White Revolution? The emphasis, the limelight and the focus were put not on the commodity but on the milk producers, the vast number of landless, marginal and small farmers. More important than developing the product, the brand or the market was the development and empowerment of these people; and the instruments of development were entrusted to these very people. Good and professional management provided the support, and we now boast of the most creative farming cooperative leadership model in the global food system. 60 to 75 percent of the consumer price of dairy products flows back to the primary producer, the farmer; this has been made possible only because the farmers were encouraged to manage and guide their own destiny aided by committed professionals.

In 1976 was released a feature film named Manthan. The title sequence of the 1976 iconic and award winning feature film Manthan begins, "500,000 farmers of Gujarat present...." Not only has Manthan been the first crowdfunded movie in the country, it is unique that its producers, and hence owners, are a staggeringly large number of landless, small and marginal farmers, each having contributed a princely sum of Rs. 2. Truckloads of these farmers would throng to cinema halls in Gujarat to watch this movie for they were the proud producers;

it was their story. The movie featured the country's best of film and theatre talent in the form of Shyam Benegal, director and Vijay Tendulkar, the writer; the cast comprised the accomplished Girish Karnad, Smita Patil, Naseeruddin Shah, Amrish Puri, Kulbhushan Kharbanda and several other brilliant names of the era. The story, set against the backdrop of the White Revolution, is the near life fictionalised account of the struggle and fighting spirit of dairy farmers who transcend not only the exploitation of middlemen but also the societal and their own prejudices to create an empowered cooperative. Manthan means churning; churning of milk separates water and gives us butter. In the movie, and in the inspiring story of the farmers of Gujarat, milk symbolically churns the rural society and washes away prejudices of caste, class, creed, religion and gender; and in the process creates an empowered community. The character of Bhola, a maverick and feisty *dalit*, played by Naseeruddin Shah sums up all when he urges disbelieving and sceptical fellow villagers to take things in their own hands with a passionate appeal, "*Yeh sisoty aapdi chheh*." This society belongs to us.

The philosophy and approach adopted in the Operation Flood programme is pretty well suited for replication in the fruits and vegetables sector to realise its immense potential. As in milk, the sector could do with streamlining from the perspective of farmers who too are producing crops of a highly perishable nature, and to some extent like milk require harvesting on a regular basis. This makes them vulnerable in the markets which are predominantly trader driven. Operation Flood never ignored the consumer but the key drivers of the project were the economic and social empowerment of the milk producer. In fact, the project managed to create a fine long term balance between the producers and consumers; we rarely witness extreme volatility in milk prices. Operation Flood was designed and implemented in such a way as to increase rural incomes through a judicious transfer of urban consumers' money to the rural sector.

While celebrating our dairy, we need to appreciate the other dimension of reality too. Big as it may appear, the cooperative network, till date, manages only about 20 to 25% or so of the country's total milk production. There are some other stark contradictions too: our genuine claim of being the top producer gets soured by our position near the bottom in cattle productivity. High per capita availability does not address the prevalence of malnourishment; most milk still reaches the market unprocessed despite the huge dairy industry. Moreover, we have been basking only in the glory of Amul. No other milk federation or cooperative institution has reached anywhere near Amul's position in the dairy industry. Part of the reason could also be the distortion which has set in the cooperatives on account of growing political and bureaucratic control. Besides being against the principles of cooperation, such interference tends to compromise the interests of the farmers.

Milk Production and Per Capita Availability (PCA) of Milk in India

Year	Production (Milliontonnes)	Per Capita Availability (gms/day)
1991-92	55.6	178
1996-97	69.1	200
2001-02	84.4	222
2006-07	102.6	251
2011-12	127.9	289
2016-17	165.4	351
2021-22	222.1	446
2022-23	230.6	459

Our livestock sector in general and dairy in particular could be well characterised by borrowing Dickensian idiom from the opening lines of his famous novel A Tale of Two Cities. ("I*t was the best of times, it was the worst of times, it was the age of wisdom, it was the age of foolishness, it was the epoch of belief, it was the epoch of incredulity, it was the season of Light, it was the season of Darkness, it was the spring of hope, it was the winter of despair*.....) Our dairy is the biggest, yet it is the smallest: we are way ahead of others in sheer numbers and quantity yet way behind in the output of those numbers i.e. quality and value. We are the richest, yet we are the poorest: biggest and most diverse resource base, highest production but poor productivity levels; it is production by mass rather than mass production. The livestock sector offers the spring of hope, but alongside also lurks the winter of despair: the sector and all its sub-sectors have been registering an impressive and consistent growth over the years, even in the midst of a general stagnancy in the agriculture sector yet the levels of productivity and the quality of produce remain matters of serious concern. Just as technology is fast changing the world, so can it revolutionise the livestock sector. In fact, the opportunities of harnessing modern technology for the advancement of livestock are several times over other activities because this sector has a very sound base of indigenous and traditional knowledge. After all, it is our great ancestors of the Indian subcontinent who deserve the credit for domesticating bovines for milk.

Dairy offers boundless opportunities for improved productivity and value addition; opportunities we have only marginally encashed so far. Future should see us moving from absolute production to quality, hence the value of our production. A premium on hygiene and improved quality of livestock management, including nutrition should address part of the issue. This should find further support through breed improvement interventions; healthier the animal, better the product. Quite an irony that despite being undisputed world leaders, our share in the global trade of milk and its products is negligible. Since only about 25% milk is handled by the organised sector, including the cooperatives, value addition in the form of an increased shelf life or more milk products is woefully lacking. In fact, our *halwais* appear to have a much greater understanding of the milk market as they manage to make three to four times the money by a minimal conversion of milk-reducing the moisture and adding sugar is the basic process in most of our traditional *mithais* which continue to command immense popularity and mass appeal all across the country; the same popularity surely cannot be assigned to chocolates or pies. We have done really well on *lassi*, *paneer*, *dahi*, *chhaas* etc. but we need to graduate beyond even the popular *shrikhand* and *mishtidoi*. A sea of opportunity exists for the organised dairy sector to branch off into industrial production of a vast range of traditional Indian sweets. This further opens the window for large scale *khoa* production for providing the consumer with hygienic milk-based sweets. The unique strength of traditional Indian sweets is their acceptability to all kinds of palates. So why not attempt to break the global hegemony of chocolate, the most widely consumed milk product.

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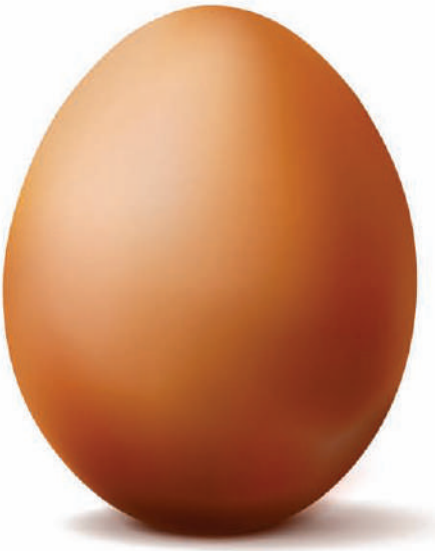

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Cobb

India and USA Resolve WTO Dispute on Poultry Trade

India and the US informed the World Trade Organisation (WTO) that they have reached a mutually agreed solution on the outstanding dispute on poultry imports from Washington thereby resolving all of their seven disputes at the global trade watching.

In 2015, India lost a long pending dispute over poultry imports from the US at the WTO. India had prohibited the imports of various agricultural products from the US because of concerns related to Avian Influenza.

New Delhi lost the case at the WTO at both the panel level and at the appellate level and though it lifted the ban, Washington remained unconvinced about the mechanism for poultry shipments and import duties and did not withdraw the case at WTO.

As India was not able to implement the decision within the stipulated time frame, the USA had demanded compensation. The two countries were discussing ways to resolve the case mutually.

Last year, the two sides settled six disputes countervailing measures on certain hot rolled carbon steel flat products for India, certain measures related to solar cell and modules, measures relating to the renewable energy sector, India's export-related measures, certain measures on steel and aluminium products, and additional duties on some products from the US.

After Prime Minister Narendra Modi and US President Joe Biden's meeting last year, India also agreed to reduce tariffs on certain American products, including frozen turkey, frozen duck, fresh blue berries and cranberries, and processed blue berries and cranberries.

Poultry Market Outlook – The Issues Influencing Production

The US poultry industry is well positioned in 2024, as market shifts have improved the overall outlook for global production, said Christine McCracken, senior protein analyst at Rabobank, during a presentation on global grains, oilseeds and poultry markets at the 2024 Annual Meat Conference held in Nashville between 18th and 20th March.

INTERNATIONAL

She identified some trends in the industry stakeholders should consider as the year progresses. For the egg industry, the cage-free movement and corporate commitments to switch to cage-free from conventional egg production practices may have an impact. Producers are making decent money after some difficult years. But the transition to cage-free production is expensive, and the costs aren't always offset with premiums in the market, she said.

"I think going forward, the thing to watch is this ongoing shift to cage free," McCracken said. "You've got six states mandating cage free, but another four that are coming on online. This cliff is coming, and that potentially could have some impact. And there's five more states talking about implementing cage-free. We'll see how that goes. So, a lot on the regulatory front that could impact egg supplies as we head into the coming year," she added.

On the broiler side, lower feed costs will be a tailwind for producers although productivity continues to be an issue.

"When the industry made some changes to address some quality issues a few years ago and at the same time moved away from antibiotics and ionophores, we took some of this productivity out of the supply," McCracken said. "We're now hitting record lows for this time of year — we're hitting 79% hatchability here this last week, and that normally, historically was running 82% to 83%. That's a pretty big hit in performance, and I think that's a big part of why we have seen a drop in production."

The United States continues to dominate global poultry supplies, but Brazil and Southeast Asia have experienced growth, McCracken said.

In its "Global poultry quarterly Q1 2024: Outlook 2024," Rabobank forecasted poultry to be the fastest-growing animal protein in the global market. Lower feed costs, which should drive a decline in prices, are expected to generate 1.5% to 2% growth, according to the report. Those and other developments have improved the outlook for poultry production and consumption.

In a follow-up interview McCracken

identified several additional issues that may impact the global poultry market, most notably highly pathogenic avian influenza.

"It's (HPAI) obviously hit the layers more, but it continues to be a challenge from a trade perspective," she said. "We're not able to get the same trade volumes into a few markets.

"We've been successful, obviously with countries that hold up their end of the bargain when it comes to how they treat these outbreaks. China has been a struggle, as you may know, and we're hopeful that we'll continue to make progress there, but you know, with those states that are involved, it's been tough to get product exported to China, and that was a huge market for us last year.

"We (the US) still face a lot of competition from Brazil, which hasn't had a commercial case of HPAI yet. So, they continue to absorb some of those markets and are very competitive on a price perspective."

From a geopolitical perspective, McCracken said there are several risks that are worth industry attention.

"Our economist has been super vocal about the risks of disruption in the Red Sea because you've already got the Panama Canal with issues and then this," she said. "The biggest issue — which I find fascinating — is if they are forced to ship around the Cape of Good Hope and land in Africa. There is not just a piracy risk, but apparently there are only so many ports. So, it's an infrastructure issue, and then it takes 10 to 14 days longer, so you're effectively reducing the number of ships available. You've seen rates go up.

"It shouldn't impact anything we send to Mexico, obviously Canada, those are top markets for us. It doesn't really affect anything going through the West Coast. But when you think about Europe, that raises all kinds of challenges for them. And not just on the exporting of meat, but the feed side is really where they get hammered."

Country's Egg Exports Set For A New Record In 2023-24

Exports of poultry products such as eggs and egg products, which crossed the Rs. 1,000 crore mark in the first nine months, are set to scale to hit a new record of Rs. 1,200 crore to Rs. 1,400 crore in the current financial year 2023-24 on strong demand from countries such as Oman and Sri Lanka among others.

India's poultry exports had touched a high of Rs. 1,081 crore ($134.04 million) during 2022-23, doubling over the previous year's Rs. 529.8 crore ($71 million) on rising demand for eggs and egg products among others. In the first nine months of the current fiscal, the poultry exports stood at Rs. 1,074 crore ($134.02 million).

Shipment volumes till end of December stood at 8.56 lakh tonnes over previous financial year's 6.64 lakh tonnes.

Exports of eggs to Sri Lanka have witnessed more than a 100 fold increase in value terms in the first nine months with the neighbouring nation emerging as the second largest buyer of Indian poultry products. Value of poultry products exported to Sri Lanka stood at Rs. 117.19 crore till December end in the current fiscal as compared to Rs. 98 lakh during 2022-23. In volume terms, the shipments to Sri Lanka stood at 1.69 lakh tonnes till December end in current fiscal over previous year's 1,416 tonnes.

Exports to Oman, the largest buyer of Indian poultry products stood at Rs. 293.90 crore in the current fiscal till December as compared to Rs. 277 crore in 2022-23. Other countries that saw an increase in poultry shipments till end December include Japan at Rs. 82.91 crore (Rs. 57.77 crore in 2022-23) and Qatar at Rs. 63.38 crore (Rs. 51.60 crore) among others.

Valsan Parameswaran, Secretary, All India Poultry Exporters Association, said robust demand from countries such as Sri Lanka and Oman among others is driving the exports. "We expect the overall exports this year to be between Rs. 1,200 crore to Rs. 1,400 crore," Parameswaran said.

Besides robust demand, the growing quality awareness among the farmers and the trade is also contributing to the growing trend, Parameswaran said, while stressing upon the need for creating additional infrastructure such as a dedicated quality laboratory in the main producing region of Namakkal in Tamil Nadu.

Dr Mahesh P S, Joint Commissioner and Director, Centre of Excellence for Animal Husbandry, Bengaluru, said going forward, the poultry exports will increase both in chicken meat and eggs.

"The focus on quality poultry products at competitive prices will increase the pie. New states joining the bandwagon of South India's poultry hub are West Bengal, Odisha, Chhattisgarh, Punjab etc. India being driven by primary choice in the global arena in this millennium, finds partners for poultry too and next year's target may be Rs. 2,000 crore," Dr Mahesh said.

Egg Glut Has Worried Telangana Poultry Producers

It is a problem of plenty for the egg industry in the state. Over the past nine years since state formation, the annual egg production has risen by over 65% from 1,061 crore in 2014-15 to 1,767 crore in 2022-23, as per the data from the state planning department's report 'Telangana at a glance 2023'. But the industry is finding it tough to keep pace with its increasing capacity as local consumption has been stagnant and there is stiff competition in other states.

With a share of 13%, Telangana occupies the third spot in the country behind Tamil Nadu (22%) and Andhra Pradesh (16%). The state produces about 3.7 crore eggs daily and out of this 1.7 crore goes to other states, mainly Maharashtra, Madhya Pradesh, Bihar, West Bengal and Uttar Pradesh.

The consumption within the state is half an egg per person daily. Though this is within the National Institute of Nutrition (NIN) recommendation, it is not a healthy figure for the egg industry. Growing the domestic market is a herculean task, industry sources said.

"In some states daily egg production is merely in lakhs. But these states too have set targets to increase their daily production to crores. This may be good for the country but for the state it is a clear sign that it has to expand the domestic market. This means that consumption has to increase," said an industry source.

According to animal husbandry department officials, commercial poultry egg constitutes for a large part of production and backyard poultry accounts for only a minor portion. The other avenue is the international market. But only Tamil Nadu has the required infrastructure and it is exporting it to West Asia, industry sources said.

"The government there gives lot of subsidies to poultry farmers. We would also be able to better with that kind of support," a poultry farmer said.

Poultry Traders Call for Forming Association

Poultry traders from across Goa revealed that the local poultry sector operates in an unorganised fashion, with a mix of legal and illegal businesses. This lack of structure contributes to the absence of standardised chicken prices in Goa.

"We have led movements since 1994 wherein we have visited at least 800 shops across Goa and made at least four attempts to form a group.

Yet, not everyone is willing to come on board, and those who do, leave when we standardise rates," said Prisco Sequeira, President, All Goa Poultry Shopkeepers' Association.

Recognising the need for cohesion, poultry traders are emphasising the establishment of an association to represent their interests in each taluka.

The traders pointed out that such an association could play a crucial role in setting industry standards, promoting ethical business practices, and fostering transparency within the poultry trade.

"An organised association has the potential to streamline operations, create a framework for fair competition, and contribute to the overall growth and sustainability of the poultry sector in Goa," he said.

Sequeira further stressed on the need for scientific management of chicken waste and garbage generated from the poultry shops, and said that they have appealed to Chief Minister Pramod Sawant to provide land where this can be done.

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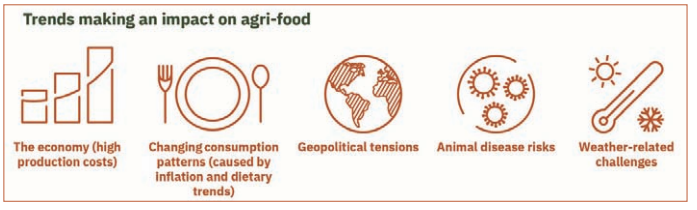
Alltech Agrifood Outlook 2024

The 2024 Agri-Food Outlook was released by Alltech on 10th April. Now in its 13th year, the survey includes data from 142 countries and more than 27,000 feed mills.

Global animal feed production remained steady in 2023 at 1.29 billion metric tons (BMT), a slight decrease of 2.6 million metric tons (MMT) — or 0.2% — from 2022's estimates.

The overall lower demand for feed was due, in part, to the more efficient use of feed made possible by intensive production systems that focus on using animal nutrition, farm management and other technologies to lower feed intake while producing the same amount of protein, or more. A slowdown in the overall production of animal protein, in response to tight margins experienced by many feed and animal protein companies, also contributed to lower feed demand. Changing consumption patterns caused by inflation and dietary trends, higher production costs and geopolitical tensions also influenced feed production in 2023.



Top 10 Countries

The top 10 feed-producing countries are China (262.71 MMT, +0.76%), the U.S. (238.09 MMT, 1.13%), Brazil (83.32 MMT, +1.84%), India (52.83 MMT, +13.43%), Mexico (40.42 MMT, +0.02%), Russia (35.46 MMT, +3.83%), Spain (27.53 MMT, -11.88%), Vietnam (24.15 MMT, -9.63%), Japan (23.94 MMT, -1.15%) and Türkiye (23.37 MMT, -11.48%).

Together, the top 10 countries produced 63.1% of the world's feed production (same as in 2022), and almost half of the world's global feed production is concentrated in four countries: China, the U.S., Brazil and India.

Notable Species Results and Outlook

Poultry

- Poultry experienced an increase in broiler feed production (385.04 MMT, +13.10 MMT, +3.5%) and remained steady with a slight increase for layers (170.88 MMT, +0.01 MMT, 0%).
- Broiler feed now accounts for 29.9% of the total feed tonnage in the world thanks to a 3.5% increase in overall tonnage in 2023. While this growth was not uniform across all regions, the poultry sector is poised to keep holding strong in 2024 thanks to a combination of regional successes and global market dynamics. Some of the biggest factors that will contribute to the resilience of the broiler sector include reduced costs for inputs, such as feed and energy, and increases in margins and profitability.
- For layers, there are industry-wide efforts to optimize feed efficiency and to keep pace with changing dietary trends and new purchasing power. Some markets around the globe were significantly impacted by macroeconomic challenges and disease outbreaks, which can disrupt production cycles. Still, the general outlook for the layer industry remains positive thanks to its resilience in the face of difficult circumstances, when other protein sectors often struggle to adapt.

Top sector by region

Region	Sector	2023 feed tonnage total	Percentage of total feed
Africa	Broiler	17.330 MMT	33.70%
Asia-Pacific	Broiler	160.667 MMT	33.80%
Europe	Pig	72.610 MMT	28.70%
Latin America	Broiler	74.325 MMT	37%
Middle East	Broiler	12.545 MMT	34.90%
North America	Beef	63.248 MMT	24.40%
Oceania	Broiler	4.087 MMT	37.90%

- The poultry sector is poised for continued strength, driven by a blend of regional successes and global market dynamics. The broiler forecast remains optimistic thanks to lower input costs, increased industrial margins and shifting consumer behaviors. For layers, challenges persist, but there are pockets of resilience and growth.

Pig

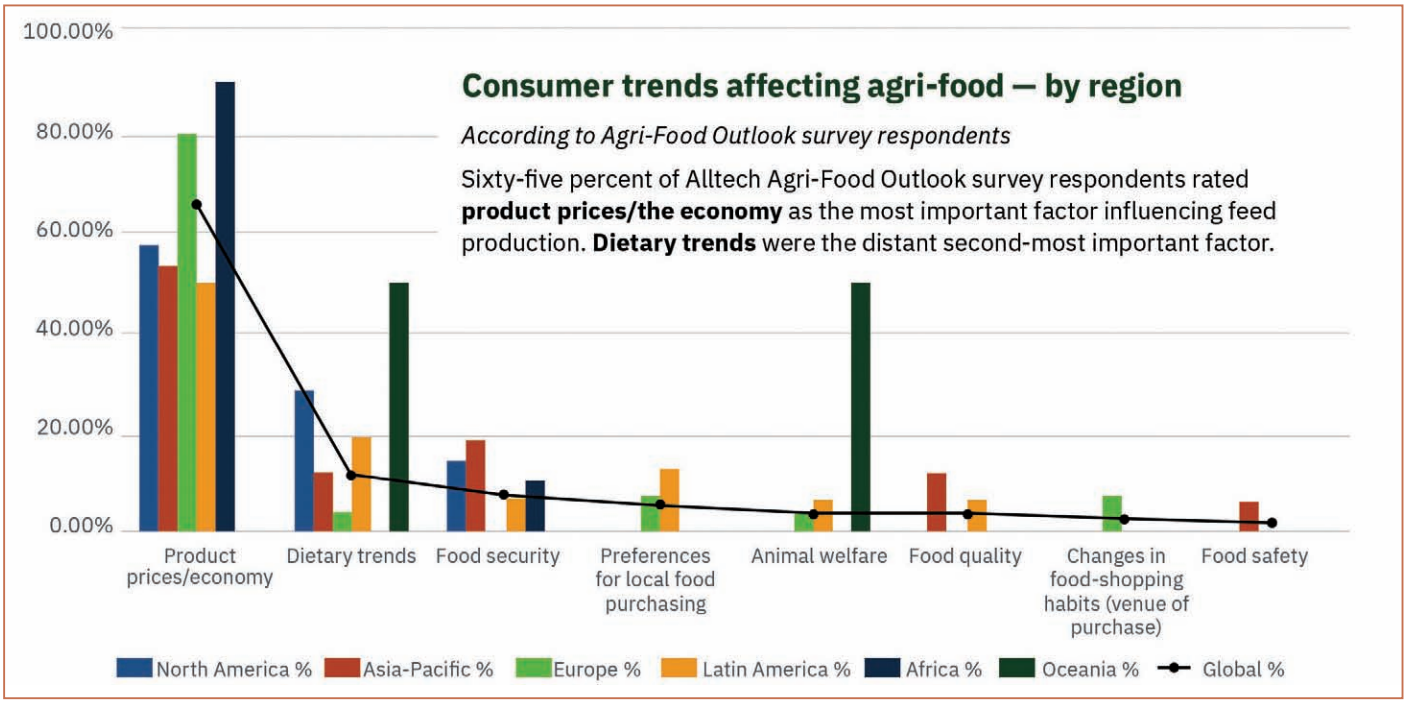
- The global pig feed production sector faced many challenges in 2023, which led to an overall decrease in pig feed production of 1.23% (320.80 MMT, -4.01 MMT).
- Latin America stood out as the only region that achieved an increase in pig feed production in 2023, while Europe, Asia-Pacific and North America — which have traditionally been the top pig feed-producing regions in the world — all faced challenges. African swine fever (ASF) continues to wreak havoc on pig production in China and Southeast Asia, where repopulation efforts are slowly proceeding.
- The trends highlight the complex relationship between economic factors, supply dynamics and disease management in the global pig feed industry. Addressing these challenges will be crucial for sustaining animal agriculture and ensuring food security.

Dairy

- Dairy feed tonnage decreased by 2.3% (126.23 MMT, -2.28%), primarily due to the high cost of feed combined with low milk prices, which led farmers to make strategic adjustments that included reducing their cow numbers and/or relying more on non-commercial feed sources.
- In Europe, dairy producers will continue to grapple with stricter environmental policies in the years ahead, and they will need to find new ways to continue growing.
- Asia-Pacific managed to buck the downward trend and emerged as the only region that increased its dairy feed tonnage in 2023. This growth was fueled by a continued increase in the consumption of milk products there, as well as an expansion of feed production in co-operatives.
- This shift reflects the delicate balance between economic factors and the need to sustain dairy production. Lower feed costs and higher milk prices would help right the ship.

Beef

- Beef feed production decreased by 4.36% (117.49 MMT, -5.35 MMT) globally — the most pronounced downward change among all species sectors last year. Changes in cattle cycles in the United States and stricter sustainability



policies in Europe had major impacts, with the Asia-Pacific beef sector notably surpassing Europe's in 2023.
- The substantial decline in North America was the result of lingering droughts and high production costs, among other issues.
- While the European and North American beef industries are expected to continue declining in 2024, growth is expected in China, Brazil and Australia — highlighting the complex dynamics and landscape of beef feed production around the world.

Aquaculture

- The aquaculture sector experienced a decline of 4.4% (52.09 MMT, -2.42 MMT).
- This decline was driven in part by a significant drop in China's supply of aqua feed due to lower fish prices, which had a far-reaching impact.
- Latin America grew by 0.27 MMT (3.87%). Despite adverse weather conditions in that region, the demand for aqua products is still strong in Latin America, which helped aqua producers there remain resilient.

Pet Feed

- The global pet feed industry continues to grow, albeit at a slower pace of 0.74% (34.96 MMT, +0.26 MMT) in 2023. Demand for high-quality pet products and services remains high from pet owners who want only the best for their animal companions.
- The Latin American and North American markets were the primary drivers of this growth, with the pet food sector in North America surpassing Europe's this year.
- Europe was the only market experiencing a decline in pet food production in 2023. Supply-chain disruptions and inflationary pressures were the key factors contributing to this decrease.

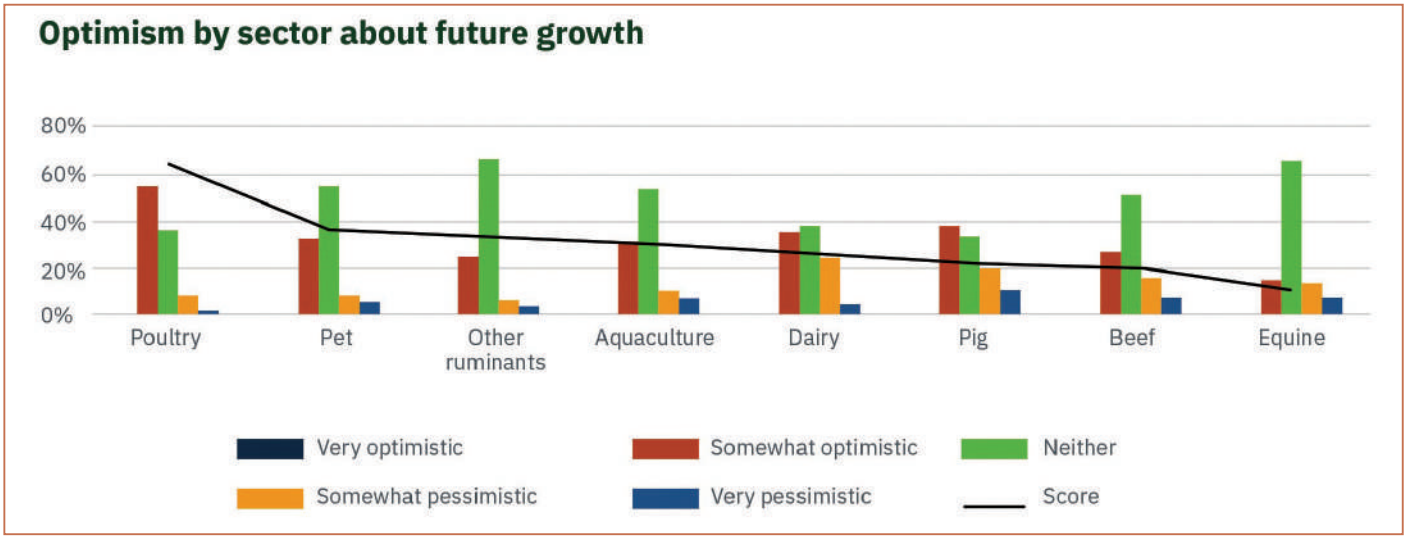
Equine

- The equine feed industry experienced a decrease of 3.9% (7.98 MMT, -0.32 MMT) in 2023.
- The top challenges in the equine sector include high labour and material prices.
- The top technologies impacting the sector are biosecurity, microchipping, genetics and nutritional solutions.
- Survey respondents said the biggest opportunities for nutritional solutions are gut health management and feed efficiency.
- Equine feed is expected to decrease both in price and in volume during the coming year.

Notable Regional Results

- North America saw a decrease of 2.8 MMT (259.26 MMT, -1.1%), with beef feed tonnage down significantly. The pig and dairy sectors also slipped slightly, but the broiler, layer and pet sectors more than made up the difference. Feed tonnage in the broiler sector was up nearly 2.9%.
- Latin America experienced growth in 2023 by 2.46 MMT (200.67 MMT, +1.24%). Despite high production costs, geopolitical tensions and changing consumer behavior due to economic reasons, the region continues to lead global growth, mainly because of its export-driven aquaculture, poultry and pork markets.
- Europe continued its downward trend in feed production, with a decrease of 10.07 MMT (253.19 MMT, -3.82%) due to issues that included the invasion in Ukraine and the spread of animal diseases such as African swine fever (ASF) and avian influenza (AI).
- Asia-Pacific led feed production growth in 2023, with an increase of 6.54 MMT (475.33 MMT, +1.4%). Feed production growth in the region's ruminant sectors offset a setback in the aqua sector. The region is home to several of the top 10 feed-producing countries, including China, India, Vietnam and Japan.
- Africa experienced continued but slower growth with an increase of 1.95%, nearly 1 MMT to total 51.42 MMT.
- The Middle East saw a slight decrease of 0.12 MMT (35.93 MMT, -0.32%).
- Oceania had the third-highest growth, 3.71% or 0.39 MMT to total 10.78 MMT.

Alltech works together with feed mills and industry and government entities around the world to compile data and insights to provide an assessment of feed production each year. Compound feed production and prices were collected by Alltech's global sales team and in partnership with local feed associations in the first quarter of 2024. These figures are estimates and are intended to serve as an information resource for industry stakeholders.



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In Conversation with...

O. P. Singh Speaks to Engormix

Engormix, the world's leading digital platform for agribusiness recently interviewed **O.P. Singh, Managing Director, ABTL** on the company's strategic vision and long-term objectives

O. P. Singh highlighted that ABTL is a place where new trends are set, products and services get enhanced, any innovations in the globe meets with the latest technology to turn an idea into an utility.

O.P. Singh answered the following questions:

- Can you tell us about the mission & vision of ABTL?
- How does ABTL differentiate itself as a leader in providing affordable poultry enzyme solutions?
- Introducing new tagline – Where Innovation Meets Technology and ABTL's commitment of R&D and its impact on product innovation?
- Share a piece of advice to leaders in the animal nutrition industry worldwid

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FAMIS

ADM Shares Environmental Analysis of Its Leading Feed Additive for Broilers

ADM, a premier global human and animal nutrition company recently performed a comprehensive Life Cycle Assessment (LCA) for XTRACT 6930, a plant extract-based feed additive for monogastric animals. LCA is a method to evaluate and quantify the potential environmental impacts throughout the supply chain of a product or service. Notably, ADM has compiled LCA results of XTRACT 6930 use on broiler operations within four global regions: Asia, Latin America, Europe and North America.

These results suggest that XTRACT 6930 is a useful tool to mitigate the environmental footprint of the broiler meat sector. Use of ADM's feed additive has demonstrated a reduction by at least 1.9% of the carbon footprint of live broilers, and at least 2.8% reduced carbon footprint of broiler meat production*. In other words, 1 kg CO_2 eq. spent using XTRACT results in savings of 75 kg CO_2 eq. in live broiler farming and a savings of 100 kg CO_2 eq. in broiler meat processing*. Additionally, XTRACT 6930 has shown a negligible influence on the environmental footprint of broiler feed.

"ADM is proud to be first in the animal nutrition sector to present such robust and reliable LCA data in the plant extract-based feed additives category, externally verified for use on four continents," said Pierre-Joseph Paoli, President of Growth and Marketing for ADM's animal nutrition business. "With rising demand to mitigate the environmental impact of our industry, LCA is a necessary step to understand how a single feed solution can have a measurable impact along the entire value chain."

Poultry is a significant source of animal protein around the world. It is interesting to note that chicken consumption contributes dietary greenhouse gas emissions (6.6%) comparable to that of pork (6.5%), milk (5.1%) or cheese (7.2%) consumption in the average US diet1. Thus, limiting the environmental impact of the global broiler meat sector can have exponential results.

XTRACT 6930 leverages a combination of microencapsulated active substances found in aromatic plants and spices with demonstrated physiological effects on poultry. A thorough performance analysis of its application and results in broilers show that the feed additive supports increases in carcass yield, weight and breast weight, as well as improved feed conversion rates.

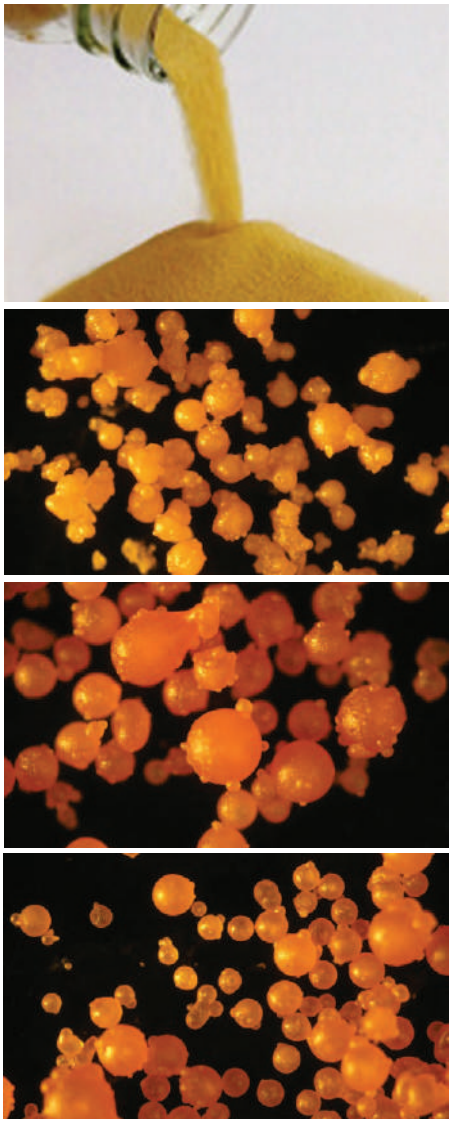
"With confirmed beneficial returns on poultry performance and end-product outcomes, producers that incorporate XTRACT 6930 in broiler diets may reduce the environmental impact of their operations without adding costs to their feed formulation," said Paoli.

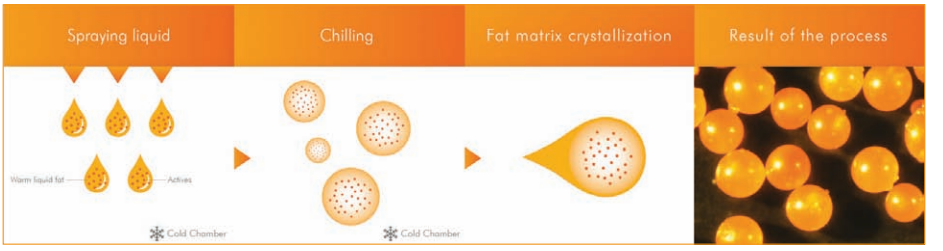
ADM's LCA analysis was performed in collaboration with Blonk Consultants, in line with ISO 14040 and ISO 14044 standards, and following European Union (EU) and Food and Agriculture Organization (FAO) guidelines for the sector. A panel of three independent, third-party reviewers then verified the accuracy of the LCA and confirmed validity of the conclusions. The panel conducted a systematic review and meta-analysis of 22 studies on XTRACT 6930, including peer-reviewed and unpublished company data.

Additional LCAs of ADM's animal nutrition products are ongoing to assess their potential environmental effects on animal protein production.

**Results differ by region. Contact ADM for specific details.*

1Heller, M, Keoleian. G, and Rose, D. (2020) "Implications of Future US Diet Scenarios on Greenhouse Gas Emissions." CSS Report, University of Michigan: Ann Arbor 1-24.





DAIRY NUTRICON

In line with their vision of popularising the future direction of the food business, Huvepharma organized a conference titled, "Dairy Nutricon – Fostering Collaboration and Knowledge Exchange." The conference served as a platform for experts, innovators, and thought leaders to come together, share insights and discuss the future of the dairy industry.

O. P. Singh delivered an insightful presentation about both the global and Indian dairy sectors. He focused on the worldwide landscape of feed and milk production, underlining India's crucial position and its vast potential in milk production. He further detailed how India's dairy industry plays a pivotal role in the nation's economy. Additionally, He discussed the Indian cattle feed market, its potential for growth and the critical need for balanced nutrition for dairy cattle. He highlighted the challenges and availability of feed and fodder, proposing strategies to improve their quality.

The highpoint of Singh's talk was the discussion on the myths surrounding

H5N1 in dairy animals. He cleared misunderstandings and emphasised the importance of precision nutrition to increase milk production. His insights offered a thorough overview of the current state and future prospects of the dairy industry.

Dr. Valentine Nenov from Huvepharma, Bulgaria delved into the technical aspects of plant cell wall digestion in the rumen. He emphasized the importance of digesting non-starch polysaccharides in dairy animals, explaining how this process contributes to their overall health and productivity. He further explained the workings of Hostazym Dairy / Ultra in the rumen, particularly its role in aiding fibre digestion. Dr. Nenov shared findings from various trials conducted with Hostazym in different countries, including India, demonstrating its effectiveness. In conclusion, discussed the application of Hostazym in dairy animals and its significance.

Dr. Nitin Tyagi, a renowned figure in ruminant nutrition, research and education, presented a detailed analysis that spotlighted key issues in the global livestock industry, particularly the significant role of greenhouse gas emissions and their relationship to climate change and animal production. He examined various sources of greenhouse gases within livestock farms and suggested actionable strategies to reduce these emissions. His in-depth discussion included enteric methane emissions and showcased effective manure management techniques to mitigate them. An important focus of his talk was on the impact of diet optimisation, specifically ration balancing, on reducing methane emissions from cattle and buffalo. Dr. Tyagi also stressed the importance of fodder production and introduced the innovative strawlage technology to the audience. He championed the wise use of crop residues and agro-industrial waste, highlighting their role in promoting sustainable practices in livestock farming. His presentation offered a comprehensive look at both the challenges and innovative solutions for managing greenhouse gas emissions in the livestock sector.

As a part of the conference, Huvepharma launched their latest product for the dairy sector, UBS 60. The introduction of this product is expected to bring about transformative changes in dairy farming practices. Salient features of UBS 60, Unique Buffer Solution are:

- Optimises rumen pH levels
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VIP's New Office Inaugurated

Vets in Poultry (VIP) officially inaugurated its new office in Pune on 2nd April marking a significant achievement in the association's journey towards fulfilling its vision and mission. The new space is designed to be a central point for collaboration, advocacy, and the exchange of knowledge, thereby strengthening the association's efforts to propel the poultry industry forward.

The opening ceremony was led by Dr. Ajit Ranade, Technical Advisor and Dr. Ajay Deshpande, President of VIP. The event featured a ribbon cutting ceremony followed by cake cutting, heralding the beginning of a new era for the association.

Speaking on the occasion, Dr. Deshpande said, "At Vets in Poultry, we are committed to promoting the welfare and growth of the poultry farming community. The inauguration of our new office in Pune signifies our dedication to advancing our mission and serving our members and stakeholders. We are grateful for the support and participation of our esteemed guests and members. Together, we will continue to bridge the gap between industry and academia, driving innovation and progress in the poultry sector.

The inauguration ceremony was attended by Dr. Santosh Ire, Secretary and Vets in Poultry Committee Members Dr. Chandrakant Pathak, Dr. Jeevan Sonawane, Dr. Pankaj Tuptewar, Dr. Sujit Kulkarni, Dr. Sanjay Satbhai, Dr. Amol Pawar, Dr. Mangesh Mende and Dr. Anju Deshpande.

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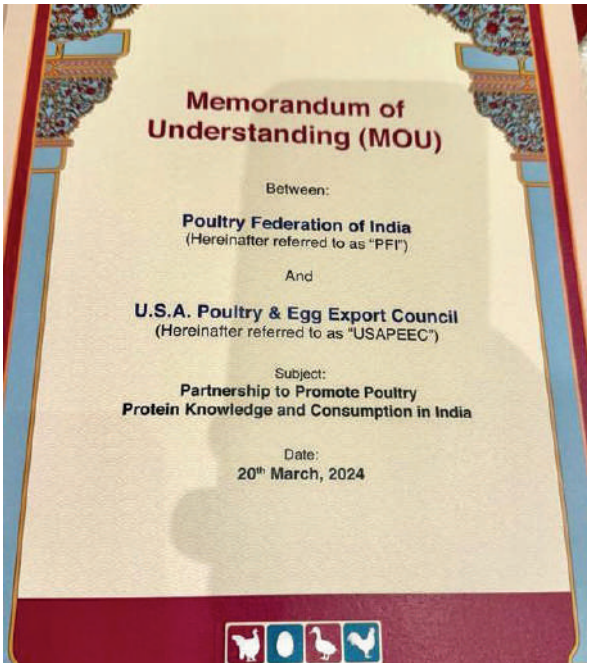
PFI and USAPEEC Sign MoU

Poultry Federation of India (PFI) and USA Poultry and Eggs Export Council (USAPEEC) signed a Memorandum of Understanding (MoU) on 20th March to jointly combat protein deficiency and promote the consumption of poultry products in India.

USAPEEC was represented by Greg Tyler, President & CEO USAPEEC and Clay M. Hamilton, Agricultural Minister Counsellor for Agricultural Affairs, USDA, while the PFI representatives were Ramesh Khatri, Chairman, Sanjeev Gupta, Vice President (HQ), Ricky Thaper, Treasurer, Parveen Kumar, Vice-President-North Zone and Mr. Jagdish.

Ricky Thaper highlighted the significance of this partnership in addressing critical nutritional needs and fostering international cooperation in the poultry industry. He added that this occasion marked the beginning of what promises to be a fruitful collaboration aimed at enhancing nutritional standards and promoting economic growth in the poultry sector.

Addressing the gathering, Greg Tyler said that this collaborative approach encompasses a range of initiatives, including educational, research and development, expansion of market opportunities and campaigns to raise nutritional awareness. By combining their expertise, both organizations aspire to raise awareness about the nutritional advantages of poultry products.



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Agrivet School Celebrates One-Year Milestone

Agrivet School from Agrivet Research and Advisory Private Limited is celebrating its first successful year of operations. The rapid growth and industrialisation of the animal agriculture sector in the last decade, backed by cutting edge technological advancement and infrastructure assistance from the Government, has created huge demand for skilled workforce. Agrivet School is all set to fill that demand by training the next generation of animal agriculture specialists.

In its first year, Agrivet School has strived to live up to its mission statement, "To be the most trusted powerhouse of talent pool for animal agriculture industry in India and South Asian region". With its state-of-the-art facility based on the outskirts of Kolkata, Agrivet School is offering a unique opportunity to both freshers and industry professionals to develop essential skill sets through a combination of classroom knowledge and hands on training in animal agriculture. Agrivet School ensures that their participants are not only "industry ready" but also proficient in entrepreneurial ventures leading to successful business endeavors. The faculty of Agrivet School comprises of a unique combination of industry veterans, decorated veterinarians and business experts who make sure the participants are guided through the various dimensions of animal agriculture in the modern context.

In February 2023, Agrivet School organised its first successful programme. A total of 22 participants from across India and Bangladesh attended the program titled "The Industry Orientation Program-Poultry Business- Level 1" which took place in Kolkata. Representatives from different domains such as poultry producers, pharmaceuticals, and biological companies like Avitech, Indovax, Ayurvet, Optima Life Sciences, Orffa, Alltech, Kemin, Glamac, Stone Water Nutrition, Raison Nutrition, Doctors Agrovet, etc. participated in the event. The five days fully residential program was a perfect convergence of hands-on experience of farms, feed mill and laboratories along with real-life wisdom straight from the industry experts.

Agrivet School offers both residential and non-residential programs that can be broadly divided into four categories:

- Industry Orientation Program (IOP)
- Farming Management Program (FMP)
- Skill Development Program (SDP)
- Hands-on Training Program (HTP)

Targeted towards poultry industry professionals, the flagship offering of Agrivet School "Industry Orientation Program" focuses on rejuvenating the skill sets to stay updated in the ever-dynamic needs of the poultry farming and auxiliary professions. The IOP - Poultry Business is directed towards professionals associated with poultry feed, poultry feed additives, pharmaceuticals, biologicals, newcomers, and individuals having interest in understanding the poultry business dynamics. IOP - Poultry Nutrition (Level 1) is more aligned with nutritionists, animal feed formulators, poultry business owners, integrators,

veterinarians, product managers, technical service providers of additive and pharmaceutical companies, poultry feed marketers etc. For individuals engaged in poultry health management and diagnostics, IOP - Poultry Health (Level 1) is a specialized course offered by Agrivet School that may prove crucial as product quality and safety becomes a challenge for the future with constant emergence and reemergence of diseases. Specially designed for feed mill operators, feed mill managers, nutritionists and technical/marketing employees of additive companies operating in feed milling technology business, the IOP - Feed Milling (Level 1) program secures that next generation poultry farming is well supported by competent employees that can maintain a steady source of proper compound feed to the livestock and poultry. There are two upcoming programs that will be launched shortly. One of them is IOP - Laboratory Technique (Molecular Biology/ Wet Chemistry/Microbiology), best suited for Quality Assurance & Quality Control professionals working for different poultry integration, animal feed, additive, pharmaceuticals, biologicals and also for aspirants looking for a job opportunity in the QA & QC segment. IOP: Poultry Enterprise Management for Successors is another crucial upcoming program of Agrivet School. This program is tailor made for the next generation members from the entrepreneur's family. It provides an end-to-end view of poultry enterprise and enables you to understand the opportunities and challenges for your organization in poultry business. While walking through the eyes of industry experts and stalwarts, you will get a razor-sharp clarity about how different verticals of Poultry Business play significant role in animal agriculture industry.

For aspiring animal agriculture entrepreneurs and professionals, Agrivet School offers "Farming Management Program", a 10 days residential training program in Broiler Farming & Management, Layer Farming & Management, Breeder Operation & Management and Fundamentals of Shrimp & Aquaculture (Virtual). Another short duration residential curriculum, "Skill Development Program" is developed to cater existing talent in the poultry industry aimed to refine their skill set and equip them with latest technological advances in poultry industry. In these two days of intense residential hands-on courses, the candidates can sharpen their skill in Hatchery Management, Poultry Vaccination Techniques, EC House Operations, Biological Sampling techniques in Poultry, Preparation of Feed Premix and Feed Mill Hygiene Management.

In addition to the above programs, Agrivet School has specifically designed laboratory oriented Hands-On Training Program that provides an array of trainings that include Internship, Industrial Training and Summer Training of variable customized durations of 15 days, one month or two months as per the requirement of the trainees. Compact programs on Real Time PCR techniques, ELISA Techniques, Microbiology Laboratory Techniques, and Analytical & Wet-Chemistry Laboratory techniques are also available for the students and individuals studying or aspiring to build their career in the field of Life Science. These array of programs are mostly laboratory based focusing on imparting the skill of R&D in microbiology, biotechnology, molecular biology, and genomic context. The candidates are expected to learn microbiological and molecular techniques that aid in animal agriculture research. As animal agriculture science is expanding into more commercial ventures with a fast pace, research and development will become an integral part of the industry aiding in every step of the way, from disease detection, feed preparation to the ultimate goal of human food supply.

The state-of-the-art infrastructure provided at the Agrivet School campus is a testimony to the responsibility and passion for creating the next generation professionals. The school is equipped with in-house Research Farms, Commercial Farms,

Pellet Feed Mill, Environmentally Controlled poultry sheds, Laboratories with advanced high-end equipment, Smart Digital Classroom, and high-speed internet connectivity. Additionally, the safety and biosecurity of the participants is considered as a high priority of the school.

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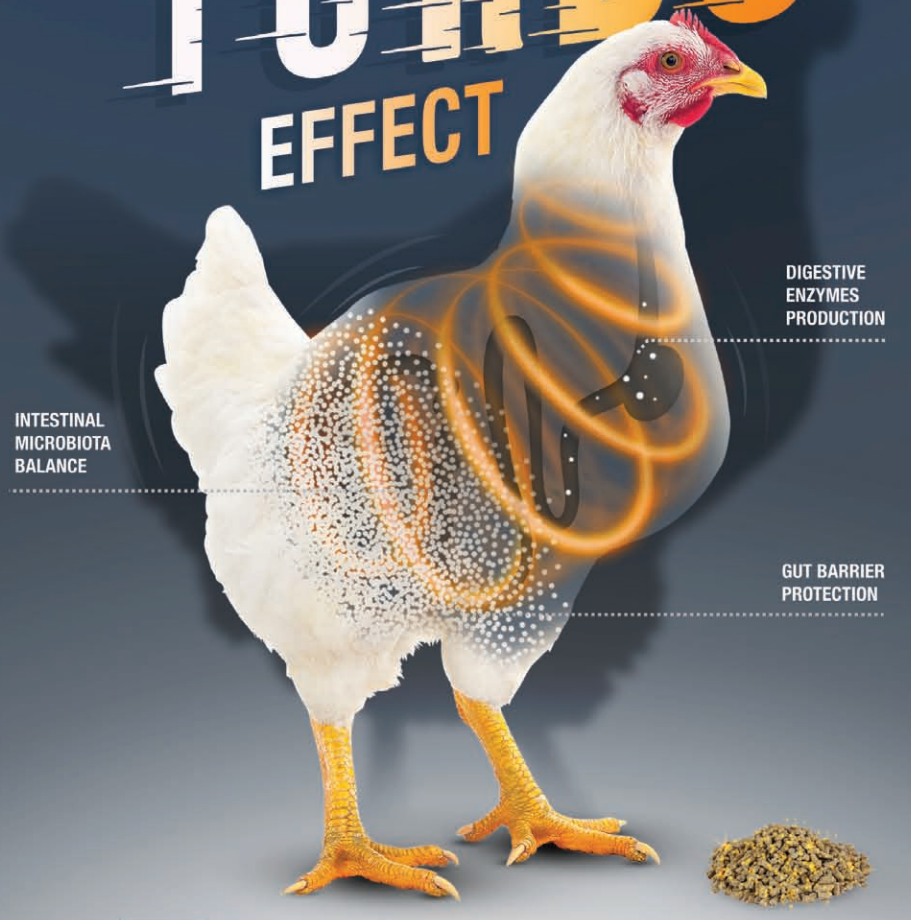

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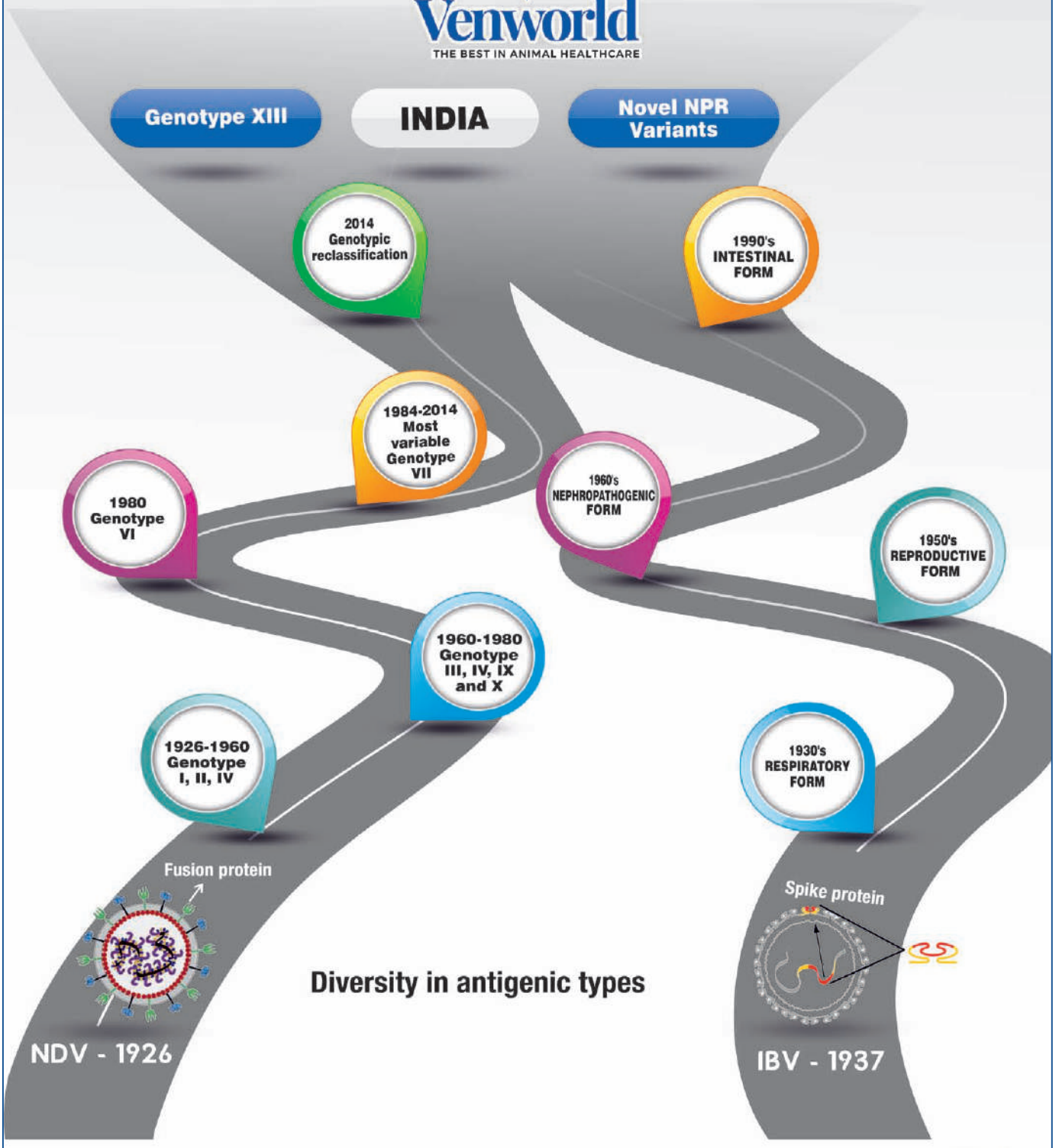

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