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Poultry Fortune

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• Production • Nutrition • Management • Marketing

March 2021

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Inside...

PREVENTION PROGRAM

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E. Coli
Clostridium
Listeria

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SEQUESTRING
CHELATING
DISPERSING
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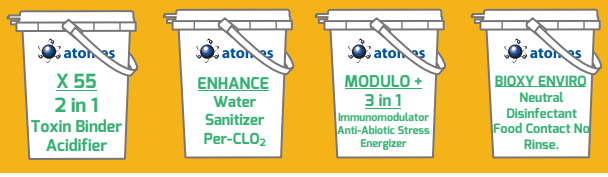

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Action on Fungi: NIL	Action on Fungi: Highly Fungicidal through Fengycin and Fusaricin
Flora: Will kill it	Flora: Substitute with better flora
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Create awareness to adopt modern technologies among Poultry entrepreneurs

10th annual Alltech Global Feed Survey estimates world feed production increased by 1% to 1,187.7 million metric tons. Women in Food & Agriculture survey reveals progress toward inclusion, but highlights areas for improvement.

Dear Readers,

The March 2021 issue of ***Poultry Fortune*** is in your hands.

In the News section you may find news about – The session of the Alltech ONE Virtual Experience launched on January 26 with the 2021 Agri-Food Outlook, highlights results from the tenth annual Alltech Global Feed Survey and the second annual Women in Food & Agriculture Survey. 10th annual Alltech Global Feed Survey estimates world feed production increased by 1% to 1,187.7 million metric tons. Women in Food & Agriculture survey reveals progress toward inclusion, but highlights areas for improvement. Alltech believes that inclusion cultivates creativity and drives innovation. Gender equality is not only a fundamental human right – it is also essential to advancing society and the global agri-food industry.

►The Clinical Research Department of the Research and Development Division of Ayurvet Limited published its 700th research communication. In fulfillment of its motto of providing efficacious and dependable solutions for improving the quality of animal life based on traditional knowledge backed by modern research, Ayurvet's R&D remains devoted to bringing in the most advanced scientific tools and technical know-how right from the conceptualization of a product up to the validation and re-validation of its efficacy and safety.

►New team of Managing Committee for CLFMA OF INDIA 2020 – 2022 was elected with Mr Neeraj Kumar Srivastava as the President. The 54-year-old industry association is recognized as one among the reputed livestock industry bodies in India. CLFMA of India is recognized by livestock farmers, Central and State Governments, government departments, Agricultural Universities, Veterinary Colleges and also National Research Institutes in India as well as outside the country.

►EW Group, a German strategic holding company in the field of animal breeding, health, nutrition and diagnostics, announces the acquisition of Hygiena from Warburg Pincus to form a leading food safety, veterinary and environmental testing solutions. Steven Nason, CEO of Hygiena said that this new partnership with EW Group will accelerate our growth, enhance our global capabilities, and expand our portfolio of products for our customers.

►To mark the 25th death anniversary of Padmashri Dr B. V. Rao, Poultry Farmers & Breeders Association, Maharashtra decided to start a 'Chicken and Eggs Promotional Campaign'. This year long campaign consists of various Chicken Awareness Programmes, Chicken Festivals, expert talks and many more which kick started on February 12. As a part of this campaign, the Association had organised felicitation programme of Associate Dean of Bombay Veterinary College Dr Ajit Ranade. He was felicitated for his immense contribution for poultry sector. Dr Ajit Ranade had taken great effort to aware common people how consumption of eggs and chicken is safe amid coronavirus and bird flu outbreak.

►Former President of Andhra Pradesh Poultry Federation and renowned poultry farmer Chairman of Ratnam Poultry Group Mr Mannava Pedda Seshaiah passed away at the age of 87 on 8 February 2021. He also served as Director of Agrocorpex India Ltd and Venkateshwara Hatcheries Pvt Ltd. He was involved in poultry farmers' welfare activities since his entry into the poultry industry and also engaged in various philanthropic activities for the betterment of the society.

►Aviagen India says that their customers continue to outdo their best and have recently reached a significant milestone. These results and the consistent progress in Ross 308 AP performance are due to the hard work, expert stockmanship and dedication of Aviagen India customers throughout the country. The Aviagen India customer support team is committed to these dedicated farmers, and works hand in hand with them to help optimize the genetic potential of the Ross 308 AP, while

Contd on next page

NRS GROUP

Poultry Fortune

Our Mission

Poultry Fortune will strive to be the reliable source of information to poultry industry in India.

PF will give its opinion and suggest the industry what is needed in the interest of the stakeholders of the industry.

PF will strive to be The Forum to the Stakeholders of the industry for development and self-regulation.

PF will recognize the efforts and contribution of individuals, institutions and organizations for the development of poultry industry in the country through annual Awards presentation.

PF will strive to maintain quality and standards at all times.

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increasing the efficiency and productivity of their businesses. To encourage and reward this star broiler performance, in Q4 of 2020 the team introduced the "Ross 308 AP Achiever Award" program, and has now recognized the five initial recipients.

In the articles section – Article titled *Prospects of Automation in Commercial Broiler Farming in India* written by Dr Abhijeet Kumar, Dr P. S. Mahesh and other authors highlighted that the objective of the article is to create awareness for adopting recent modern technologies among poultry entrepreneurs. The combination of climate controlled shed with automatic feeding system, nipple drinking system with filtration & automatic medicator will improves the broiler health, FCR, livability and biosecurity.

►Article titled *Bacteriophages – History and Evaluation* written by Dr Ramdas S. Kambale highlighted that bacteriophages also known as "phages" are viruses that are capable of infecting bacteria. Phage comes from the Greek word phagein that means "to devour", so bacteriophage literally means "bacteria eater". Although it may seem odd that a virus can infect bacteria (single celled microbe) but in fact, bacteriophages are nearly 40 times smaller compared to bacteria. The bacteriophages get attached to their targeted bacteria via specific tail fibre receptors. The tail fibres happen to be one of the crucial structural elements of bacteriophages that makes each phage type specific to its host bacteria.

►Article titled *Understanding Nesting Behaviour: Managing for fewer Floor Eggs in Layers* written by Technical Team, Hy-Line International highlighted that nesting behaviours are habituated in the hen soon after egg production begins and, once established, become difficult to change. Manage the flock to provide positive early nesting experiences, leading to good nesting behaviours. Eliminate obstacles, interruptions, and negative experiences that might cause hens to lay out-of-nest eggs. Understanding a hen's nesting behaviour can help you manage your cage-free flock for fewer floor eggs and better profitability.

►Article titled *Electrolytes through Feed: A Preferred Approach* written by Technical Team, Avitech Nutrition highlighted that high temperature is a major limitation to growth and meat yield of broilers in tropical countries of the world. Reduced feed intake, growth rate, feed conversion, survivability, dressing yield, breast meat and total meat and increased abdominal fat are the immediate consequences of rearing broilers in a hot humid environment. In layers, heat stress significantly affects feed intake, egg production and egg shell quality. This situation demands an economic and efficient means to improve the thermo-tolerance of broilers in hot humid environment. Electrolytes play a crucial role in maintaining body's acid-base balance as well as osmotic pressure in body fluids. Electrolytes also help in retaining water inside the body.

Readers are invited to send their views and comments on the news and articles published in the magazine which would be published under "Readers Column". Time to time, we shall try to update you on various aspects of Poultry sector. Keep reading the magazine regularly and update yourself. Wish you all fruitful results in your efforts.

M.A.Nazeer
Editor & Publisher
Poultry Fortune

Insights from global industry surveys revealed during the Alltech ONE Virtual Experience

10th annual Alltech Global Feed Survey estimates world feed production increased by 1% to 1,187.7 million metric tons

Women in Food & Agriculture Survey reveals progress toward inclusion, but highlights areas for improvement

LEXINGTON, Ky., 3 February 2021: The session of the Alltech ONE Virtual Experience launched on January 26, Tuesday with the 2021 Agri-Food Outlook, featuring insights supported by data from Alltech's industry-leading surveys. The presentation, which is available on demand, highlights results from the 10th annual Alltech Global Feed Survey and the second annual Women in Food & Agriculture Survey. During the virtual session, Dr Mark Lyons, president and CEO of Alltech, speaks with global industry experts to go beyond the numbers and explore the trends shaping the future of agri-food.

The discussion focuses on five emerging trends and includes:

"China's Rebound" with Jonathan Forrest Wilson, President of Asia, Alltech; and Winnie Wei Jia, Director of Customer Experience, Alltech China.

"A Reshaping of the Supply Chain" with Eric Glenn, Global Purchasing and Supply Chain Director, Alltech; and Kathryn Britton, Senior Director of IMI Global Operations, Where Food Comes From, Inc.

"The Inexorable rise of E-Commerce" with Anand Ramakrishnan Iyer, Digital Marketing Manager, Alltech.

"Health - conscious consumers" with Nikki Putnam Badding, Director, Acutia and Human Nutrition Initiatives, Alltech.

"Innovation through Empathy and Inclusion" with Bianca Martins, General Manager, Alltech Mexico.

"This has been an exceptional time for the agri-food industry," said Dr. Mark Lyons, President and CEO of Alltech. "Agriculture stood strong in the face of adversity, and the global food supply chain continues to provide one of the most basic needs for human survival. The data and insights we have gathered reflect challenges, successes and extraordinary opportunities as we chart a course for the future."

Results from the Alltech Global Feed Survey and the Women in Food & Agriculture Survey, including graphs and maps, are available on the Alltech ONE Virtual Experience platform in conjunction with the virtual session.

Alltech Global Feed Survey:

Now in its 10th year, the Alltech Global Feed Survey serves as an invaluable barometer for the state of animal feed production. Fortified by a decade of documentation and research, it is the strongest evaluation of compound feed production and prices in the industry and is the most complete data source of its kind.

The 2021 Alltech Global Feed Survey estimates that international feed tonnage increased by 1%, to 1,187.7 million metric tons (MMT) of feed produced last year. China saw 5% growth and reclaimed its position as the top feed-producing country, with 240MMT. Rounding out the top10feed-producing countries, including tonnage and growth percentage, are the U.S. (215.9 MMT, +1%), Brazil (77.6 MMT, +10%), India (39.3 MMT, -5%), Mexico (37.9 MMT, +4%), Spain (34.8 MMT, 0%), Russia (31.3 MMT, +3%), Japan (25.2 MMT, 0%), Germany (24.9 MMT, 0%) and Argentina (22.5, +7%). Altogether, these countries account for 63% of the world's feed production and can be viewed as an indicator of the overall trends in agriculture.

The global data, collected from more than 140countries and more than 28,000 feed mills, indicates feed production by species as follows: broilers, 28%; pigs, 24%; layers, 14%; dairy, 11%; beef, 10%; other species, 7%; aquaculture, 4%; and pets, 2%. The predominant growth came from the broiler, pig,aqua and pet feed sectors.

Going beyond the numbers for a holistic look at the state of the industry, the survey also incorporates qualitative questions to uncover trends such as COVID-19, sustainability and antibiotic reduction.

The 2021 Alltech Global Feed Survey results, including species-specific feed production numbers, interactive graphs and maps, are available at one.alltech.com/2021-global-feed-survey.

Women in Food & Agriculture Survey:

Alltech believes that inclusion cultivates creativity and drives innovation. Gender equality is not only a fundamental human right – it is also essential to advancing society and the global agri-food industry. To gather real-world insights into the professional landscape for women in agriculture, Alltech supported the second annual Women in Food & Agriculture (WFA) Survey in partnership with Agri Briefing and the WFA Summit. Launched in October 2020, the survey aimed to collect feedback that empowers the agri-food industry to create a

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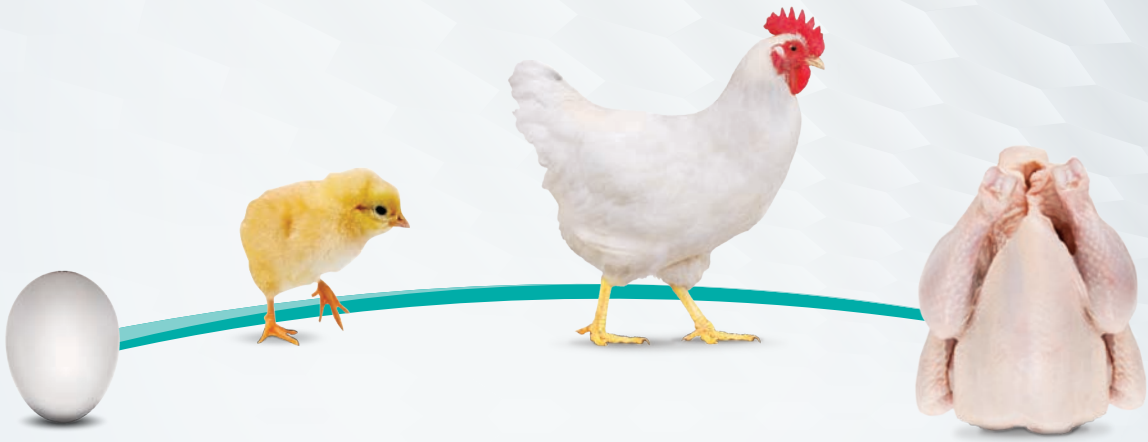

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TO HARVEST

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more equitable workplace environment.

For meaningful change to be possible, the conversation itself must be inclusive, so the survey gathered insights from men as well as women. Responses from more than 3,200 participants representing more than 80 countries and all sectors of agriculture shed light on the current workplace environment, barriers to success and the outlook for the future. As 2020 ushered in unprecedented challenges, questions related to COVID-19 reveal its impact on the workforce specifically.

In the survey, more than a fourth (26%) of female respondents indicated that they are the primary caretakers for children or aging parents while working from home. Additionally, 21% of women working within the agri-food industry indicated that they are concerned that working from home will negatively impact their careers. Conversely, 13% of male respondents shared the same concern for their career.

With the majority (62%) of all respondents agreeing that the industry is becoming more inclusive, there is reason to be optimistic.

To access speaker insights from the 2021 Agri-Food Outlook and explore full data results from the Alltech Global Feed Survey and the Women in Food & Agriculture Survey, visit one.alltech.com/2021-agri-food-outlook.

For any queries on Global Feed Survey, please contact:

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About Alltech:

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

We are a global leader in the animal health industry, producing additives, premix supplements, feed and complete feed. Celebrating 40 years in 2020, we carry forward a legacy of innovation and a unique culture that views challenges through an entrepreneurial lens.

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

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

700th Research Communication published by Ayurvet

27 January 2021, Baddi, Himachal Pradesh:
The Clinical Research Department of the Research and Development Division of M/s Ayurvet Limited published its 700th research communication this month. In fulfillment of its motto of providing efficacious and dependable solutions for improving the quality of animal life based on traditional knowledge backed by modern research, Ayurvet's R&D remains devoted to bringing in the most advanced scientific tools and technical know-how right from the conceptualization of a product up to the validation and re-validation of its efficacy and safety. Beginning since 1992, Ayurvet's R&D has published an average of two scientific communications every month.

The 700th publication, 'Phytogenic feed-additives improve broiler feed efficiency via modulation of intermediary lipid and protein metabolism-related signaling pathways' appeared in Poultry Science, the highest rated journal in the field of poultry research. Undertaken in collaboration with the Centre of Excellence for Poultry Science at the University of Arkansas, USA, the work presented in this publication, for the first time in the world, unearths the peripheral mechanisms, which operate in the liver, fat tissue, and muscles of broilers receiving phytogenic supplements and that contribute to their improved feeding efficiency and growth performance. It is noteworthy that Ayurvet's R&D had previously also, for the first time in the world, uncovered the central mechanisms operating in the brains of the broilers receiving phytogenic supplements that contribute to their improved feeding efficiency and growth performance. The work was published in the renowned journal Neuropeptides. Ayurvet's R&D believes that such mechanistic studies will not only help the company in strengthening its own presence in the industry but also earn much-needed faith and conviction for traditional herbal knowledge.

New Leadership Team at CLFMA OF INDIA for 2020-2022

Mumbai, 1 February 2021: CLFMA of India is the apex organization and the voice of the country's dynamic livestock sector. The 54-year-old industry association is recognized as one among the highly reputed in India. CLFMA of India is well recognized by livestock farmers, Central and State Governments, government departments, Agricultural Universities, Veterinary Colleges and also National Research Institutes in India as well as outside the country.

On 1st February 2021, CLFMA's Extra Ordinary General Meeting was held and the new leadership team took charge for the period 2020-2022. The outgoing Chairman Mr S. V. Bhave expressed his appreciation and conveyed best wishes to the new team led by Mr Neeraj Kumar Srivastava, World Area Director - SCA of Novus Animal Nutrition (India) Pvt Ltd, who got elected as the new Chairman.

Mr Bhave in his tenure was instrumental in developing a strong network with the Government especially with the Animal Husbandry Ministry and its departments. During the 52nd AcM » 61st Symposium held at Le Meridien, New Delhi, he was able to get Mr Giriraj Singh, Hon'ble Union Minister of Fisheries, Animal Husbandry and Dairying as our Chief Guest and otherwell - known speakers viz. Mr Atul Chaturvedi, Hon'ble Secretary, Department of Animal Husbandry and Dairying, GOI., Mr Pawan Agarwal, CEO, Food Safety and Standards Authority of India (FSSAI), Government of India, to quote a few. During his period, the 5th Combined Feed Additive List was approved by GOI. He conducted around 14 successful Events (Seminars & Webinars) at pan India locations which was well appreciated. **Mr S. V. Bhave outgoing Chairman said that, it was indeed a great pleasure to work with CLFMA as a Chairman and after 2 years and 4 months extra responsibility due to COVID 19 pandemic, CLFMA has decided to appoint Mr Neeraj Kumar Srivastava,** who is an accomplished, talented business leader having a proven record of successfully managing the businesses in Animal Health and Nutrition Industry. He has a great networking with all the industry stake holders including government authorities of the Animal Health and Nutrition sector - domestic and worldwide especially South Asia. As he is a Strong leader and talented professional with a Master of Science (M.Sc.) & MBA Marketing his experience and vision will be of great asset to CLFMA and under his Stewardship, we anticipate CLFMA would continue to grow to greater heights.

Chairman
Neeraj Kumar Srivastava, Novus Animal Nutrition (India) Pvt Ltd

Mr Neeraj Kumar Srivastava, newly elected Chairman thanked Mr S. V. Bhave and said that, it was a great honour to be nominated as CLFMA Chairman, as CLFMA is a single leading voice of the Animal Husbandry Industry and promised to do his level best to help CLFMA work for the benefit of its members and the industry at large. He added that, he was truly honoured and thrilled to carry the great legacy of many distinguished leaders and which is more than 5 decades for serving our Industry. He promised to build and add to the best of his capacity towards the visibility of CLFMA, its image & reputation and working towards betterment of the livestock industry.

He also said that, Mr Bhave's team has done a great job especially with regard to government engagements and conducting relevant seminars during his tenure.

CLFMA of India has over 230 members representing diverse subsectors of animal protein value chain including feed manufacturing, poultry, dairy and aquaculture business, animal nutrition and health, veterinary services, machinery and equipment, processing, distribution and retailing of meat and ancillary services such as banking.

Following Office Bearers were elected for the period 2020 – 2022 :

Deputy Chairman
Divya Kumar Gulati,
Nurture Aqua Technology Pvt Ltd

Deputy Chairman
Sumit Sureka, Shivshakti Agro (India) Ltd

Secretary
Suresh Deora, S. A. Pharmachem Pvt Ltd

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Immediate Past Chairman
S. V. Bhave, Berg and Schmidt India Pvt Ltd

Executive Director
Ms Chandrika Venkatesh

The other members of the Managing Committee 2020 - 2022 comprises of:

Mr Vijay Bhandare, Bhavani Agrovet Pvt Ltd
Mr Selvan Kannan, Noveltech Feeds Pvt Ltd
Dr Prashant Shinde, Cargill India Pvt Ltd
Mr Anil M, KSE Limited
Mr Sujit Komarla, Komarla Feeds
Mr Lakshmanan, Shanthi Poultry Farm Pvt Ltd
Mr Ramakanth V. Akula, The Waterbase Limited
Mr Sandeep Kumar Singh, Godrej Agrovet Ltd
Dr Sujit Kulkarni, Trouw Nutrition India Pvt Ltd
Mr Balaram Bhattacharya, Indian Herbs Specialities Pvt Ltd
Mr R. Ramkutty, Niswin Enterprises
Dr Devender Hooda Huvepharma SEA (Pune) Pvt Ltd
Mr Abhay Shah, Spectoms Engineering Pvt Ltd
Mr Prashant Vatkar, Godrej Tyson Foods Ltd
Mr Nissar Mohammed Coastal Exports, Corporation (Co-opted)
Dr Saikat Saha Evonik, India Pvt Ltd (Co-opted)
Dr Vijay Makhija, Intervet India Pvt Ltd (Co-opted)

Mr Suresh Deora, the New Secretary, CLFMA gave the vote of thanks and said that "The new team of CLFMA has an apt mix of experienced professionals which will strive to uphold the reputation and the legacy of CLFMA and work with commitment towards its growth in the years to come. He concluded saying that the government engagements of CLFMA would be strengthened further and the new team will certainly work towards the overall development of the Animal Industry at large.

EW Group announces the acquisition of Hygiena from Warburg Pincus to form a leading food safety, veterinary and environmental diagnostic solutions company

16 February 2021, Visbek, Germany / Camarillo, CA, USA: EW Group, a German strategic holding company in the field of animal breeding, health, nutrition and diagnostics, announced the acquisition of Hygiena, a leader in food safety and environmental testing solutions. The terms of the transaction have not been disclosed. The transaction is expected to close in March 2021.

Hygiena, headquartered in Camarillo, California, USA, with 9 locations around the world, develops, manufactures and distributes food safety and environmental diagnostic solutions. The products are sold in over 100 countries to more than 10,000 customers. For two decades, Hygiena has been committed to providing accurate and easy-to-use-diagnostic tests, supported by the most knowledgeable technical service teams in the industry.

"We have always been committed to providing the best-in-class diagnostics and customer support around the world. This new partnership with EW Group will accelerate our growth, enhance our global capabilities, and expand our portfolio of products for our customers," said Steven Nason, CEO of Hygiena. "I couldn't have imagined a better outcome for Hygiena and our Hygiena team. We are so excited to continue our mission within EW Group and look forward to joining forces with the BioChek and Biotecon teams. Warburg Pincus has been an amazing partner in our journey over the past four and a half years. I would like to thank them for their close partnership, invaluable contribution and strategic insight."

The newly formed group of companies, under the Hygiena umbrella, will include BioChek, a global veterinary diagnostic company, as well as Biotecon, an innovator in PCR, GMO, ID and environmental diagnostics. Both companies are subsidiaries of the EW Group, expanding Hygiena's food safety portfolio with attractive molecular diagnostic capabilities, sample preparation as well as the veterinary diagnostic field.

"We are extremely excited about welcoming Hygiena to EW Group. Due to the outstanding leadership of Steve Nason and his team, Hygiena has become a leading player in the food and environmental testing space," commented Jan and Dirk Wesjohann, both Managing Directors at EW Group. "We are convinced that the combination of Hygiena with our existing diagnostic activities will create a basis for substantial future growth."

Thomas Struckmeyer, CEO of BioChek and Biotecon, is

also enthusiastic: "With this acquisition and through the synergetic combination with our existing diagnostics businesses, we will create a leading player in food and veterinary diagnostics, providing a true 'One Health' approach from 'Farm to Fork' to the benefit of our global customer base."

As part of the partnership, EW Group and Hygiena are committed, based on the EW Group principles, to invest in new technologies, R&D and international structures. Technical expertise will be leveraged amongst the companies to develop new products in diagnostics, accelerate development and further improve data interpretation and management software capabilities.

"We are excited for Hygiena's next chapter of growth and know that they will continue to thrive in combination with EW Group, a partner that shares the same values, ensures a positive future for the entire Hygiena team and lays the foundation for an excellent outlook for future business development," adds Stephanie Geveda of Warburg Pincus.

Houlihan Lokey and Citi served as financial advisors and Cleary Gottlieb Steen & Hamilton LLP served as legal advisor to Hygiena. Sidley Austin LLP and Moulton | Moore | Stella LLP acted as legal counsel for EW Group.

About Hygiena

Hygiena is a leader in rapid diagnostic solutions in the food & beverage, healthcare, pharmaceutical, water and other hygiene-focused end-markets. Our mission is focused on protecting people and products by delivering technologies that promote hygiene, sanitation and product safety. For more information, please visit hygiena.com

About EW GROUP

EW Group is a strategic holding company based in Germany. The activities of EW Group are comprised of the business areas of poultry and aqua breeding, as well as animal health, nutrition and diagnostics (BioChek & Biotecon). EW Group operates 165 subsidiaries in 45 countries worldwide, employing over 15,000 team members. For more information about EW Group's diagnostic business, please visit biochek.com and bc-diagnostics.com

About Warburg Pincus

Warburg Pincus LLC is a leading global private equity firm focused on growth investing. The firm has more than $58 billion in private equity assets under management. The firm's active portfolio of more than 195 companies is highly diversified by stage, sector, and geography. Warburg Pincus is an experienced partner to management teams seeking to build durable companies with sustainable value. Founded in 1966, Warburg Pincus has raised 19 private equity funds, which have invested more than $89 billion in over 920 companies in more than 40 countries. The firm is headquartered in New York with offices in Amsterdam, Beijing, Berlin, Hong Kong, Houston, London, Luxembourg, Mumbai, Mauritius, San Francisco, São Paulo, Shanghai, and Singapore. For more information please visit www.warburgpincus.com

RR Animal Health Care Ltd develops Cyromazine Active Pharmaceutical Ingredients

To work as import substitution for Indian market

15 February 2021, Hyderabad: RR Animal Health Care Ltd is excited to share the news of development of our first Animal Pharma Active Pharmaceutical Ingredient (API) for poultry segment. With the development of Cyromazine 99.5% through an in-house developed route of synthesis, we became one of the first Animal Health Care company from India to develop this molecule with complete backward integration using a Green Chemistry route without the use of solvents.

Cyromazine, which is used as a Larvicide in Animal Health Care Industry, presently been imported mainly from China and most domestic suppliers were blending it with carrier material to prepare 1% or 2% formulated product. Many users and suppliers import the blended 2% product for their cost optimization.

This product shall work as an import substitution for Indian market. Presently with 3000 kg production capacity at a GMP certified facility in Hyderabad, India, which will be equivalent to nearly 150 tons of 2% formulation product, we are optimistic to supply to a large domestic customer base & export client. We promise to deliver a global standard product, readily availability in India across the year at an economical rate.

Our one small step towards Aatmanirbhar Bharat!!

About RR Animal Health Care Ltd.

RR Animal Health Care Ltd is a company with diversified interested in Animal and Human Health & Nutrition segment. With over 12 years of legacy, this company has established itself with unique solutions for Human, Poultry, Aqua and Livestock management in India. With 3 manufacturing facilities in India, the company is committed to deliver value to its customers across diversified species & segments. Pioneer in farm biosecurity segment with new concepts, the company is well recognized as a 'Unique Solution Provider' across industries. For more info: www.rrahc.in.

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Felicitation and Chicken Promotion programme organised by Poultry Farmers & Breeders Association

Felicitation of Associate Dean of Bombay Veterinary College Dr Ajit Ranade and Chicken Promotion Event organised by Poultry Farmers & Breeders Association Felicitation and Chicken Promotion Event organized by Poultry Farmers & Breeders Association

Maharashtra, 12 February 2021: To mark the 25th death anniversary of Padmashri Dr B. V. Rao,

Poultry Farmers & Breeders Association (MH) has decided to start a 'Chicken and Eggs Promotional Campaign'. This year long campaign consists of various Chicken Awareness Programmes, Chicken Festivals, expert talks and many more which kick started on February 12, Friday.

As a part of this campaign, PF & BA on Friday had organised felicitation programme of Associate Dean of Bombay Veterinary College Dr Ajit Ranade. He was felicitated for his immense contribution for the poultry sector. Dr Ajit Ranade had taken great effort to aware common people how consumption of eggs and chicken is safe amid coronavirus outbreak. During coronavirus and bird flu outbreak Dr Ajit Ranade stood firmly behind all poultry farmers and through print as well as electronic media he clarified all doubts regarding chicken and eggs consumptions.

During his address Dr Ajit Rande said, "Bird Flu disease only found in birds only. Hence there is no need to be panic for us." He further thanked our ancestors for our traditional cooking method, in which no virus can survive for 100 degree celsius temperature. At the same time, he also warned not to eat half cooked chicken, always prefer full cooked chicken.

PF & BA President C Vasanthkumar told that, because of rumors during pandemic there were drop in chicken and eggs consumption and now again because of bird flu there is drop in consumption. Hence to create awareness among consumers we have decided to organise programme like this with the help of poultry experts. PF&BA had also facilitated some media representatives as they had supported poultry farmers during pandemic. We are indeed grateful for all of your willingness to include us in your coverage in a positive during pandemic. Please extend our thanks to everyone involved, said a note from

Mr C. Vasanthkumar, President, PF & BA (MH).

M.P. Seshaiah passes away

Warangal: Ratnam Poultry Group Chairman Mr Mannava Pedda Seshaiah passed away at the age of 87 at his residence on 8 February 2021. Telangana Poultry Federation (TPF) expressed its condolences on the demise of M.P. Seshaiah, Director of Ratnam Poultry Private Limited. In a press release here on 8 February 2021, Federation president Errabelli Pradeep Kumar Rao said that his services to the poultry industry in both the Telugu States were recognised by State and Central governments. Several small marginal farmers had followed his guidance, he added.

Telangana Poultry Federation (TPF) has extended condolences over the demise of M.P. Seshaiah, former president of Andhra Pradesh Poultry Federation and the present Director of Ratnam Poultry Private Limited.

Born on December 11, 1934 in a small village of Vinjanampadu in Guntur District of Andhra Pradesh, Seshaiah came to Hyderabad and completed his graduation. He worked in AP Govt Health Department from 1959 to 1973. Later, he resigned from government service and joined Ratnam Poultry Pvt Ltd which he started along with his wife Nagaratnamma in 1968 at Saroornagar with 250 birds, a small poultry farm. He was one of the leading poultry farmers and an important poultry luminary having a vast experience of five decades in the poultry

M. P. Seshaiah
DOB: 11-12-1934 DOD: 8-2-2021

industry, TPF in a press release said.

The Poultry Federation said that Seshaiah played a vital role in the development of poultry industry in Andhra Pradesh. He was involved in poultry farmers' welfare activities since his entry into the poultry industry.

"He has been a source of inspiration and support to thousands of farmers in the State. It was during his 16 years of tenure as president that AP Poultry Federation has received fame and recognition from poultry farmers, State and Central governments and agricultural universities," said Errabelli Pradeep Kumar Rao, president of TPF.

He also served as the former director of Agrocorpex India Ltd and Venkateshwara Hatcheries Pvt Ltd. He was involved in the poultry farmer's welfare activities since his entry into the poultry industry and also engaged in various philanthropic activities for the betterment of the society. He was awarded the First Poultry Legend Award by Poultry India in 2015.

APPF holds Condolence meeting of M.P. Seshaiah

Condolence Meeting of Sri MP Seshaiah held in Vijayawada on 15th February 2021 at Dr B. V. Rao Bhavan, A.P. Poultry Federation Association Hall.

Vijayawada, 15 February 2021: M.P. Seshaiah condolence meeting was held in Vijayawada on 15 February, at Dr B. V. Rao Bhavan, A. P. Poultry Federation Association Hall. A number of farmers from East Godavari, West godavari, Krishna and Guntur districts attended and remembered the valuable services rendered by late Mr M. P. Seshaiah to the development of poultry farming in the combined State of Andhra Pradesh since 1976 to his last day of life. Rich tributes were paid to his services by - P. Venkat Rao, CMD, Venkatrama Poultries Pvt Ltd, Guntur, Mulpuri Lakshmana Swamy, Challapalli, K. V. Subba Rao, Vice President, APPF, Tanuku, P. Subba Reddy, General Secretary, APPF, Anaparthi, K. V. Mukunda Reddy, Zonal Chairman, NECC, Anaparthi, Dr K. Somi Reddy, Joint Managing Director, Srinivasa Hatcheries Private Limited, T. Kutumba Rao, Zonal Chairman, NECC, Vijayawada, R. Satyanarayana Reddy, President, KDLFWA, Vijayawada, B. G. K. Reddy, Regional Chairman, APPF, Krishna Region, B. Punna Rao, Poultry Farmer, Nidumukkala. Many poultry farmers and pharmaceutical representatives attended the meeting.

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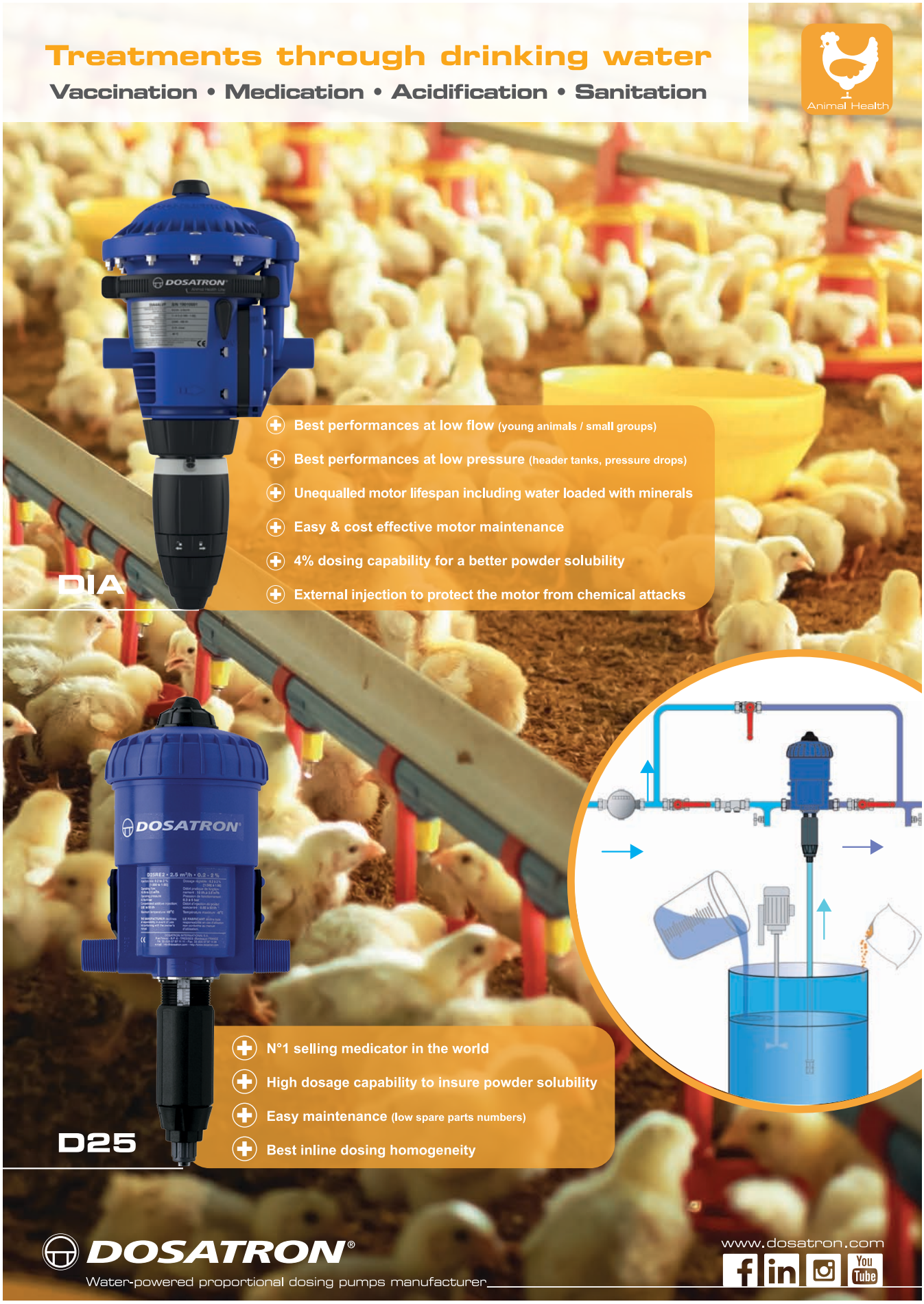

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January-2021	1850	38	2.862 Kg

Mor%	CFCR	DAILY GAIN	EPEF
7.24%	1.445	75.32 gms	427

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The road map for reducing public sector role

How will the new disinvestment policy oversee the future of all central public sector enterprises?

21 February 2021: The story so far: Finance Minister Nirmala Sitharaman, in her Budget speech for 2021-22, announced a new policy for central public sector enterprises (CPSEs), which she said will serve as a clear roadmap for disinvestment of government-owned firms across sectors. "We have kept four areas that are strategic where bare minimum CPSEs will be maintained and rest privatized. In the remaining sectors, all CPSEs will be privatized," the Minister said.

A disinvestment bid for Air India under the Vajpayee government had got stalled amidst a political outcry.

What goes outside government control?

The government had revealed the broad contours of the policy in May 2020 as part of the Atmanirbhar Bharat package unveiled in the initial stages of the COVID-19 pandemic. The strategic sectors identified at the time for retaining certain public sector entities within the government's control remain the same in the final policy approved by the Cabinet. These are atomic energy, space and defence, transport and telecommunications, power, petroleum, coal and other minerals, and lastly, banking, insurance and financial services. While the initial plan was to retain one to four public sector firms in these sectors, this has now been replaced by the phrase "bare minimum presence".

Once the government decides what is the bare minimum number of firms it wants to retain, the rest of the firms will be privatized, merged or subsidiarised with other CPSEs, or closed. For all firms in sectors considered non-strategic, privatization or closure are the only two options being considered. The policy's objective is to minimise the public sector's role and create new investment space for the private sector, in the hope that the infusion of private capital, technology and management practices will contribute to growth and new jobs. The proceeds from the sale of these firms would finance various government-run social sector and developmental programmes.

Why is this significant?

A bold push for disinvestment of the public sector was expected soon after Prime Minister Narendra Modi assumed office in May 2014 and announced that the government had "no business to be in business". This was seen as a clear intent to privatize a huge chunk of India's large public sector, a legacy from post-Independence policies that placed government firms at the 'commanding heights' of the economy.

However, the first term saw little activity by the government on this front, barring an aborted attempt to sell 76% of its stake in the loss-ridden national carrier Air India. A few public sector enterprises were merged with other PSEs and the proceeds from the transactions counted as disinvestment proceeds in the government's accounts.

In its second innings, however, there has been some enthusiasm to privatise, with a fresh push to sell Air India (lock stock and barrel, with 100% stake sale), followed by Maharatna oil PSU Bharat Petroleum Corporation Ltd (BPCL), and the likes of Shipping Corporation of India, Container Corporation of India and Pawan Hans. The process for those sales is under way, although timelines and investor interest were affected by the pandemic. However, the process indicated a piecemeal approach to privatisation and created uncertainty.

The new policy is significant as it goes beyond such an approach and lays down a rationale for deciding the future ownership pattern of 439 CPSEs, including their subsidiaries. For instance, it is now clear that 151 public sector firms in non-strategic sectors (including 83 holding companies and 68 subsidiaries) will either be closed or sold. The policy also brings public sector banks and insurance entities into the disinvestment ambit for the first time.

How is this different from policies in the past?

This is the first time since 2004 that India is working on a slew of privatisation deals. Earlier, the Atal Bihari Vajpayee government between 1999 and 2004 had managed to sell off majority stakes in a dozen-odd public sector enterprises, including Modern Foods, Balco, Hindustan Zinc, VSNL and a few hotels. A separate Ministry had been formed

In her Budget speech, Finance Minister Nirmala Sitharaman promised the sale of two more public sector banks and a general insurance player, along with plans to list the Life Insurance Corporation of India on the stock markets

just for disinvestment, led initially by the late Arun Jaitley and then by Arun Shourie, who drove the process.

An attempt to sell Air India at the time had, however, got stalled in the face of a political outcry. Prior to that, the early 1990s saw the stock market listing of minority stakes in a bunch of public sector firms, a policy that was replayed when the UPA government was in office from 2004 to 2014. The new policy goes beyond the Vajpayee-era privatisation drive, which was limited to a 'case-by-case' sale of entities in non-strategic sectors, by stressing that even strategic sectors will have a 'bare minimum' presence of government-owned firms.

What is likely to be sold?

The government hopes to conclude the sale of Air India, BPCL and some other entities, where some progress has already been made over the past year. Ms Sitharaman also promised the sale of two more public sector banks and a general insurance player in her Budget speech, along with plans to list the Life Insurance Corporation (LIC) of India on the stock markets.

The Union Budget has estimated ₹1.75 lakh crore as receipts from PSU stake sales in the year, compared to its target of ₹2.10 lakh crore for 2020-21, of which just about ₹20,000 crore has been raised so far. However, the Finance Ministry mandarins are confident of achieving next year's target.

What is the proposed process for selecting the CPSEs to be sold or retained?

The NITI Aayog has been entrusted with suggesting which public sector firms in strategic sectors should be retained, considered for privatisation or merger or 'subsidiarisation' with another public sector firm, or simply closed. A core group of secretaries on disinvestment will consider the NITI Aayog's suggestions and forward its views to a ministerial group. Apart from the Finance Minister, the group will include Road Transport and Highways Minister Nitin Gadkari and the minister in charge of the administrative ministry of the public sector enterprise concerned. After the ministerial group's nod, the Department of Investment and Public Asset Management in the Finance Ministry will move a proposal to the Cabinet Committee on Economic Affairs for an 'in-principle' nod to sell specific CPSEs. The NITI Aayog is expected to soon formalise its recommendations on which of the 77 public sector companies in strategic sectors should remain with the government.

Public sector firms and corporations engaged in activities allied to the farm sector, such as providing seeds to farmers, or the procurement and distribution of food for public distribution, will not be privatised. Similarly, the policy excludes departments with commercial operations like Railways and Posts, firms making appliances for the physically challenged, and those providing support to vulnerable groups through financing of SCs, STs, minorities and backward classes. CPSES "maintaining critical data having a bearing on national security", security printing and minting companies, will also be retained in the public sector.

What are the risk factors?

The turmoil in the global economy could impact the valuations of firms being privatised, as many potential investors may not have the appetite for bidding in these times. The prospect of post-deal scrutiny by audit and investigating agencies, like the CAG (Comptroller and Auditor General of India) and the CBI, will be a source of worry for officials, with similar cases pertaining to the Vajpayee-era transactions still cropping up in courts.

Lastly, as economist Pronab Sen has warned, privatisation is a good idea, but doing it during a recession may dampen economic recovery as investors will end up buying existing capacities instead of embarking on fresh investments.

Courtesy: *The Hindu*

Hy-Line International announces Commercial Director Hire

West Des Moines, IA (5 February 2021): Hy-Line International, the world leader in layer poultry genetics, is pleased to announce that Gustavo Wassermann joins the senior management team as commercial director, reporting to Jonathan Cade, president. He will oversee all sales activities except for parent stock sales to Hy-Line International's sister company and USA distributor, Hy-Line North America. His role will include responsibility for the sales team around the globe. He will be based in West Des Moines, Iowa, USA.

Gustavo Wassermann joins the senior management team as Commercial Director

"Gustavo brings to our team a wealth of knowledge in the poultry breeding business," said Jonathan Cade, president of Hy-Line International. "As we intensify our efforts in our targeted growth areas around the world for all our layer varieties, he will support the sales team to increase Hy-Line's presence globally."

Wassermann had been serving in a business development role for Hy-Line for efforts in India, Africa and Southeast Asia. Prior to joining Hy-Line, Wassermann's more than 20 years of experience involved roles in product development, technical service, sales and business operations for global nutrition and poultry genetics.

Ease path for businesses: Modi

States should work to reduce compliance burden, PM says at NITI Aayog meeting

New Delhi, 20 February 2021: Talent is Indian but product is not, PM says on Google; calls for further strengthening of start-ups, MSMEs.

States need to work towards reducing compliance burden for citizens to ensure ease of living and promote ease of doing business, Prime Minister Narendra Modi said on 20 February, Saturday, while stressing on the importance of better coordination between the Centre and the States for the country's development.

"There are thousands of compliances within the government that we can remove for the common man... Now, there is no need to ask people again and again when there is technology. States should come forward. I have also said this in the Government of India and our Cabinet secretary is following this. The number of compliances has to be reduced now. This is also very important for ease of living," Mr Modi said speaking at the sixth meeting of NITI Aayog Governing Council.

The meeting was attended by 26 Chief Ministers, three Lieutenant Governors and two administrators, besides Union Ministers, special invitees and NITI Aayog officials. Chief Ministers of Punjab, Gujarat, West Bengal and Telangana, however, did not attend the meeting.

"I want to request two things. Today, we have got an opportunity in the world

and we should try to grab that opportunity... Globally, for positioning of India, for India to gain opportunities, ease of doing business is important. For this, we have to improve our laws, systems and meet the expectations of the citizens of the country... We will have to emphasize what is necessary for Ease of Living," Mr Modi said.

The Prime Minister added that the foundation of the country's progress is that the Center and the States work together and move in a definite direction.

Stating that policy framework and better coordination between Centre and States is very important, the Prime Minister asked the States to take advantage of Central schemes like PLI to attract investments. He pointed out that States have a 40% share in the National Infrastructure Pipeline and therefore, it is imperative that States and the Centre synergize their budgets, make plans, and set priorities.

"We are also seeing how the private sector of the country is enthusiastically coming forward to participate in the country's development...As the government, we also have to honour this enthusiasm and give them as much opportunity in the *Atmanirbhar* Bharat campaign," he said.

Farm laws not raised

Speaking at a press conference after the meeting, NITI Aayog Vice-Chairman Rajiv Kumar said the farm laws, which have sparked protests across the country, were not discussed during the day-long meeting.

"I can assure you that no State brought up the farm laws for discussion. Agriculture was discussed... but no discussion on the farm laws and that they should be repealed," Mr Kumar said, replying to a query.

NITI Aayog CEO Amitabh Kant added that agriculture issues which were discussed included aligning cropping system to agro-climatic conditions at district level for optimal resource utilization, promoting water conservation, promoting diversification towards nutri-cereals, pulses, horticulture, fisheries and animal husbandry, food-processing agro-based industry and exports.

During his address, the Prime Minister said agriculture offers immense opportunities and that reforms are very important for farmers to get necessary economic resources, better infrastructure and modern technology.

He added that even though Indian is an agrarian economy, it imports edible oil worth ₹65,000-70,000 crore. "We can stop this. Money can go to our farmers' account. Our farmers are entitled to this money. But we need to plan accordingly for this."

Mr Kumar added that most chief ministers emphasised on developmental agenda and timely completion of infrastructure projects.

"I don't honestly recall any specific request for fiscal assistant etc. Nobody mentioned that... Some States have requests, for example, Bihar, which is a landlocked State, wants a special port in Odisha to handle their cargo. This was backed by Jharkhand. Rajasthan, for example, wanted the Indira Gandhi Canal to be given the national status... so, much more development-oriented requests rather than any financial," he said.

Courtesy: *The Hindu*

Courtesy: *NECC*

Dr Satyajit Jagtap joins Perstorp to lead Animal Nutrition Sales for the Indian subcontinent

Global feed additive company Perstorp has appointed Dr Satyajit Jagtap to lead the sales activities for the Animal Nutrition business in the Indian subcontinent. Dr Jagtap joined Perstorp on January 18th and reports directly to Perstorp Animal Nutrition Vice President for APAC Dr Jim Ren.

Sweden: Perstorp's Animal Nutrition Business has an ambitious growth strategy in Asia Pacific. Its portfolio is based on organic acids and esters of organic acids such as butyric and propionic acid. These solutions have exhibited highly effective properties in improving animal growth performance, gut heath and preservation, making them ideal candidates to support the transition to Antibiotic Growth Promoter (AGP) free production.

Dr Jagtap will be responsible for continuing

Perstorp appointed Dr Satyajit Jagtap to lead Animal Nutrition Sales for the Indian subcontinent

Perstorp's growth in the Animal Nutrition Business in India, Bangladesh, Sri Lanka and Nepal, and will continue to build on market presence and sales availability. His strategic focus will be on feed additives that support gut health, feed hygiene and water hygiene.

Jagtap has more than 17 years of experience in the animal nutrition industry, working at both multinational feed additive companies and local feed mills. He holds a Master's degree in Animal Nutrition and a Bachelor's degree in Veterinary Science.

"With his strong technical background and commercial experience, I am sure Satyajit will strengthen our team and grow our business further in APAC" says VP APAC for Perstorp Animal Nutrition, Jim Ren. "Satyajit will enable Perstorp Animal Nutrition's unique products and solutions to reach more customers and create more added value to the livestock and feed industry in the Indian subcontinent."

"I am thrilled and excited to join Perstorp's Animal Nutrition team and look forward to work with my colleagues to bring very innovative and differentiated solutions to our customers in the Indian subcontinent. I am sure Perstorp's future ready product portfolio will help to meet our customers' current needs and address future market and regulatory challenges in the areas of gut health, mold inhibition and feed and water hygiene" states Satyajit.

Courtesy: *Vencobb*

Aviagen India Customers Surpass 500 PEF Milestone as Company Launches "Ross 308 AP Achiever" Award

11 February 2021, Udumalpet, Tamilnadu: Aviagen® India customers continue to outdo their best and have recently reached a significant milestone -- Performance Efficiency Factor (PEF) scores of greater than 500. In fact, many customers are seeing 400+ PEF numbers on a regular basis. (PEF is calculated with the formula: Liveability (%) X live body weight (kilograms) X 100 / age in days X Feed Conversion Ratio (FCR).)

Aviagen India customers go from strength to strength

These great results and the consistent progress in Ross 308 AP performance are due to the hard work, expert stockmanship and dedication of Aviagen India customers throughout the country. The Aviagen India customer support team is committed to these dedicated farmers, and works hand in hand with them to help optimize the genetic potential of the Ross 308 AP, while increasing the efficiency and productivity of their businesses. To encourage and reward this star broiler performance, in Q4 of 2020 the team introduced the "Ross 308 AP Achiever Award" program, and has now recognized the five initial recipients.

And the winners are…

The following table shows the first five Ross 308 AP Achievers, along with the winning PEF, Feed Conversion Ratio (FCR) and Daily Weight Gain (DWG):

Sandip Divekar and family, Japfa Comfeed

AP Achiever	Month	PEF	FCR	DWG (grams)
Yaheya Hussain, Srinivasa Farms	December	512.2	1.257	65.81
Mr Amit, Indian Broilers	December	508.4	1.390	72.44
Thuleswar Dascha, Indian Broilers	November	478.5	1.433	71.92
Lokande Suresh, Baramati Agro	September	470	1.36	68.5
Sandip Divekar, Japfa Comfeed	October	451.6	1.460	69.5

"I am very happy with the Ross 308 AP bird. Because it has a healthy growth rate and good feed efficiency, it eats less and lives well. I'm looking forward to the next flock," commented Lokande, who is a contract grower for Aviagen India's customer Baramati Agro. "Thanks to Baramati Agro for their enthusiastic support."

Coming soon… the "best of the best"

Aviagen will announce a new award recipient each month, and, in addition to PEF scores, will be tallying results for traits, such as daily weight gain, weight for age, FCR and liveability. The "best of the best" in these categories will then be recognized at an annual ceremony to debut in September, where top honors and awards will be presented, and a highest "Ross 308 AP Achiever" will be named.

"I congratulate all the winners for their tremendous success with Ross 308 AP broiler chicks, and am proud of their excellence in flock management and passion for their birds. Our dedicated customers deserve so much credit for the ongoing rise in performance and productivity, as well as outstanding health and welfare. They are a great example and encouragement to producers throughout India," said Marc Scott, Business Manager of Aviagen India. "I look forward to seeing more great performance throughout the year and to honoring our top winners in September."

About Aviagen

Since 1923, Aviagen® has been a preferred global poultry breeding company with a mission to help its customers -- the world's chicken meat producers -- supply sustainable, affordable and nutritious protein to their growing communities. Putting into practice its corporate value of "Breeding Sustainability," Aviagen implements efficiencies that make commercial chicken production environmentally and socially responsible and economically beneficial to producers, while at the same time promoting bird performance, health and welfare.

To meet varied market demands, Aviagen offers a full portfolio of breeding stock under the Arbor Acres®, Indian River® and Ross® brand names. The Rowan Range® and Specialty Males® target slower-growing and other niche market needs. Aviagen is based in Huntsville, Alabama, US., with operations across the UK, Europe, Turkey, Latin America, India, Australia, New Zealand, Africa and the US, and joint ventures in Asia. The company employs close to 8,000 people, and serves customers in 100 countries.

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Prospects of Automation in Commercial Broiler Farming in India

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Highlight Points

The objective of this article is to create awareness for adopting recent modern technologies among poultry entrepreneurs. The combination of climate controlled shed with automatic feeding system, nipple drinking system with filtration & automatic medicator will improves the broiler health, FCR, livability and biosecurity.

India ranks third in egg production and fifth in broiler production having 851.81 million poultry population with a growth rate of 8.5 per cent. The annual production of eggs has reached to 103.32 billion (Husbandry, B.A. and Statistics, F., 2019; 20th Livestock census, 2019). Majority of the poultry owners follow the open house conventional rearing system. The higher short term costs and easy availability of man power shows reluctance among farmers to opt modern technologies. The trend in poultry production has been towards large commercial farming. This compels the farmers to switch over from traditional practices to mechanized farming which saves time and labour. This includes mechanical cleaning equipment; automatic feeding and watering equipment, medication, egg collection, litter removal etc.

The use of these types of equipments makes it possible for large number of bird to be handled in the operation. Controlled feeding and automating the controlled feeding system of broiler for optimum nutrition is a beneficial step and must be applied in poultry enterprises. Poultry production in India has continuously faced challenges of providing optimum environment for maximum growth, production, disease control and finally the cost benefit ratio involved for a successful poultry husbandry practices. In order to sustain growth and profitability, it is becoming essential to create innovative ways to decrease the cost of production as much as possible and at the same time to produce high quality products. Factors like feeding, watering, handling, vaccination and medications must be optimized to improve returns and economic feasibility. Maintaining or/and improving performance of birds, may be achieved by improving farm management practices.

The following automation and robotics done in the different segments of commercial Broiler farming:

Automatic Pan Feeding: These are auger driven feeding system of poultry feed. The auger is generally composed of special alloy known as Mangalloy. Mangalloy, also called manganese steel or Hadfield steel, is an alloy steel containing an average of around 13% manganese. Mangalloy is known for its high impact strength and resistance to abrasion once in its work-hardened state. The usage of this alloy will increase the surface toughness by three times which makes the feeding system more durable.

Fig 1: Automatic Auger Driven Pan Feeding System

An automatic pan feeder system (Fig 1), particularly for raising chickens, and controlling the level of the feed in the pan, includes a pan assembly which has an adjustable skirt that determines the level of the feed, such skirt being adjustable by two structures. The first structure is an intermediate member between the drop tube and the

skirt which is adjustable on the drop tube for adjusting the vertical position of the skirt. The second structure is the adjustment of a skirt by an anti-roost wire tied to the skirt by ties. The anti-roost wire is movable along the elongated; such movement asserts a pull on the ties which raises the skirt to adjust the level of the feed in the pan. Another feature of the invention is a cone shaped deflector member mounted on the central axis of the drop tube for deflecting both the fines and coarse particles of the feed outwardly towards the outer periphery of the pan to eliminate the fines from accumulation in the central area of the pan (Hart,1995). This deflector member is adjustable for shutting off the flow of feed through the drop tube.

Climate Control Poultry Shed:

Fig 2: Tunnel Ventilation

Fig 3: HEPA Filters

In climate controlled poultry house (Fig 2), external air is drawn or pumped through very dynamic large fans of high efficiency HEPA filters(Fig 3), efficient to remove almost 99.97 % of the airborne particles with size 0.3 micrometers or larger. This system will rely on the principle, cooling outdoor air by passing it over water-saturated pads, causing the water to evaporate into it. The 15°- to 28°F-cooler air is pushed into the poultry house then and distributed by using a duct system. According to a private entity involved, number of birds housed in Climate controlled shed and income is double than conventional system of rearing of commercial broilers.

Nipple drinking system:

Fig 4: Nipple drinking system (Source: Roxell & Lubing group)

Fig 5: Filtration Unit with Automatic Medicator

These drinking nipples are made of high-alloy stainless steel. The plastic components of the system are made up of high density polyethylene. Drinking nipples and automatic drinkers for rearing chicks are sturdy and precise. They contain no delicate operations. These designs guarantee long life and minimal maintenance. The valve components and large cross-section arrangement provide optimal protection against contamination (Hawk, 2008).These drinking system is connected with filtration unit which reduces the pathogens and hardness of water for the poultry. Thus nipple drinking system ensures continuous water supply throughout day and night, less spillage of water thanks to cup attached to the system results reduction in litter moisture, improved rearing result and minimum maintenance, care, and cleaning .One of the study reported that nipple drinking system doesn't allow to microbes like E. coli to produce biofilm compare to bell drinker system.

Automatic medicine dispenser: Automatic medicine dispenser or automatic medicator is the another assembly in this type of drinking system which utilized for water medication, water vaccination, water acidification, water supplementation, water sanitation, water disinfection, hygiene & biosecurity .The Automatic medicator operates by using the gravitational water flow as a source of energy. The pressure and flow of the water trigger the motor piston which drives a dosing piston. The additive is injected and mixed continuously with the water from the mains supply at the selected dosing rate % (rate of product/water incorporation). The dose of concentrated additive is directly proportional to the volume of water which passes through the automatic medicator, independently of variations in the flow rate and pressure of the mains water supply (Chehri X Dosatron®, 2010).

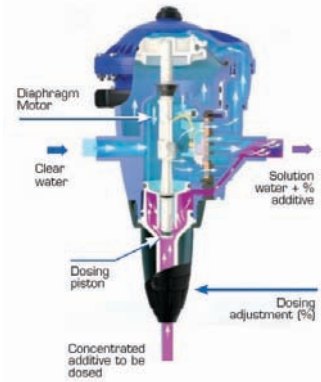

Fig 6: Automatic Medicator (Source: Lubing-Dosatron)

Broiler Chicken Harvester: Broiler chicken harvester moves around the shed and picks up 200 birds at a time in about 30 seconds. Once the harvester is fully packed then it places the birds onto a hopper and returns to the shed to pick up another batch of birds. The Chicken harvester is capable of catching and handling up to 8000 birds an hour and can operate in either a clear span or posted shed.

Fig 7: Chicken Harvester (Source: fwi.co.uk)

The Chicken harvester is driven by one operator and it rules out the need for repetitive manual catching and there is no longer any human contact with the birds during the catch. The results will be consistent since there is no manhandling of birds. Lifting of broilers birds is more laborious and

exhaustive job and person employed for the manhandling will get tired and not able to perform the task for rest of the day. This Chicken harvester machine will aid to maintain the welfare of chicken since the birds are never picked up by the legs and carried upside down, as a result they tend to flap which can cause injuries. A trail was conducted to compare the manual handling and chicken harvester for lifting the broiler birds and results shows that there is significant reduction in leg and wing damage when broilers are lifted by chicken harvester. This system also ensures the human welfare as the catcher driver can wear an air filtration mask to isolate them from the dust, compared with a manual catcher who finds difficulty in working with mask due to more cardio nature of the job.

Conclusion: The combination of climate controlled shed with automatic feeding system, nipple drinking system with filtration & automatic medicator will improves the broiler health, FCR, livability and biosecurity. The usage of chicken harvester for catching the broilers at the marketing age will improves the birds & human welfare and also reduces the leg and wing damage of broilers. As a result, the adaptation of automation in commercial broiler farming would improve the efficiency in broiler performance in India.

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Bacteriophages – *History and Evaluation*

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Highlight Points

Bacteriophages also known as "phages" are viruses that are capable of infecting bacteria. Phage comes from the Greek word phagein that means "to devour", so bacteriophage literally means "bacteria eater". Although it may seem odd that a virus can infect bacteria (single celled microbe) but in fact, bacteriophages are nearly 40 times smaller compared to bacteria. The bacteriophages get attached to their targeted bacteria via specific tail fibre receptors. The tail fibres happen to be one of the crucial structural elements of bacteriophages that makes each phage type specific to its host bacteria.

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History

In 1896, a British bacteriologist named Ernest H Hankin observed that the waters from Yamuna and Ganga contained some biological principle which destroyed cholera-inducing bacteria. He also observed that millipore filters that were known to retain microorganisms like bacteria, couldn't stop this substance from passing through. In 1915, another British bacteriologist named Frederick Twort discovered a small agent capable of infecting and killing a bacteria.

Two years after the discovery made by Twort, Felix

d'Herelle, a French-Canadian microbiologist observed a similar finding while studying patients recovering or suffering from bacillary dysentery. It was in fact d'Herelle who started bacteriophages use in clinical medicine and brought to light the "phage therapy" concept.

After the invention of the electron microscope, a German doctor named Helmut Ruska came up with the first physical description of the bacteriophages. Following his observations, Luria and Anderson visualised various types of bacteriophages and described their common structure. In the subsequent years, considerable progress was made in the field of bacteriophages with the first human experiments staring in the 2000s.

Bacteriophage Lifecycle

Similar to other viruses, bacteriophages need to infect their targeted bacteria to reproduce. The infection process involves a series of steps which can be referred to as the 'phage lifecycle'.

There are two cycles, while certain bacteriophages reproduce only via a lytic cycle, other bacteriophages alternate between a lysogenic lifecycle and lytic lifecycle. In a lytic lifecycle, the bacteriophages cause lysis of the targeted bacterial cells by bursting the cell wall of bacteria. In a lysogenic lifecycle, the bacteriophages doesn't kill the targeted bacteria cell, instead they are replicated along with the bacterial cell DNA every time the cell divides.

Lytic Cycle

The characteristics of a bacteriophage in a lytic cycle is typical to that of a virus; after attachment to their targeted bacterial cell the resources of the cell is utilised to produce new phages. This causes the cell to burst and lysis of the bacteria.

The phases of the lytic cycle:

- Binding: The bacteriophage tail attaches to a specific receptor present on the bacterial cell's surface.
- Invasion: The phage genome enters the cytoplasm of the bacteria.
- Biosynthesis: The phage DNA replicates and translates the important viral components to make phage proteins.
- Maturation: New phage particles are created.
- Lysis: The cell expands and bursts releasing the newly created phages.

Lysogenic Cycle

In the lysogenic cycle, the initial two phases are identical to that of the lytic cycle. However, after the phage DNA enters the cell, it recombines with the bacterial chromosome causing the phage genome DNA to integrate into the chromosome. The integrated phage DNA is also known as a prophage. Thus, every time the bacteria replicates its chromosome, the phage's DNA is also replicated and passed along to new cells during reproduction.

The phases of the lysogenic cycle:

- Binding: The bacteriophage attaches to the host.
- Invasion: It injects the DNA into the host cell.
- Integration: The DNA of the phage recombines with bacterial chromosome.
- Cell Division: The phage DNA is passed onto the new cells after cell division.

If the conditions become stressful, the prophage DNA comes out of the bacterial chromosome to enter the lytic cycle.

Bacteriophages - Alternative to Antibiotics

Before Alexander Fleming discovered antibiotics in 1928, considerable research was conducted on bacteriophages to treat bacterial infections. Though research on phage was abandoned in various parts of the world post the discovery of antibiotics, but in different Soviet nations the developments continued mostly because of the lack of western antibiotics. Of late, owing to increasing problems of antibiotic resistance, there has been a resurgence of interest in the "phage approach".

In fact, bacteriophage therapy is being used nowadays to help fight different bacterial diseases in animal and poultry. Leading the way, Proteon Pharmaceuticals has emerged as a prominent name focused on improving animal and human health with their sustainable bacteriophage products and solutions. Using precision biology for microbiome protection, Proteon Pharmaceuticals aims to reduce the unnecessary use of antibiotics to enhance on-farm productivity and enhance environmental sustainability of livestock production. ■

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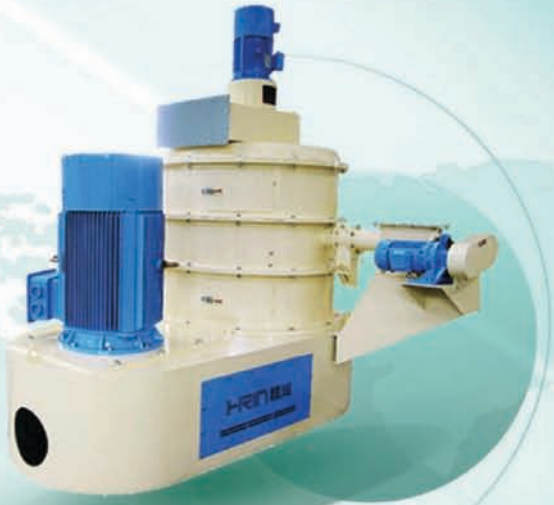

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UNDERSTANDING NESTING BEHAVIOUR: MANAGING FOR FEWER FLOOR EGGS IN LAYERS

Understanding a hen's nesting behaviour can help you manage your cage-free flock for fewer floor eggs and better profitability

Technical Team, *Hy-Line International,* Email: info@hyline.com

Introduction

Many egg markets have moved to more cage-free table egg production systems. In cage-free facilities the nesting behaviour of hens is an important economic trait. Eggs that are laid outside of the nests are more likely to be contaminated by bacteria through increased contact with feces and litter. Out-of-nest eggs are easily cracked, broken and eaten by other hens. The value of these eggs is lower due to downgrading and diversion to egg processing. The costly manual collection of eggs from the floor or within the aviary system is a nuisance to egg producers. Floor-laid eggs may lead to more cloacal cannibalism in the flock, which is a welfare issue.

It is common for young layer flocks to lay some floor eggs as nesting behaviour is established. Typically, the number of floor eggs will drop to a low level within 2–3 weeks. Floor eggs typically range from 1–4% for the life of a laying flock (4). In the field, the incidence of floor eggs depends on factors related to bird, environment, nest training, and management practices.

Nesting Behaviour in Chickens

Understanding the normal nesting behaviour of layers is important when developing appropriate management programs to minimize floor eggs. The nesting behaviour of the hen is a complex interaction of genetic, behavioural, hormonal, and environmental factors. The laying hen's environment should provide designated nesting areas that allow expression of the hen's natural instincts to seek a nest for egg laying. Elimination of inappropriate nesting sites within the bird's environment is the management challenge.

Pre-Laying Behaviour

Figure 1. Pre-lay behaviour in hens includes making many visits to examine potential nesting sites before making a final nest selection.

One to two hours before laying an egg, the hen will become restless and begin examining potential nesting sites as a part of the pre-lay ritual. A hen makes frequent nest visits before final nest selection, averaging 21.3 nest visits per egg laid (7). Between these nest examinations, the hen might eat, drink, and preen, as well as other behaviours (Figure 1). After selecting a site, the hen may turn around several times, exhibiting nest building behaviour. If loose nesting material like sawdust is present, the hen spends more time nest building. Just before laying an egg, the hen extends the neck and body feathers. Some hens will stand to lay their egg. The time for the hen to lay an egg is highly variable between 10 and 90 minutes (7, 11). After the egg is laid, the hen may vocalize (cackling) and want to sit on the egg for some time or just leave the nest.

The start of pre-laying behaviour is triggered by the hen's last ovulation (releasing the ovarian follicle into the oviduct) and not by the presence of an egg ready to be laid. The previous ovulation releases the hormones, estrogen and progesterone, which are responsible for the hen's pre-laying behaviour (1). Any stressful event eliciting a fear response could cause the hen to suspend nest selection and delay egg laying. If the pre-laying stimulus passes before the egg is laid, then the hen may lose interest in seeking a nest, resulting in more eggs laid on the floor.

Pecking Order

During the rearing period, the social hierarchy of dominant/submissive relationships between individuals in a group of birds is established. High ranking birds have first access to food, water, and nesting sites. High ranking, dominant hens will occupy preferred nesting sites to the exclusion of lower ranking hens. If the number of preferred nesting sites is limited, then submissive hens might be forced to seek alternative nesting sites, resulting in more out-of-nest eggs.

Nest Preference

Hens prefer nests that are dark, secluded, warm, and comfortable. Nests containing loose material, such as wood shavings, rice hulls or straw are preferred and hens express more nest building behaviours. In cage-free commercial production systems, it is common to utilize automatic egg collection nests, with a rubber (plastic) nest floor mat or artificial turf. Hens show a preference of solid nest floors over wire nest floors (13). Hens prefer nests located in corners or at the end of the line. Nests in elevated locations are generally preferred compared to ground level nests (8). Young, inexperienced hens may prefer nests that are occupied by other hens (gregarious nesting) (1); this behaviour tends to lessen with bird age (Figure 2). In aviary systems, hens will choose more isolated nests located along the wall before utilizing nests located within the aviary rack (6).

Figure 2. Gregarious laying behaviour is more common in young inexperienced hens.

Nesting is a learned behaviour, but once established in a hen, it becomes difficult to change. Hens tend to return every day to the same nesting sites. Consistent nest layers and floor layers can be identified in a flock (3). The management challenge for egg producers is to make the designated nests attractive to hens and eliminate alternative nesting sites where hens might lay out-of-nest eggs.

FACTORS AFFECTING THE INCIDENCE OF FLOOR EGGS

Bird Behaviour

- Nest training
- Dominant hens or roosters prevent subordinate hens from reaching nesting sites
- Gregarious nesting behaviour, especially in young layers
- Overcrowding in corner and end of the line nests

Facility design

- Hens' movement to nests is blocked by waterlines, feeders or enrichments
- Litter depth
- Elevation changes not properly ramped

Nests

- Insufficient number of suitable nesting sites
- Nests located in areas with more mechanical noise or vibration
- Worn nest floor mats, making nests uncomfortable
- Dirty or malodorous nests. This can occur when nests are not closed at night or are soiled with egg contents.
- Interior of nest too bright

Environment

- Overcrowding of birds, blocking movement toward nests
- Uneven ventilation, causing nests to be too cold and drafty. In summer, uneven ventilation may cause some nests to be too hot with stale air.
- Uneven light distribution
- Heat stress
- Stray voltage (new construction, recent electrical repairs)

Feed Management

- Running feeders during peak nesting time, attracting hens away from the nests
- Use of grit, feed formulations with high fiber to increase foraging behaviour

Bird Health

- Leg problems from infections (*Staphlyococcus*, *Enterococcus*, *Mycoplasma synoviae*)
- Injuries during handling, transfer or within the aviary system
- Nests infested with insects (red mites, northern fowl mites, fleas, ticks)
- Nests infested with rodents

HY-LINE'S SELECTION PROGRAM FOR GOOD NESTING BEHAVIOUR

Cage-free traits have moved to the forefront of Hy-Line International's breeding program. Nesting behaviour as it impacts the incidence of floor eggs may be the most important cage free trait. Hy-Line International has been selecting against floor eggs for more than a decade. The genetic determination of this trait and an estimate of its heritability in commercial lines has been established (10). Nesting behaviour has been measured by observing the incidence of floor eggs in pen production of all versions of Hy-Line Brown male lines. Birds are evaluated under challenging conditions. Sire breeding values are predicted to select families that are less prone to lay out of the nest. A new approach uses up-selected males with better breeding values for nesting behaviour in pen matings and only utilizes hatching eggs from hens with good nesting behaviour. This new approach is being used to produce male lines for cage-free markets. In addition, new approaches are being tested to identify nesting behaviour of individual females (instead of sire families), to separate consistent nest users from hens that prefer laying on the floor. These new approaches include trap nesting hens in aviary-like systems; wearing Radio Frequency Identification (RFID) transponders to study nest usage and behaviour; and a biological approach that combines laying behaviour phenotypes with genomics to identify hens that lay in the nest. Breeding efforts have resulted in a reduction of the genetic predisposition of hens to lay their eggs on the floor.

MANAGEMENT CONSIDERATIONS DURING REARING

Training

Training hens for good nesting behaviour begins during their rearing period. If hens will have to jump up to reach the nests and perches during the laying period, then jumping behaviour should be habituated during the rearing period.

Feeders, water systems, and perches used during rearing and laying should be matched. Pullets reared in aviary systems adapt faster after transfer to aviary laying facilities, with fewer floor eggs than floor-reared pullets (2).

Water Tables

In addition to perches, birds reared primarily on the floor should have water tables. In none aviary houses, water tables (Figure 3, elevated platform) should be under 100% of all water lines so birds have to jump to drink. This setup helps birds learn to look for what they need (feed, water, nests) in vertical as well as horizontal environments.

Perches

Perches and elevated water platforms should be present in the rearing flock by 10 days of age to establish jumping behaviour in the young pullets and develop strength in leg and breast muscles. Perches provide a safe resting space for birds and lowers the density of birds on the floor. The ability of pullets to use perches will be important later for accessing elevated nests. Hy-Line's internal research has found negative genetic correlation between perch use and nesting behaviour (manuscript pending publication). The type of perches used in rearing should be the same design and material as those to be used during the laying period (Figure 3). Perches should be placed on the slats when using a litter (scratch area)/slat flooring. The perches should support the bottom of the bird's foot and be easy to grip. Do not use electric deterrent wire over water or feeder lines, as this will discourage jumping behaviour in pullets.

Wall Perch

Perch over feeder

A-frame perch with slats

A-frame perch

Elevated platform

Figure 3. Types of perches

MANAGEMENT CONSIDERATIONS DURING TRANSFER

Transfer pullet flocks to the laying facility by 16 weeks of age, or a minimum of 14 days before first eggs. This provides the birds sufficient time to adapt to the new laying environment and to re-establish the pecking order. In laying facilities utilizing litter and elevated slat areas, the pullets should be transferred onto the slats. It is important that the hens use the aviary system for roosting during the night. Any hens on the litter at dusk should be manually placed in the aviary system (Figure 4). The nests should be open and available for examination by hens at housing. Lifting every third or fourth nest flap will encourage nest exploration. Run the egg belts during the day to accustom hens to the noise and vibration of this equipment.

MANAGEMENT CONSIDERATIONS DURING THE LAYING PERIOD

Training Period

The nest training period begins from transfer until the flock reaches the peak of egg production (around 27-32 weeks). During this time, the young layer should learn to consistently use the provided nests.

Figure4. It is important to train newly housed birds to roost in the aviary system and not on the litter.

In the training period, the flock manager should walk in the flock a minimum of six times each day, starting from the opposite side of the nest area. During these walks, the birds should be stimulated to get up and move away from the walls, out of corners and toward the nests. Any floor eggs should be picked up immediately and any hens observed nesting outside of the provided nests should be gently placed inside a nest. The presence of a few eggs in the nests will attract hens to visit the nest. Observe where floor eggs are being laid and devise a plan to make these locations less attractive for nesting.

During nest training, leave the floor free of obstacles that might block the movement of hens to the nests, such as pecking blocks or lucerne (alfalfa) bales. These enrichments can be suspended above the floor or introduced after the training period (Figure 5). The hens' path to the nests should be clear of blockages, such as low water lines and feeders.

Figure 5. Enrichments, such as lucerne (alfalfa) bales, should be suspended so as not to encourage birds to lay next to them or block hen movement to nests.

Keeping the house temperature around 20–21°C (68–70°F) or lower, with good air movement, keeps the hens active and discourages floor eggs.

Figure 6. The shaded area under the feeder motor used as an alternative nesting site.

Figure 7. The space between the feed trough and perch used as an alternative nesting site.

Figure 8. This LED light source produces directional light that creates distinct areas of light and shade under the feeder and perch, causing floor laying.

Nest Opening and Closing

Automatic nests should be opened two hours before lights on, and closed two hours before lights off. When using dawn/dusk sequential lighting, the nests can be opened two hours before the beginning of the dawn light sequence. Nest closing can be one hour before the dusk lighting sequence. The last feeder run should be scheduled just prior to nest closing to pull hens out of the nests that may otherwise be settling in for the night.

Eliminating Alternative Nesting Sites

Corners of any kind are common locations in which to find floor eggs. Rounding these corners will make them less desirable as nest sites. Along a wall is another common location for floor eggs. Shaded areas under feeder troughs, feed hoppers, feeder motors, pan feeders, bell drinkers, and environmental enrichments may attract hens to lay on the floor (Figures 6–9). Supplemental lights can be added in areas where shadows exist. String lights work well for this application (Figure 10).

Figure 9. Unwanted egg laying under the feeders.

Figure 10. String LED lights are placed beneath an elevated platform to remove the shadows that might attract unwanted nesting.

Electric Deterrent Wires

Figure 11. Electrified deterrent wire placed along the perimeter walls and pen partitions.

Electric deterrent wires, where they are permitted, can be an important tool to prevent floor eggs. Deterrent wires should be positioned to keep birds away from the walls and pen partitions, and out of the corners. Activate deterrent wires as soon as the flock is transferred to the laying facility. Deterrent wires are especially effective during the nest training period and may be turned off after the hens are consistently using the nests (Figure 11).

Nest Usage

Figure 12. Placing partitions (false walls) between the nests can reduce overcrowding in corner and end of the line nests.

Calculations for nest space assumes that all nests will be used by the flock. Often this does not occur and only a percentage of the total nests are used by the hens. When this occurs, partition the flock into smaller bird groups to force more uniform bird distribution. Hens may prefer corner and end of the line nests, causing overcrowding in these nests. Placing false walls between the nests might alleviate the crowding in these areas (Figure 12).

Egg Collection

The majority of eggs are laid 1–5 hours after the house lights are turned on. This corresponds to the time of peak nest occupancy (6,7,8 and 9). Egg collection should begin after the majority of the hens have gone to the nests. To avoid disturbing nesting hens, the egg belts should not be run during the time of peak egg laying. If it is necessary to run the egg belts, do so at a low speed to reduce the noise and vibration of the equipment.

Litter

Litter is an attractive nesting material for hens and encourages nest building behaviour. When using litter on floors, the depth should be less than 5 cm (2 in) to discourage nesting in the litter. Build up to this level gradually with minimal depth during nest training. Periodically rake the litter to prevent areas of deep litter, where hens might be attracted to lay eggs.

Ventilation

Poor ventilation can contribute to hens rejecting a nest site. Nests located near fans or facing air inlets might become too drafty and cold. Tunnel ventilated houses during the summer season may not move enough air inside nests, causing them to be too hot.

Figure 13. Nests should have a staging area at the entrance to allow hens to examine the nests with easy access and sufficient space for movement.

Figure 14. Ramps make elevation changes easier and reduces crowding in front of the nests. Use ramps when the elevation change is greater than 90 cm.

NEST DESIGN

Nest Space

In automatic egg collection colony nest systems, provide 1 m^2 (10.8 ft^2) of nest floor space per 100–120 hens (83.3–

Figure 15. Ramps and landing platforms in front of the nest should be wide enough to allow two-way traffic with secure grid type floors.

100 cm/32.8–39.4 in per hen) or 40 hens per linear meter of open space at the front of the nest. For manual egg collection, nest boxes should provide one nest per six hens.

Check local regulations regarding nest space.

Nest Design

The nests should be designed to provide a safe and comfortable environment with easy access. The perches and landing platforms in front of nests should be easy to access and traverse (Figure 13). If hens have to jump to access the nests, the vertical height is ideally 65 cm (25.6 in), but not exceeding 90 cm (35.4 in) (Figure 14).

Use ramps and broad landing platforms to provide easy access to elevated nests (Figure 15). Hens made fewer balance movements with 60 cm (23.6 in) width platforms compared to 30 cm (11.8 in) platforms, with less aggressive behaviour between hens. Hens prefer a grid floor platform to wooden slats (6).

Commercial automatic egg collection group nests used in cage-free facilities are common. Typically, each nest has a floor surface area ranging from 0.5 to 1.8 m2 (5.4 to 19.4 ft2), with a relatively constant depth of 0.5–0.6 m (1.6–1.97 ft) and a width of up to 3 m (9.84 ft).

Hens show a preference for smaller group nests (0.72 m/2.36 ft width x 0.6 m/1.97 ft depth) compared to larger nests (1.44 m/4.72 ft width x 0.6 m/1.97 ft depth), based on more eggs laid in the smaller nest with fewer nest visits per egg (9). Hens prefer group nests with non transparent flaps covering the nest entrance compared to open nests. Nest flaps cut into strips are preferred over nests with one whole flap (12).

Slope of Nest Floor

In automatic colony nests, the nest floor is sloped to allow the rapid roll-out of eggs from the nest onto the egg belt. Nest floors that are excessively sloped may not be comfortable, causing hens to seek alternative nesting sites outside of the system. Commercial colony nests with automatic egg collection generally provide nest floors with 12% to 18% slope. This range is widely accepted by laying hens, but there may be a hen preference for 12% compared to 18% (11).

Nest Floor Mats

Clean and sanitize nest floor mats between flocks. Replace worn nest floor mats to keep nests comfortable for the nesting hens. Good nest floor mats ensure that eggs are gently rolling out of the nest onto the egg belt (Figure 16). Worn mats cause eggs to be retained in the nests and allow hens to sit on eggs, resulting in more cracked eggs and more aggression toward new entrants.

Figure 16. Attributes of a good nest floor mat.

Egg Belts

Egg belts should be cleaned regularly and, if damaged, replaced between flocks. Egg belts that have been soiled with broken eggs may give the nest an objectionable smell, causing the hens not to use the nests. In automatic nests, the brushes that hide the egg belt from view of nesting hens may become worn, revealing the moving egg belt. Hens can be disturbed by the movement of egg belts and leave the nest. Not running the egg belts during the peak egg laying times can mitigate this problem.

LIGHTING PROGRAM

Distribution of Light

Place lights to eliminate any shadows in the activity, feeding and drinking areas in the bird's environment. One or two rows of lights positioned in an alternating pattern usually creates the most uniform light distribution. Use a light source that produces diffused light and does not create

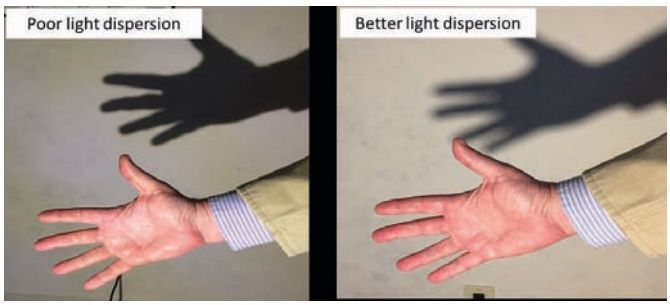

Figure 17. Some LED light sources produce light that is directional, creating sharp shadows which may attach unwanted nesting. Select light sources that produces diffuse light to reduce these shadows.

shadows. Some LED light sources produce directional light that produces sharp areas of shadow under feeders, water lines, and in corners (Figure 17). The brightest area in the house should be in the activity area where birds eat, drink and rest. The entrance to nests should be well-lit, but not brighter than the activity area. The inside of the nests should be dark, preferably less than 0.5 lux (Figure 18).

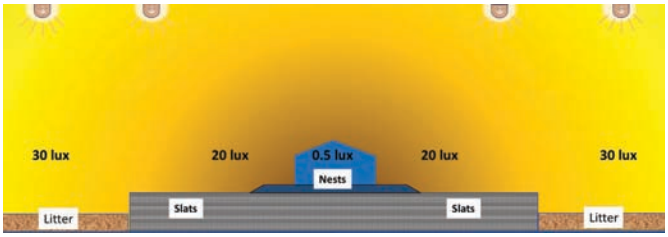

Figure 18. Light intensity should be highest over litter and slats, and lower near the nests.

Simulation of Dawn and Dusk

In aviary systems, the house lights are typically stepped / sequenced to draw the birds up onto the system at night. Any birds that remain on the floor should be lifted and manually placed in the system. Not permitting hens to spend the night on the floor can reduce floor eggs.

Nest Lights

String LED lights placed inside automatic colony nests can be used to attract hens to the nests in the morning. Nest lights are typically turned on one hour before and turned off one hour after the house lights come on. Nest lighting can be especially effective during the nest training period. Nest lights can be discontinued after the hens are consistently using the nests.

Timing of Lights-on

If floor eggs are encountered, it is important to determine what time of day they are being laid. In houses that are not fully light-proof, the outside light, particularly in summer months, may cause birds to lay before house lights are switched on. In this instance, house lights should be programmed to come on earlier.

FEEDING CONSIDERATIONS

Feeding Schedule

Schedule the automatic feeder runs not to interfere with the pre-laying behaviour and egg laying of the flock. Typically, the first feeder run is timed when the house lights come on in the morning, or alternatively, just before the house lights turn on. The second feeding is after the majority of eggs have been laid. Poorly timed feeder runs can interrupt pre-laying behaviour and motivate hens to leave the nests, resulting in more floor eggs. Preferably, place all feeders on the slats when using a combination of litter (scratch) and slats.

Adjust feeder and water lines to the proper height to avoid creating obstacles for hen movement to the nests. Prevent swinging water lines that could distract nesting hens. Provide sufficient feeder space and use fast feeder run times (18 meters /min feeder) to ensure that all hens can eat simultaneously.

CONSIDERATIONS FOR BREEDING FLOCKS

In breeder flocks, eggs laid outside the nests are not suitable for hatching and cause significant economic loss. These eggs are often soiled with feces and dirt, leading to bacterial contamination of the egg and hatchery. Hatchability and chick quality are decreased if out-of-nest eggs are used for hatching.

The proper ratio of roosters to hens should be set by 16 weeks of age. See Hy-Line Parent Stock Management Guides (www.hyline.com) for the recommended ratios for each genetic variety. Too many roosters result in excessive fighting as they establish territories and compete for females. This can lead to males acting aggressively toward females and disrupting their normal nesting behaviour. Roosters may attempt to "corral" hens, blocking their movement to the nests.

Low-ranking males often hide inside the nests to avoid persecution by dominant males. The presence of males inside the nests may result in females refusing to use these nests. Low ranking males without tail feathers, small combs, or appearing pecked and underweight should be continuously culled from the flock.

SUMMARY

Nesting behaviours are habituated in the hen soon after egg production begins and, once established, become difficult to change. Manage the flock to provide positive early nesting experiences, leading to good nesting behaviours. Eliminate obstacles, interruptions, and negative experiences that might cause hens to lay out-of-nest eggs.

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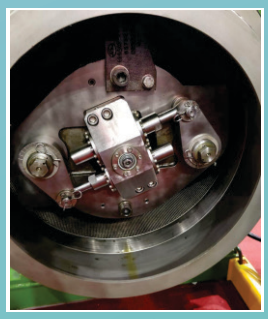

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Electrolytes through Feed: A Preferred Approach

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Highlight Points

High temperature is a major limitation to growth and meat yield of broilers in tropical countries of the world. Reduced feed intake, growth rate, feed conversion, survivability, dressing yield, breast meat and total meat and increased abdominal fat are the immediate consequences of rearing broilers in a hot humid environment. In layers, heat stress significantly affects feed intake, egg production and egg shell quality. This situation demands an economic and efficient means to improve the thermo-tolerance of broilers in hot humid environment. Electrolytes play a crucial role in maintaining body's acid-base balance as well as osmotic pressure in body fluids. Electrolytes also help in retaining water inside the body.

High temperature is a major limitation to growth and meat yield of broilers in tropical countries of the world. Reduced feed intake, growth rate, feed conversion, survivability, dressing yield, breast meat and total meat and increased abdominal fat are the immediate consequences of rearing broilers in a hot humid environment (Geraert, 1998). In layers, heat stress significantly affects feed intake, egg production and egg shell quality. Deposition of calcium and pigments in the shell are also reported to get reduced due to heat stress. Depleted performance and decreased profitability are aggravated when high temperature is associated with high relative humidity. This situation demands an economic and efficient means to improve the thermo-tolerance of broilers in hot humid environment.

Electrolytes play a crucial role in maintaining body's acid-base balance as well as osmotic pressure in body fluids. The role of each individual component present in electrolyte supplement is difficult to define without taking into consideration the rest of the elements. The biological role of all these elements in normal metabolism during production of poultry is essential. Disturbances in their metabolism can result in toxicity. However, a combination of relevant quality control programs in the animal feed industry, as well as the adequate education, nutritionists can significantly reduce the risks associated with the appearance of electrolytic imbalance and toxicities.

While requirements for electrolytes have been clearly defined, there is currently an understanding of the need to achieve a balance between cation and anion supply (Leeson and Summers, 2001). The balance of dietary cations and anions is in close relationship with broiler performance, affecting the metabolism quite differently than the individual ions. Dietary electrolyte balance (DEB), also known as cation-anion difference (CAD), is calculated using only the monovalent ions (strong ions) of sodium, potassium and chlorine.

Electrolyte imbalance is quite rare in comfortable weather conditions, since body's buffering system provides maintenance of normal physiological pH value. The maintenance of this value is determined by three major factors – balance and ratio of electrolytes in feed, endogenous acid production and level of renal activity.

Some examples of electrolyte imbalance include Tibial dyschondroplasia and respiratory alkalosis. Tibial dyschondroplasia in chicks can occur as the consequence of electrolytic misbalance. The condition is associated with a range of factors including administration of NH_4Cl in feed production (Leeson and Summers, 2001).

Respiratory alkalosis occurs at high temperatures consequent to excessive loss of carbon-dioxide induced by panting. The condition can result in poor growth rate in meat industry and poor quality of eggshell that quite often affects highly-productive laying hens. Acid-base balance substantially affects the process of eggshell formation. The acid-base status of the intrauterine extracellular fluid strongly affects calcium solubility (precipitation).

Electrolyte balance can affect the metabolism of numerous amino acids, especially lysine and methionine. It is well established that deficit of potassium in feed induces increased lysine accumulation in tissues. The accumulation rate correlates with potassium level. Such conditions of potassium deficiency result in decreased growth rate in chicks. High levels of sodium chloride, regardless of amino-acid balance, negatively affect the growth rate in poultry (Leeson and Summers, 2001).

Feed formulations with low electrolyte balance in hot summer strongly require electrolyte supplementation.

Electrolyte imbalance can be prevented by adding an appropriate electrolyte product and simultaneously balancing anion and cation ratio in poultry feed formulations. Electrolyte product should be sufficiently rich and at the same time it should not disturb the predetermined dietary electrolyte balance of the feed.

Supplementing electrolytes through feed is a good strategy especially in integration models, rather than adding through water at the farm level, which is difficult to control and monitor. Providing electrolytes through water during summer season (which could be about 5-6 months long), especially in the Indian subcontinent, requires an extra effort and constant attention. Not only this, there is a continuous flushing of fresh cool drinking water in farms in summer months which makes electrolyte supplementation at appropriate times consistently through water, a daunting task.

Adding a properly balanced and sufficiently rich electrolyte product into the feed, throughout the summer season, is the best way to ensure that there is sufficient level of electrolytes present in the bird's body all the time. This maintains a uniform level of electrolytes in the blood and body fluids continuously. An adequate regular supply of ions makes up the continuous loss of electrolytes happening due to heat stress. This also maintains a normal acid-base balance between extra-cellular and intra-cellular fluids.

Electrolytes also help in retaining water inside the body. Birds are able to maintain an optimum level of hydration throughout the season as there is sufficient electrolyte present in body fluids. With this strategy, not only a sustained hydration but also an optimum performance can be maintained during the hot weather. Farmers as well as integrators, both can be rest assured that birds are getting necessary supplementation of electrolytes continuously, without putting any extra effort.

Avilyte-FS, an electrolyte product from Avitech, a unique rehydration formula designed by the nutritionists is specially meant for supplementation through feed. Avilyte-FS is the only product, containing all the ions in monovalent form, which provides the birds a faster rehydration and a swift recovery. Avilyte-FS is a zero-ionic balance formula, which means it does not affect DEB of the feed, and at the same time provides required levels of electrolytes to the birds. ■

Main Causes of Changes in Liver Coloration in Poultry

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Highlight Points

In many poultry markets around the world where chicken viscera are commonly sold in supermarkets, the appearance of the liver is very important for marketing purposes. Customers have a tendency to associate the health status of the birds with the color of the livers displayed in the shelves in stores. If the organ looks pale, yellow or congested, it is generally assumed that something went wrong in the farm and that the animal got sick before being slaughtered. In our case, we frequently visit slaughterhouses to identify the origin of these changes. Anatomically, the main structural unit that conforms the liver are microscopic cells called hepatocytes. When hepatocytes are loaded with fat or pigments, as a consequence of some of the elements that we are going to describe in this article, some changes in color will be observed. The main factors involved with coloration changes in young and adult commercial birds are the following: physiological, nutritional, ingestion of toxic substances, and/or management-related practices before slaughtering.

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Physiological changes

During the first week of life, young chickens and turkeys normally have large amounts of fat and pigments (carotenoids) deposited in the liver as a result of the mobilization of the yolk content through the intestines. At this stage, it is normal to detect fat vacuoles (microscopic fat deposits) inside the hepatocytes. The yellow color present at birth can last several days, while the fat/pigments are mobilized from the liver to other parts of the body. Usually, after approximately seven days of age, the liver of a normal bird will show a mahogany-brown coloration. In adult birds, hens, the amount of fat in the liver increases before the point of lay because of the effect of estrogens, hormones present in higher levels once maturity is reached. Usually, most laying hens in a flock will show a pale brown or yellowish liver because all the fat and pigments transported from the liver to the oviduct to form the yolk of the eggs (picture 1). Histopathology is a very important tool that can be used to establish a differential diagnosis when livers appear yellow or pale. It will allow the differentiation between the microscopic damage produced by physiological changes or intoxication with mycotoxins such as Aflatoxin, T2 toxin and/or Fumonisin.

Nutritional deficiency or imbalance

- **Fatty liver and kidney syndrome (FLKS) associated with biotin deficiency:** Gross lesions include the presence of pale, blotchy and enlarged livers and kidneys with some mortality, usually below 10%. Microscopically, fat infiltration is widespread in different organs. It has been mainly reported in broilers and pullets (layer-type) during the first 4 weeks of life. However older flocks can show the condition.
- **Fatty liver and hemorrhagic syndrome (FLHS):** Characterized by yellowish, enlarged livers engorged with fat. The presence of hemorrhage in the abdominal cavity is typical but not always present. This syndrome is a metabolic disorder of hens as a consequence of a nutritional imbalance (energy/protein). Feeding low protein-high energy diets or a ration containing an

amino acid imbalance or deficiency, can be responsible for the syndrome. It has been well established that feeds with low levels of lipotropic factors, such as choline, methionine and vitamin B12, can result in fatty infiltration of the liver. Microscopically, the presence of vacuoles inside the hepatocytes of laying hens are normal. Hepatocellular fatty vacuolation (microscopic holes or blank spaces in the liver) or degeneration of hepatocytes refers to the excessive accumulation of globules of triglycerides and other lipid metabolites within the cytoplasm. Hepatocytes overloaded with lipids will produce necrosis. In commercial conditions, around 45 weeks of age, healthy flocks will include some hens affected by FLHS. This doesn't mean that the whole flock is showing the syndrome. The pale and yellow color of the liver, while characteristic, is not always specific to FLHS, since normal layers that are fed appreciable quantities of yellow corn or high levels of xanthophyll tend to show this coloration. Frequently, we are asked how to differentiate FLKS from an intoxication with mycotoxins. In the latter case, hens show a yellow liver with petechial hemorrhages without excessive abdominal fat deposits. If the syndrome is the result of a metabolic disorder, the abdomen will contain thicker pads of fat in the cavity. This is just a clinical observation that is not necessarily always present in field cases.

Toxic substances

Toxins as mycotoxins, heavy metals and some poisonous plants can have a serious effect on the physiological performance of the liver. Aflatoxin, one of the most toxic mycotoxins identified in nature, can cause fatty vacuolation and hepatocyte necrosis. Also, bile duct epithelial hyperplasia and fibrosis can be detected. It is important to point out that Aflatoxin will affect the mitochondrial and protein synthesis capacity of the liver, which means that the organ will not be able to manufacture critical substances normally secreted by the body. Mycotoxins such as T2 toxin can also damage the hepatocytes causing hemorrhage and necrosis. The presence of pale bile content (bilis) is associated with Aflatoxin because of a reduction in amylase, lipase and biliary salts production by the liver. The final result is the presence of excessive levels of fat in feces (steatorrhea), which is difficult to detect grossly because chicken excrete urine and feces together through the cloaca. The bile also contains amylase, which aids in the digestion of carbohydrates as well as activation of the pancreatic lipase. Regarding the effect of Fumonisin in the liver, we must emphasize that even though the performance (gain weight, feed conversion, etc.) of the flock could be affected, this toxin does not cause distinctive macroscopic changes in the liver, even when 100 ppm of Fumonisin were added experimentally to the diet in a scientific trial. Macroscopically (gross appearance), only certain degree of paleness has been reported. The damage to the liver is established by measuring the concentration of metabolites (biomarkers) of sphingolipids (sphinganine/sphingosine) in the blood and a reduction in the concentration of protein in the blood. Microscopically, some scientific papers have reported hyperplasia of the bile ducts, as is reported in cases of aflatoxicosis.

Management practices

- **Fasting before slaughtering**

This is a factor that is more important and common in broilers because of the traditional management practices followed in this type of birds. Generally, the access to feed is interrupted for approximately 12 hours before broilers are slaughtered with the objective of reducing fecal excretion to avoid cross contamination during transportation and the possibility of fecal contamination of the carcass during automated evisceration in the slaughterhouses. One of the consequences of fasting is the presence of changes in the color of the liver. Scientific reports have shown that full-fed broilers have lighter liver colors because of higher lipid content. Broilers fasted for 12 hours show darker livers because of lower levels of fat inside the organ. Other reports talk about the importance of deposits of glycogen in the liver and its effect of these element in the coloration of the liver is somewhat controversial. Glycogen is a very large form of glucose that can be broken down to yield glucose molecules when the bird needs it.

Normal liver (yellowish, pale) in a laying hen to the right and a dark brown liver of an out of production hen to the left.

- **Post mortem evaluation**

The gross appearance of the liver depends on the amount and distribution of blood inside the organ. When a chicken is bled before euthanasia by cutting the blood vessel located in the neck, jugular vein, the organ will look paler because there is less blood deposited inside the organ. On the contrary, if the chicken is not bled, the liver's appearance will be darker. These details make it more difficult to determine if the changes in color are the result of antemortem congestion or hyperemia. Once the livers are taken out of the abdomen and mixed with ice, you should notice that they look paler than when kept at room temperature.

Liver of a 46-week-old brown layer fed a diet experimentally contaminated with 3 ppm of Aflatoxin for 41 days. Notice the presence of petechial hemorrhages in the surface of the liver and the lack of fat deposits in the abdominal cavity.

In conclusion, there are many factors that must be taken into consideration when evaluating the cause of pale or yellow livers in broilers, pullets or hens. In many cases determining the etiologies of these changes are critical to maintain a high performance in some commercial flocks. ■

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