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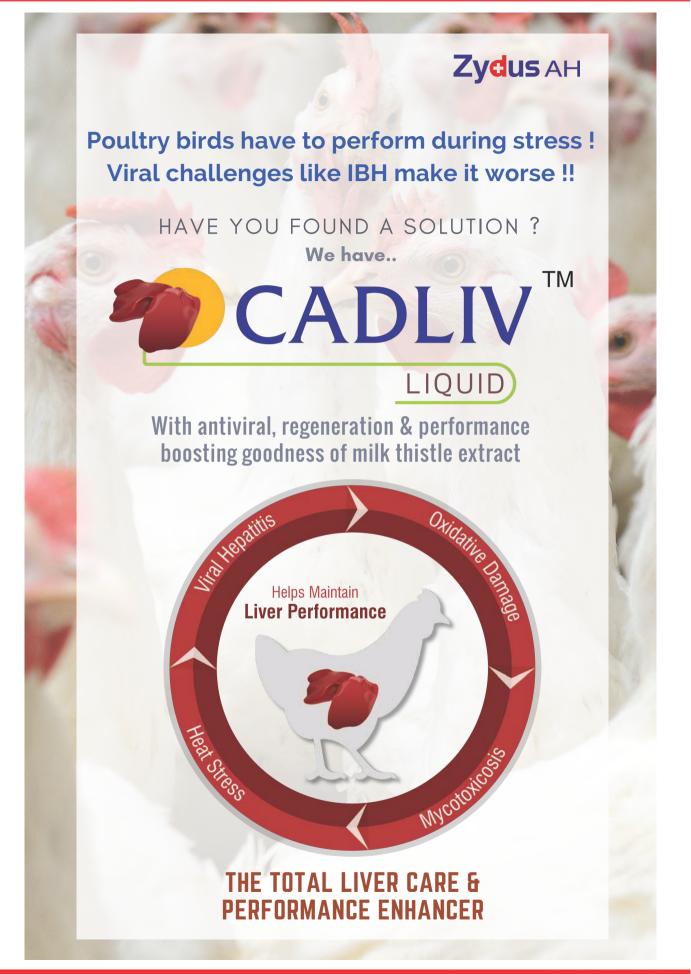
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### **Poultry Fortune**



### **Poultry Fortune**

**English Monthly Magazine** (Established in May 1991) Volume 20 Number 07 February 2019 Editor & Publisher M. A. Nazeer

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- Editor



### CONTENTS

#### 11. From the Editor...

#### News:

- 12 With Completion of Neovia Acquisition, ADM Creates Premier Global Leader in Animal Nutrition.
- Dr G. Gopal Reddy nominated as Member 14. of Research Advisory Committee of ICAR - NIANP, Bangalore.
- 14 Zydus Animal Health receives Best company in India /Middle East / Africa.
- 14. Krishi Unnati Mela in Delhi on Feb 25 -Mar 5
- 16 High Feed Prices to affect Profit Margins of Poultry Farms in India.
- Maharashtra: Online portal for rural 16. women to sell eggs
- Authorities Order Culling of Poultry 18. Birds in India's Bihar following Bird Flu Outbreak.
- 18. Retailers Must Pay Poultry Producers by Weight – IFA.
- 18. Aviagen EMEA School Adds New Subject Matter to 2019 Prospectus.
- 20. Cargill survey shows young generation wants connection to agriculture.
- 22. NatureForm appoints Rory Harman as new Regional Sales Manager for North America.
- 22. ICAR- DPR participates in Mahapashudan Expo at Jalna, Maharashtra.
- 24. Poultry industry can create 30,000 new jobs, says organization.
- 24. Pas Reform appoints new Sales Director.
- TEC-IVRI, Pune organises training 26. on "Poultry Farming for Livelihood Improvement".
- 29 Mumbai hosting India International Poultry Expo on October 22 - 24

#### Articles:

- Mortality composting the right way: Tips 32. for poultry producers.
- Summer Stress Management in Poultry. 36.
- 40. Enzymes, Feed Additives and Non Additives in Feed Production.

### ADVERTISERS'INDEX

$\sim$	
A.P. Poultry Equipments	51
Alltech India	51 6 7 43 13
Aviagen India Ltd	7
B.V. Bio-Crop Pvt Ltd	43
Boehringer Ingelheim India Pvt Ltd	13
	•
EW Nutrition India Pvt Ltd	39 8 2
Guangzhou Tinder Industry Co. Ltd	2
Hindustan Animal Care Pvt Ltd	35
India International Poultry Expo 2019	28 & 30
Indian Herbs Specialities P. Ltd	33
Indovax Pvt Ltd	31
Jiangsu Liangyou Zhengda Co. Ltd	28 & 30 33 31 19
Kemin Industries South Asia Pvt Ltd	BC
Lemmens Shardlow	15
Nigeria Intl Poultry & Livestock Expo	37
Perstorp Chemicals India Pvt Ltd	FC
Poultry India (IPEMA)	52-53
Phileo Lesaffre	17
Provet Pharma Pvt Ltd	47
Provimi Animal Nutrition India Pvt Ltd	21
Royal Agro Farm	45
Sanzyme Biologics Pvt Ltd	25
Skov Asia Ltd	27
Srinivasa Farms Pvt Ltd	10
Swastik Plast	20
Team Agrovtech Pvt Ltd	23
Trouw Nutrition	55
Venky's (India) Pvt Ltd	54
Ventri Biologicals	3
Vibrant Remedies (I) Pvt Ltd	49
Zhanjiang Hengrun Machinery Co Ltd	45 25 27 10 20 23 55 54 3 49 4 41 5
Zoetis India Ltd	41
Zydus Animal Health Ltd	5

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### High Feed Prices affecting Profit Margins of Farmers



Dear Readers,

The February 2019 issue of *Poultry Fortune* is in your hands. After a long time, I visited Venkateshwara Hatcheries Group Corporate Office at Pune on February

2nd and first the impression I got is that the corporate office building is very well maintained even after 30 years of its construction.

I also found people are busy with their works and the visitors. When B.V. Rao passed away in 1996, there were worries in the industry on the future of Asia's No 1 Poultry company, VH Group, but year after year the company is growing and becoming stronger thanks to the professionalism brought into the company by the Chairperson Ms Anuradha J. Desai. I think other competitor companies are also taking motivation at the way VH Group further establishing its group activities in the country. Zonal working system is being organized well in the Group in the nation with responsible senior executives taking charge. I think the people in the company are working as per the vision of B.V. Rao for VHPL growth.

#### \*\*\*\*

In the News section, you may find news about: Poultry farmers in India are facing pressure on their profit margins due to sharp increase in feed prices and their inability to pass them on to the consumers, despite a peak demand season.

In a pilot programme, which will be launched in Palghar and Dhule districts, the Maharashtra state Women and Child Development (WCD) department has encouraged self-help groups (SHG) and women with small poultry farms to sell their produce to the village centers, from where eggs will be sold through an online portal that will be handled by the state government.

The Irish Farmers' Association (IFA) has called on retailers to pay poultry producers by the weight of the produce, rather than by classification. The Association claims that the current system, whereby producers are paid a set rate depending on the size classification of

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Reception area of V.H. Group Corporate Office

the chicken – small, medium or large – works to the advantage of retailers, and means that the producer loses out.

The local government in India's eastern state of Bihar ordered culling of over 15,000 poultry birds following confirmation of bird flu as per officials. The orders were given by department of animal husbandry in Munger district, about 179 kms east of Patna, the capital city of Bihar.

A recent report by Cargill showed that young people around the world want to connect with farm life. In its latest Feed4Thought survey, Cargill found that twice as many young respondents aged 18 to 34 in the US and China reported knowing a livestock or seafood farmer compared to those over 55 with similar trends in Mexico and France. The survey also found that 81 percent of 18 to 34 years old Chinese participants visited a livestock or seafood farm during their lifetime, compared to 50 percent of their older surveyors.

Training and Education Centre of ICAR-IVRI, Pune in collaboration with State Animal Husbandry Department, Govt. of Maharashtra organized a training programme for tribal farmers on "Poultry farming for livelihood improvement" recently at Bhagdari tribal village in Akkalkuwa Taluq of Nandurbar district, Maharashtra under Tribal Sub-plan Programme.

Readers are invited to send their views and comments on the news and articles published in Poultry Fortune and they would be published. under "Readers Column".

M.A.Nazeer Editor & Publisher 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.

**Send a letter:** Letters to the Editor must include writer's full name, address and personal telephone and mobile numbers. Letters may be edited for purposes of clarity and space. Letters should be addressed to the Editor:

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### With Completion of Neovia Acquisition, ADM Creates Premier Global Leader in Animal Nutrition

Combined Animal Nutrition business one of the largest in the world, with estimated sales of \$3.5 billion, and full range of animal nutrition products and solutions for customers globally.

Chicago: Archer Daniels Midland Company (NYSE: ADM) announced recently that it has successfully completed its €1.544 billion acquisition of Neovia, creating a global leader in value added products and solutions for both production and companion animals.

"The addition of Neovia represents a major milestone in the execution of our strategic plan to become a global leader in nutrition," said ADM Chairman and CEO Juan Luciano. "This acquisition - our largest since we added WILD Flavors in 2014 — instantly creates a premier global leader in animal nutrition, while simultaneously providing a strong platform for future growth. It meets our returns objectives, expands our geographic reach, and helps us continue to expand our portfolio and better serve our customers."

ADM's acquisition of WILD Flavors in 2014 kicked off the most extensive portfolio transformation in the company's 115-year history, significantly expanding its human and animal nutrition capabilities. In the animal health and nutrition space, the company has made a series of expansions and investments in recent years, including:

 Building and renovating three specialty animal nutrition plants in China and four plants in the U.S.; • Acquiring pet treat manufacturer Crosswind Industries;



- Expanding pet food ingredient manufacturing capabilities in North America
- Investing in state-of-theart value added complete feed manufacturing facilities in North America
- Entering into a partnership with China-based Qingdao Vland Biotech Group and building a cuttingedge research lab in California to develop and commercialize animal feed enzymes; and
- Purchasing Protexin, a leading provider of probiotic supplements for human wellness as well as a variety of animal markets, including aquaculture, equine, livestock and companion animals.

Now, with the addition of Neovia, ADM Animal Nutrition spans the globe, offering premixes, complete feed, ingredients, pet care solutions, aquaculture, additives and amino acids to our customers.

"The acquisition of Neovia marks an important new chapter for ADM Animal Nutrition," said Pierre Duprat, president, ADM

Animal Nutrition. "I have been fortunate enough to meet with talented colleagues from Neovia over the last six months, and I am excited about the global platform this combination of our existing capabilities and Neovia has created to serve our customers and accelerate our growth. Combining our resources, expertise, innovation and researchdriven technologies creates something very special: the premier global provider of animal nutrition ingredients and solutions, best-inclass customer service and leading R&D capabilities for our animal nutrition customers across the globe and creating value for our shareholders."

#### Forward-Looking Statements

Some of the above statements constitute forward-looking statements. ADM's filings with the SEC provide detailed information on such statements and risks, and should be consulted along with this release. To the extent permitted under applicable law, ADM assumes no obligation to update any forward-looking statements.

#### About ADM Nutrition

ADM is a world-leading nutrition company with the widest range of specialty ingredients, blends, systems and experience. We move customers from concept to launch faster with sustainable, differentiated products that address their evolving needs. ADM helps our customers create consumer preferred nutritional solutions through our on-trend and customizable portfolio of natural flavors and colors; an unmatched range of plant-based proteins; industry-leading, sciencebacked bioactives; as well as specialty ingredients such as hydrocolloids, lecithin, Omega-3 solutions, probiotics, polyols, texturants, soluble fibers and much more. Our talented team also provides consumer insights and intelligence; sensory expertise; culinary creativity; and full productdevelopment services.

#### About ADM

For more than a century, the people of Archer Daniels Midland Company (NYSE: ADM) have transformed crops into products that serve the vital needs of a growing world. Today, we're one of the world's largest agricultural processors and food ingredient providers, with approximately 31,000 employees serving customers in more than 170 countries. With a global value chain that includes approximately 500 crop procurement locations, 270 food and feed ingredient manufacturing facilities, 44 innovation centers and the world's premier crop transportation network, we connect the harvest to the home, making products for food, animal feed, industrial and energy uses. Learn more at www.adm.com.

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### Dr G. Gopal Reddy nominated as Member of Research Advisory Committee of ICAR – NIANP, Bangalore

Bangalore: Dr G. Gopal Reddy, A well noted veterinarian in India has been nominated as member of the newly constituted **Research Advisory** Committee of ICAR – NIANP (National Institute of Animal Nutrition & Physiology) -Govt of india, for a period of 3 years w.e.f 30th Nov 2018. His role will be a bridge between Poultry Sector, Academia and ICAR to integrate and align the research agenda to be taken up by the scientific community, informed Inayath Ulla Khan.

Dr Gopal Reddy pursued his Bachelor degree in Veterinary Sciences from the University of Veterinary Sciences, Bangalore in the year 1990, and Diploma in Business Management from University of Dublin, Ireland. He has served many poultry companies at various levels. He has also served KPFBA being Executive Secretary in the year 2014 and currently he is the Vice President of



IVPI [Institute of Veterinary Professionals of India]. Dr G. Gopal Reddy is now working as Vice-President for Lexington Enterprises Pte Ltd, Singapore. Dr G. G. Reddy's success

came through on his continuous communication with poultry fraternity and hence he sincerely seeks deep insights regularly in order to take them forward with the Research Advisory Committee of ICAR – NIANP for further course of action. You may write to him on gopalreddy374@gmail.com with your valuable inputs. Let's wish Dr G Gopal Reddy all the very best in his new endeavor.

### Zydus Animal Health receives Best company in India /Middle East / Africa

Ahmedabad: Once again Zydus Animal Health has retained its crown in 2018 for the Animal Pharm Award- "Best Company in India, Middle East, Africa. It has been the 3rd Animal Pharm Award in the last 4 years. Earlier, Zydus had also received3 national awards for being the Best Poultry Company & the Best Animal Pharma Company.

Zydus Animal Health (Zydus AH), a division of Cadila Healthcare Ltd is headquartered at Ahmedabad, India. Zydus AH is one of the leading players in the Indian veterinary formulations market having the most comprehensive range of products in all major therapeutic segments to cater to the varied demand of Large & Small Ruminants, Poultry, Pigs, Equines and Companion Animals.

Zydus maintains highest standards in its product offerings and ensures innovative solutions through continued improvement in its operations. A wide range of capabilities have helped Zydus Animal Health to create a robust manufacturing infrastructure. The firm has a state-of-the-art WHO-GMP compliant plant in Haridwar for manufacturing powders, tablets, liquid and injectables. Recently, the plant has cleared the audit of Saudi Arabia regulatory authority.

Zydus' dedicated probiotic



Dr Arun Atrey, Head, Zydus AH

manufacturing plant at Ahmedabad is also expanding its reach to cater for Indian and international veterinary probiotic markets.

Backed by Pharmaceutical Technology Centre of Zydus with more than 400 scientists, Zydus AH has an unmatched record of introducing large number of new products for the first time in the country. In 2018, Zydus introduced six new products to strengthen its food animal portfolio. The company received Indian approval for two poultry vaccines, as well as 26 marketing authorizations from south-east Asia, Africa and the Middle East.

The company keeps on exploring newer opportunities to expand its market reach year after year and has current turnover in excess of INR 500 Crore. Going forward, export will be a major growth driver for Zydus.

### Krishi Unnati Mela in Delhi on Feb 25 – Mar 5

**Delhi:** KRISHI UNNATI MELA-2019 is going to be held from February 25 to March 05, 2019 at Mela Ground, IARI, Pusa, New Delhi which shall be inaugurated by Prime Minister of India. The visiting delegates will include various union ministers and other such VIP dignitaries, informed a note from Poultry Federation of India. **Venue:** Mela Ground, IARI, PUSA, New Delhi

**Date:** February 25 to March 05, 2019

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### High Feed Prices to affect Profit Margins of Poultry Farms in India

Overall increase in raw material cost has raised the cost of production of broiler chicken to Rs 80 a kg

Poultry farms in India are facing pressure on their profit margins due to a sharp increase in feed prices and their inability to pass them on to the consumers, despite a peak demand season.

The scenario has changed in the sector over the last two months. The government's effort to protect farmers through sustained increase in the minimum support prices (MSP) has seen a rise in prices of maize and soybean. The two are used as feeds, and take up half the cost of chicken and eggs.

Maize prices have jumped 21 per cent in the last two months to Rs 2,000 a quintal due to crop losses owing to deficient rainfalls in Andhra Pradesh and Karnataka, and pest attacks in other parts of the country. Thus, poultry farmers have to pay around Rs 2,000 a quintal compared to Rs 1,450-1,500 a quintal last year. The government raised the MSP by 19 per cent to Rs 1,700 a quintal this year. Soybean prices rose 16 per cent to hit a five-year high at Rs 3,964 a guintal. This is attributed to a continuous hike in the MSP, which was raised by 11 per cent to Rs 3,399 a quintal this year.

"Owing to the feed price increase, the cost of eggs and broiler chicken production has gone up

by 15-16 per cent in the last few months. But, prices of chicken and eggs have not gone up proportionately. In fact, prices of poultry products are flat, resulting in pressure on profit margins. If the trend continues, the industry will have to cut down production in the coming months," said K.G. Anand, General Manager, Venkateshwara Hatcheries, the producer of Venky's brand of poultry products. Despite a forecast of bumper output of 13.5 million tonnes (mt), soybean prices are moving up due to lower arrivals in mandis. Also, prices of soybean meal, another feed, have increased proportionately due to increase in bean prices.

"Feed prices have risen abnormally high in the last few months, which need to be passed on to the consumers," said Balram Yadav, Managing Director, Godrej Agrovet.

Meanwhile, the increased cost of production has not been passed on to the consumers due to the fear of consumers shifting to value-based purchase instead of volume-based ones.

"When consumers purchase poultry products, they fix a disposable amount in their mind. In case of price rise, they reduce the quantity instead of raising their budget," said Anand. Overall increase in raw material cost has raised the cost of production of broiler chicken to Rs 80 a kg. But, it is being sold at Rs 68 - 70 a kg in the north and south Indian states, and Rs 78-80 a kg in Maharashtra.

"Many farmers have already shut their shops due to viability issues. If the current trend continues, poultry farmers would be in trouble again," said Ramesh Khatri, President, Poultry Federation of India. Usually, by volume, maize forms 60-65 per cent of poultry feed, while soymeal forms 28-30 per cent, with the rest being rice bran oil, de-calcium phosphate, among others.

"Remunerative broiler realization and low feed prices had boosted profitability in the industry during FY17 and FY18. However, the profitability will moderate substantially in FY2019 due to lower realisation and a sharp increase in maize prices," said Ashish Modani, Vice-President, corporate sector ratings, ICRA.

### Maharashtra: Online portal for rural women to sell eggs

In a pilot programme, which will be launched in Palghar and Dhule districts, the state Women and Child Development (WCD) department has encouraged self-help groups (SHG) and women with small poultry farms to sell their produce to the village centres, from where eggs will be sold through an online portal that will handled by the state government.

Rural Development Minister, Pankaja Munde, said, "We hope to encourage this business model for rural women. The government will facilitate the sale through an online portal."

The portal that will sell eggs online will be launched on January 23, said R Vimla, CEO of Maharashtra State Rural Livelihoods Mission. So far, 1,200 women have been registered across the villages of Palghar and Dhule to supply eggs. The programme will be replicated in other districts gradually.

"In rural areas, people with poultry usually consume the eggs themselves and do not supply it commercially. We are channelising the surplus," Vimla said. Each village will have a collection centre, where women can sell an egg for Rs 8. The state government will supply it further for Rs 10. There are 3.5 lakh SHGs across Maharashtra that will be roped in to encourage women for taking up this business model.

The Maharashtra government is also set to put on display handicraft products, created by over 5.5 lakh rural families, in an exhibition at the MMRDA grounds in Bandra Kurla Complex between January 23 and February 4. At the exhibition, spices produced locally, traditional handicraft items, paintings and art works will be available. As many as 7,500 SHGs will be part of this exhibition.





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### Authorities Order Culling of Poultry Birds in India's Bihar following Bird Flu Outbreak

New Delhi: The local government in India's eastern state of Bihar ordered culling of over 15,000 poultry birds following confirmation of bird flu, officials said.

The orders were given by department of animal husbandry in Munger district, about 179 km east of Patna, the capital city of Bihar.

"Government has ordered culling of over 15,000 poultry birds in Munger district following confirmation of bird flu," an official in Munger said. "The animal husbandry department ordered culling of birds within one km radius of Sampatchak village in Jamalpur block of the district."

A senior government official in Munger district, Anand Sharma told media this was the second instance of bird culling in the district.

Last month, 588 poultry birds were culled at Gorho village in Asarganj block of the district.

In wake of the outbreak a

six-member federal team is visiting Patna to conduct a detailed study of bird flu and take required measures to contain its spread.

The H5N1 avian influenza in the state has so far claimed lives of 200 birds, including seven peacocks and a Khalij pheasant at the Sanjay Gandhi Biological Park, referred to as Patna zoo.

Following the deaths the zoo was closed for public on December 25.

Officials at Patna zoo said the process of immunization and disinfection was initiated inside the zoo following the deaths. However, the zoo is yet to be reopened.

Fresh samples of faecal matter of several dead avian species have been sent for tests to the National Institute of High Security Animal Diseases, Bhopal, officials said.

Meanwhile, health officials have advised people to avoid chicken and poultry products like egg as a precautionary measure in the affected district.

### Retailers Must Pay Poultry Producers by Weight – IFA

The Irish Farmers' Association (IFA) has called on retailers to pay poultry producers by the weight of the produce, rather than by classification.

The association claims that the current system, whereby producers are paid a set rate depending on the size classification of the chicken – small, medium or large – works to the advantage of retailers, and means that the producer loses out.

"The current system essentially results in retailers getting up to 200g for free on certain birds," according to Andy Boylan, the IFA's poultry chairman.

This is completely

unacceptable at a time when poultry producers are struggling with increased production costs.

Boylan argued that this practice is unfair when compared to the system of payment used in the production of other meats, which is based on the weight of the produce.

"If we look at other meats, such as beef, retailers charge customers by weight for the product. It's transparent, in that if you ask for 800g of mince, the butcher weighs it and you pay for 800g. This does not happen in poultry," said Boylan.

Boylan also said, speaking from what he claimed was personal experience, that it was "impossible" to keep a chicken consistently within a certain weight classification, which cuts the price the producer might receive.

A small chicken is classified as weighing between 1,100g and 1,300g. Retailers pay poultry producers a flat price, regardless of the weight of the bird. I know from my own facility that it's impossible to keep a bird at an exact weight of 1,100g, which means retailers often end up getting product for free.

He went on to argue that: "Chicken feed costs increased dramatically in 2018, as did energy costs, labour costs and the general cost of doing business. The retailers that ultimately sell chicken to the consumer need to recognize the true costs of sustainable production."

Boylan concluded by calling the current state of affairs an "unfair trading practice", and saying it "has to end".

### Aviagen EMEA School Adds New Subject Matter to 2019 Prospectus

Aviagen releases prospectus for 2019 Europe, Middle East and Africa (EMEA) Production Management School

EMEA Production Management School prospectus now includes Ventilation as one of six core modules.

As part of its commitment to sharing knowledge and practical poultry management skills, Aviagen runs a Europe, Middle East and Africa (EMEA) Production Management School each year. Covering a wide range of subjects, the School's six individual week-long modules focus on Breeders, Hatchery & Incubation, Broilers, Processing, Ventilation, and Nutrition. The latest additions to the School syllabus are the Nutrition and Processing Modules, plus the Ventilation module, which will be introduced in 2019 for the first time.

For further info on Module content, dates, locations and application process, spaces for each module are limited and the allocation process of these slots is handled by the regional customer support teams. Please contact your local representative or school@ aviagen.com for further details.



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### Cargill survey shows young generation wants connection to agriculture

**Minneapolis** - A recent report by Cargill showed that young people around the world want to connect with farm life.

In its latest Feed4Thought survey, Cargill found that twice as many young respondents ages 18 to 34 in the US and China reported knowing a livestock or seafood farmer compared to those over 55 – with similar trends in Mexico and France.

The survey also found that 81 percent of 18-to-34-yearold Chinese participants visited a livestock or seafood farm during their lifetime, compared to 50 percent of their older surveyors.

"We know people increasingly care about animal welfare, the healthfulness of foods and sustainability," said Marina Crocker, head of Cargill Animal Nutrition market insights. "By pairing Cargill's understanding of what our customers need with state-of-the-art analytics about what people want, we can anticipate and serve emerging consumer expectations in the solutions we provide our customers."

Fifty-two percent of younger participants also said they changed their eating habits for sustainability reasons in the past year compared to 19 percent for older US respondents. Eighty percent

of young Chinese people surveyed reported changes in their eating habits as well. More than 80 percent of total survey respondents said the way an animal is raised is important. Almost half of the respondents would also pay more as a result of different animal welfare practices. Chinese survey participants were the most open to paying a premium price at 59 percent while Americans were at 31 percent.

The data showed that US and Chinese young people were both more willing than their grandparents to pay for this type of practice.

Cargill also mentioned the rise in technology including block chain as a focus for consumers and producers to gain more information about the farm process.

"The digital revolution has arrived in agriculture," said Scott Ainslie, Vice President and group Director for Cargill's animal nutrition premix business. "This will offer our customers a completely different way of making decisions and marketing their products. For example, they could use real-time data collected from on-farm sensors to inform nutritional programs, detect heat in dairy cows or determine the best harvest date for pigs and broilers. All this improves the health, well-being and productivity of their animals."



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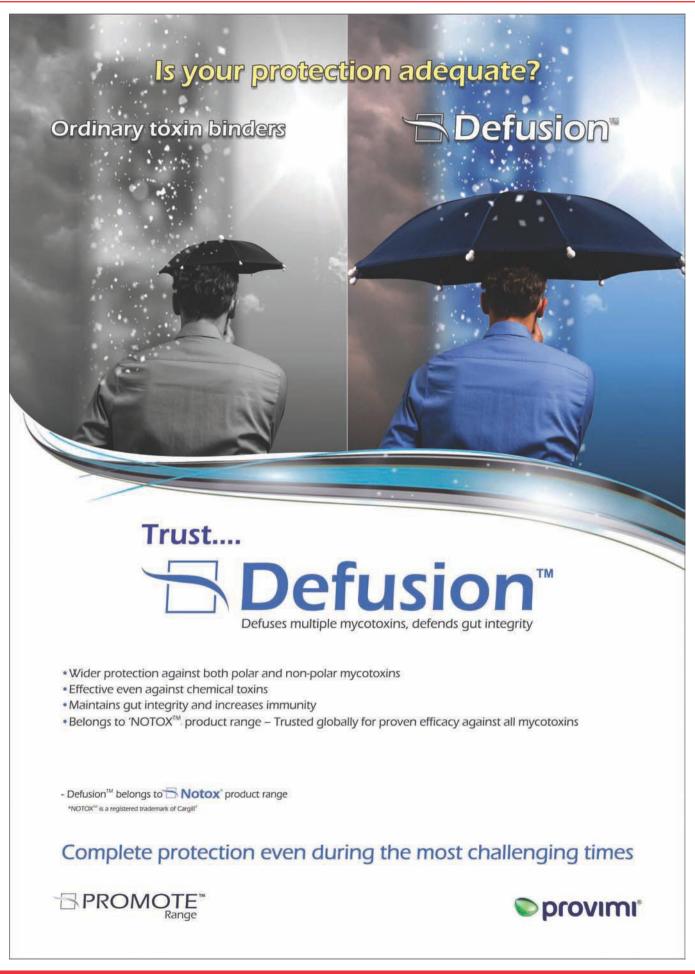
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### NatureForm appoints Rory Harman as new Regional Sales Manager for North America

As part of its continuing programme of international expansion, Pas Reform has appointed John de Rijk to the role of Sales Director. John will work with Pas

Reform's sales, project management and service teams, to provide equipment and support solutions for the growing base of hatchery customers in the UK, Ireland, Scandinavia, Israel, Greece and Francophone Africa.

John previously held positions in The Netherlands – with Noldus Information Technology, and at Stanley Healthcare Solutions, where he managed agents, distributors and customers in the Benelux, Scandinavia, Africa and the Middle East. He also has significant experience of solution selling,both in Benelux and abroad.

Commenting on his appointment, John says: "As a globally operating company with a strong focus on innovation and service, Pas Reform was



very attractive to me. I am eager to use my skills to help drive this dynamic, hard-working organisation to the position of market leader in the regions I'm now responsible for."

John reports directly to CEO Harm Langen, who says of his appointment: "We are delighted to welcome John to the team. The proven skills and experience he brings to Pas Reform will help to further build our reputation andgenerate exciting new businessopportunities."

John will be based at Pas Reform's Zeddam office and can be contacted directly on +31 6 11 184 012 or by email at derijk@pasreform.com

## JK to extend insurance cover to poultry farms

Jammu and Kashmir administration is all set to extend insurance cover to the poultry farms to encourage investment in the sector, an official spokesman said recently.

The decision to this effect was taken here at a highlevel meeting chaired by Principal Secretary Animal, Sheep and Fisheries department, Asghar Hassan Samoon.

The initiative to provide insurance cover to the poultry sector was the long pending demand of poultry entrepreneurs.

"I am hopeful that with

insurance cover, poultry entrepreneurs will feel encouraged to expand their business and increase the production of their units," Samoon said.

Stating that disease outbreaks in the poultry farms are very rare, he said insurance cover is a winwin situation for insurance companies as well as entrepreneurs.

Samoon stressed on the insurance companies to charge minimum premium from the poultry unit holders, which will act as protection against any eventuality.

He also asked them to cover maximum diseases in their

quotations.

The principal secretary asked the officers and representatives of insurance companies to fix all modalities of rolling out the scheme formally within a week.

"The aim of the initiative is not only to achieve self-sufficiency in poultry production but make Jammu and Kashmir a poultry exporting state," the principal secretary said.

Samoon directed the poultry development officers to ensure health certificates to the poultry units are issued within three days of applying.

Source: Business Standard

### ICAR- DPR participates in Mahapashudan Expo at Jalna, Maharashtra

Maharashtra: ICAR-DPR participated in Mahapashudan Expo-2019 organized by Department of Animal Husbandry, Maharashtra Government during 2 to 4 February, 2019 at Jalna, Maharashtra.

Hon'ble Minister of state for Dairy Development of Maharashtra Government, Sh. Arjun Khotkar inaugurated the exhibition on 02 February 2019. Native chicken breeds Aseel, Gaghus and Nicobari and improved chicken varieties, Vanaraja and Gramapriya, were displayed by the Directorate in the exhibition which attracted the attention of farmers and other visitors. Farmers attended the mela on each day and also visited the ICAR-DPR stall.

Farmers showed lot of interest in learning about the different chicken varieties and also feeding management for small scale or backyard poultry. Queries of the farmers regarding chicken varieties, feeding and other management aspects were answered and printed literature on the backyard varieties was provided to the farmers.

Many farmers and rural youth showed interest in adopting backyard poultry production as their livelihood. Hon'ble Minister Sh. Arjun Khotkar, Animal husbandry commissioner and other dignitaries visited the stall and appreciated the efforts being made by the Directorate for uplifting the economy and nutritional status of the resource poor farmers. Technical sessions were also organized for the benefit of farmers. Maharashtra Chief Minister Sh. Devendra Fadnavis attended the closing ceremony on 4 February 2019 evening.



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### Poultry industry can create 30,000 new jobs, says organization

SA Poultry Association says more people can be employed with the right support measures from the government and curbing of imports

If the right support measures are put in place by the government, including curbing cheap chicken imports, the SA Poultry Association (Sapa) says the sector can immediately create 30,000 new jobs.

The sector employs about 130,000 people. However, it has shed hundreds of jobs in recent years, blaming this on an influx of cheap chicken imports particularly from the EU and Brazil. Brazil is the world's largest poultry exporter.

The local industry and unions argue the EU and Brazil sell chicken meat below cost and have called on the government to intervene. But the EU and producers in the South American country have said their farmers are simply more competitive than their counterparts in SA.

Sapa recently approached the International Trade Administration Commission — the organization tasked with customs tariff investigations, trade remedies, and import and export control — calling for an increase to the ad valorem tariff on bone-in and boneless frozen chicken portions to 82% from existing levels of 37% and 12%, respectively.

Izaak Breitenbach, the newly appointed Sapa GM, said on Wednesday the biggest challenge facing the broiler industry at the end of 2018 was the impact that dumping has had on the

#### sector.

"Producers in Brazil, for instance, have financial incentives to export and there is great concern over the traceability of certain imports that are repackaged in SA, since some importers flout the legal requirements," he said. "This is an industry that is immensely competitive internationally in terms of those elements of the value chain that it can manage or influence directly."

However, SA's semi-arid climate puts pressure on local producers' competitiveness, said Breitenbach, as drought pushes up the cost of feed and grain and necessitates expensive grain imports.

"Chicken prices are established by the price of individual portions, but due to phytosanitary restrictions preventing South African producers from exporting, they are unable to participate in the lucrative EU and US markets for white breast meat, which would in turn allow them to subsidise their own 'brown' meat, as happens in other countries," he said.

"It has to be noted that it is incredibly difficult for countries with smaller chicken industries to compete with the big guns such as Brazil, the US and the EU, who all protect their own with subsidies and incentives."

Breitenbach said he is in favour of the proposed strategic and operational industry masterplan that will address transformation and place chicken on a growth trajectory, to benefit the economy through job creation and additional tax generation.

"Great strides have already been made by chicken companies in developing a successful model for empowerment of black farmers. It is essential for both small and big farmers that the macroeconomic environment is managed successfully to grow the industry; and if that were to happen the industry could expand by 30% and create 30,000 new jobs virtually immediately."

This week, the Brazilian Association of Animal Protein said the argument that SA, as a "globally efficient producer of chicken" faces profit challenges and job losses due to imports of frozen chicken, "does not sustain itself".

"Whereas one of the main reasons SA is facing difficulties is that SA poultry production has been highly affected by bird flu [pathogenic avian influenza] since 2017," the association representing Brazilian poultry exporters said.

It argued that the requested tariff-rate increase in frozen poultry products would also affect the domestic prices for SA consumers, "given that imports would be more expensive and there would be a lack of supply by SA's production".

### Pas Reform appoints new Sales Director

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### **TEC-IVRI, Pune organises** training on "Poultry Farming for Livelihood Improvement"

Pune: Training and Education Centre of ICAR-IVRI, Pune in collaboration with State Animal Husbandry Department, Govt. of Maharashtra organised a training programme for tribal farmers on "Poultry farming for livelihood improvement" on 30th January 2019 at Bhagdari tribal village in Akkalkuwa Tq of Nandurbar district (Maharashtra) under Tribal Sub-plan Programme.

A total of 93 farmers including 46 farm women of different villages of Akkalkuwa Tq, such as Bhagdari, Bijri Pati, Matth Phali, Sakali Umar, Kanjala and Molgi attended the programme. The programme was inaugurated by deputy surpanch of the village. Dr K.N. Bhilegaonkar, Station In-charge, TEC-IVRI briefed about the objectives of the training programme under TSP, and appreciated the tribal farmers for coming in large numbers and showing keen interest in the training programme.

He also thanked the State Department of Animal Husbandry as well as all the resource persons for their cooperation. Dr S.K. Das and Dr H.P. Aithal, Pr. Scientists from TEC Pune were also present.

Three Livestock **Development Officers** from the Department of Animal Husbandry namely Dr N.B. Chavan, Dr P.A. Khatke and Dr V.S. Nawale. delivered lectures on different aspects of poultry farming including prospects of poultry farming in the present scenario, housing and management, nutrition, healthcare and marketing, etc. in the local Marathi language. Video films were also shown to the farmers on different aspects of poultry farming for better understanding. Afterwards, the participants were taken to a nearby poultry farm for live demonstration. The participants showed keen interest in the training programme.

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- Diseases: Prevention & Control.
- Chicken & Egg Processing.
- Branding & Marketing of Eggs & Chicken to promote consumption.

*Note:* Knowledgeable Speakers on the subject with good communication skills are invited to contact us to make presentation in "UPDATE" on the above topics on or before 5th April 2019.

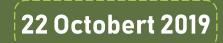
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- 12. Best Poultry Healthcare Products Manufacturer Award
- 13. Best Poultry Feed Miller Award
- 14. Best Layer Breed Award
- 15. Best Broiler Breed Award
- 16. Best Young Entrepreneur Award
- 17. Best Executive with Long Service Award
- **18. Best CEO in Poultry Industry Award**
- 19. Life Time Achievement Award

**PF International Awards** 6:30 PM to 8:00 PM

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SION-Panwel Highway, Swami Pranabananda Marg, Sector 30-A, Vashi, Navi Mumbai - 400 703, Maharashtra, India.

### Mumbai hosting India International Poultry Expo on October 22-24

Mumbai: A 3-day exhibition and conference on poultry sector titled India International Poultry Expo 2019 (IIPE 2019), will be held at Vashi, Navi Mumbai, India, on 22, 23 & 24 October 2019. The Venue for the Expo is CIDCO Exhibition & Convention Center (CECC), Vashi, Navi Mumbai, India.

The main objective of the Expo is to bring awareness among farmers and other stakeholders of Layer & Broiler sectors, and various products, technology and services available to get better yield and results. The Expo is a wonderful opportunity to poultry farmers to update their knowledge on various aspects in poultry, informed Mr M.A. Nazeer, Chief Executive, IIPE 2019 and Editor, Poultry Fortune. The event is also an opportunity for Buyers and Sellers as well in the sector. The event is being organised by Poultry Development Council of India and NRS Group. NRS Publications, publishers of Poultry Fortune, organized 10 expos on Poultry. It has also held 33 expos on Aquaculture sector so far since 1993.

Companies dealing with manufacture and supply of products and services related to poultry sector will display their products in the Expo consisting about 300 stalls. Organizations with research and development on aquaculture would also take part in it. UPDATE Knowledge on Poultry (Conference): In connection with India International Poultry Expo 2019, there is a one day Conference on October 22, where scientist and experts will make presentations on different technical and nontechnical aspects of poultry  Branding & Marketing of Eggs and Chicken to promote their consumption.

Poultry Farmers, Entrepreneurs, Scientists & Technical Personnel and other stakeholders of poultry industry are invited to participate in it.

### 11<sup>th</sup> Edition from NRS Group



### 22-23-24 October 2019 CIDCO Exhibition & Convention Center, Vashi, Mumbai, India

such as:

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- Feed & Nutrition, Biosecurity & Management.
- Diseases: Prevention and Control.
- Chicken and Egg Processing.

#### Whom its useful ?

Besides entrepreneurs of various companies of different segments of poultry sector, UPDATE is very useful for experts and technical personnel serving in Layer & Broiler Farms, Hatcheries, Feed Mills, Chicken & Egg Processing units, Nutrition & Healthcare products manufacturing units, Sales & Marketing etc. Those who want to take part as delegates in **'UPDATE Knowledge on** Poultry' are requested to register their participation soon. There are about eight valuable topics and presentations on different subjects of poultry by renowned scientists / experts and do not miss the UPDATE. Registration Fee to take part in UPDATE is Rs 5,000 (inclusive GST).

### PF International Awards 2019

We also invite companies and individuals to send their nominations for 'PF International Awards 2019'. Categories of PF International Awards are:

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- Best Poultry Scientist Award
- Best Poultry Equipment & Automation Award
- Best Poultry Healthcare Products Manufacturer Award
- Best Poultry Feed Miller Award
- Best Layer Breed Award
- Best Broiler Breed Award
- Best Young Entrepreneur Award
- Best Executive with Long Service Award
- Best CEO in Poultry Industry Award
- Life Time Achievement Award
- Last date to receive Nominations for the Awards is 20 July 2019. Category of Awards and other particulars may be seen on www.poultryfortune.com For any details / clarif ication, please contact: Mr M.A.Nazeer, Chief Executive, IIPE 2019, NRS Events, Hyderabad, India. Tel. 040-2330 3989, 70329 19554, Email: nrs.iipe@gmail.com

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### Mortality composting the right way: Tips for poultry producers

### Tom Tabler,

PhD Extension Professor Mississippi State University Extension Service, Poultry Science Department

Composting is the biological decomposition and stabilization of organic matter under controlled conditions. It's an aerobic process, meaning it requires oxygen. Microorganisms such as bacteria and fungi use organic waste - in this case, poultry mortality - as an energy source and the waste is transformed into compost, which has value as a soil amendment.

Composting daily mortality on-farm has several advantages. It helps avert the potential for groundwater pollution that, in the past, was associated with burial or disposal pit use. It avoids high fuel costs and potential air pollution associated with incineration, and it prevents potential disease spread that can occur if poultry carcasses are moved off the farm. Composting mortality is cost effective, environmentally sound and biosecure.

#### **Bigger Houses, More Mortality**

The importance of composting has taken on added significance due to changes in the poultry industry. Over the last 20 to 30 years, the number of poultry farms has continued to decrease, but the farms that remain have more houses and the houses are bigger.

In the early 1980s, when I was a broiler service technician in Arkansas, a farm with just four houses was considered huge. At that time, 40 feet by 400 feet (about 12 meters by 120 meters) was a typical size for a broiler house. Today, I work with numerous growers who have anywhere from six to 12 broiler houses on their farm. Largely due to economies of scale, bigger is considered better. A 50 foot by 500 foot (50 meters by 152 meters) house is more common, and I've been in houses as large as 66 feet by 600 feet (18 meters by 183 meters).

This increase in farm and house size potentially means more mortality to deal with in a smaller geographic area. In most cases, there isn't that much mortality, but it's continuous throughout the flock. Mortality disposal needs to be a daily management chore.

#### Follow the Recipe

For composting to be successful, the microorganisms that do all the work need the right ingredients in the right amounts to perform properly. Any elements that are lacking or in excess will cause inadequate heat production, and you'll be left with a poor composting environment.

The fact is, making good compost is a lot like baking a cake. You have to follow the recipe. The composting process

is directly affected by several factors, particularly temperature, oxygen and moisture.

The moisture level is very important and maybe most important to successful composting. Moisture in

### **Highlight Points**

Mortality disposal is critical to every poultry farm's biosecurity programme. Composting is a safe, biosecure and efficient way of managing everyday losses. However, it must be done correctly or issues can arise

the 50 percent to 60 percent range seems to work best. The process slows down if moisture is less than 40 percent. If moisture is greater than 70 percent, the compost becomes anaerobic (lacks oxygen) and the progress slows even more dramatically. That's when flies and odors become a problem. The temperature will also drop, and if it gets lower than 130°F (54°C), disease organisms may remain viable, which threatens your biosecurity programme.

#### Check the Temperature

If you are using a bin or alleyway composter, it's helpful to have a compost thermometer, which has a 3-foot probe on the end you can stick into your compost material to monitor temperature (similar to a soil moisture meter). Checking the temperature a couple of times a week gives you a pretty good idea of what's going on.

Even though they make moisture meters, I've never known anyone that used one on their composter. Most growers just develop a "feel" for how much moisture is in their compost material by monitoring the temperature. Generally if the temperature is right, the moisture level is right, and if the temperature is too low, the moisture level is too high.

One thing I've learned about composting is that it's pretty forgiving. If you mess up, you can fix it. If it's too wet, you can add extra bulking material like shavings, sawdust, litter, etc, and if it's too dry, just add water to get the moisture up to 50-60 percent. Your compost pile will start working again. Theoretically, it's possible to get compost too dry, but in my experience, it's unlikely. Everyone I've ever known that had problems failed by getting the material too wet. It gets too wet because it's not managed correctly - it's that simple. I can say that because I've composted a lot of mortality over the years, and it didn't always go the way I'd hoped.

#### **Compost in Layers**

For instance, you can't just dump a front-end loader bucket full of mortality into your compost bin, cover it with just enough material to keep mortality out of sight and call that composting. Birds need to be layered, and each layer needs to be covered with bulking material thick enough to soak up all the moisture in that layer as birds decompose.

In addition, if you're using a bin or alleyway composter, keep birds at least 6 inches from the composter wall on all sides as you fill the bin. Compost temperatures near outside walls don't get hot enough for successful composting to occur.

Adjust Bulk Material

To layer properly, you must constantly adjust the amount of bulking material used as the flock ages. There's not much water in a 2-day-old chick, so the

## 

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### Usage

- Optimize egg production in breeder & commercial eggers
- Maintain egg production during stress
- Maintain peak egg production level for a larger period
- · Helps reproductive maturity of pullets for laying on time
- · Improve productivity & hatchability in breeder birds

### Water Inclusion rate

(per 1000 birds)

10 gm concentrate powder to be given mixed in drinking water for 7-10 days or as advised by the poultry consultant.

### Presentation

10 gm & 50 gm sachets.

For Optimum Egg Production

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C-215, 2nd Floor, Elante Offices, Plot No. 178 - 178A, Industrial & Business Park Phase - 1, CHANDIGARH (U.T.) - 160002 Ph. No. +91 9023247217 ihspl@indianherbs.org bulking layer doesn't need to be as thick as it should be for a market-ready, 63-day-old broiler that weighs 9 pounds or more. If you aren't increasing the thickness of your bulking layer as birds get bigger, the compost material will be too wet, regardless of whether it's a bin or in-vessel system.

Composting is not difficult to master if you know what to do. Properly done, temperatures will easily reach  $130^{\circ}$ F to  $140^{\circ}$ F ( $54^{\circ}$ C to  $60^{\circ}$ C), which will kill most disease-causing organisms that may be present. This is important and explains why a properly functioning composter is critical to every farm's biosecurity programme.

Growers have all the necessary ingredients on their farm to compost correctly. But again, you have to follow the recipe! If your cake recipe calls for 3 cups of sugar and a teaspoon of salt and you add 3 cups of salt and a teaspoon of sugar, you've got problems.

It's the same with composting. If you need 50 percent moisture and you have 85 percent instead and your compost bin is leaking black goo onto your concrete slab, you've got problems. If this is the case, I can guarantee you are going to have odors and flies and could end up with a visit from your state's Department of Environmental Quality if someone calls in and complains. Keeping the proper moisture content solves fly, odor and neighbor-relations issues.

#### **Educate Growers**

In late 2016 and early 2017, our Extension programme conducted compost training sessions in conjunction with Mississippi Board of Animal Health personnel. We initiated the sessions for all six broiler integrators in Mississippi because we were seeing a few poorly managed composters that were leading to problems.

After nearly all of these training sessions, there would always be one or two folks that hung around afterward to tell me "I didn't know you needed to add extra bulking material when the chickens got big" or "I didn't know you couldn't dump a front-end loader full in all at once."

This is something we all need to take note of. It's my opinion that those of us who have been around the chicken business for a while may assume growers know more than they do. I can tell you there are a lot of contract growers out there who bought farms and built chicken houses even though they'd never grown a chicken before and certainly never composted one.

Therefore, it's important those of us with experience help growers understand the principles of mortality composting before we turn them loose with a million-dollar (or more) farming operation and expect them to know what to do. Some growers are knowledgeable, but others are going to struggle and need assistance. Fortunately, there's help available from poultry company service technicians and veterinarians, state agencies that oversee nutrient management plans, Extension service personnel as well as friends and family who raise commercial chickens.

Keeping biosecurity practices in mind, let's utilize that assistance to help growers master the composting process and make every poultry operation successful and biosecure. Protection of both the commercial and backyard poultry world depends on everyone's biosecurity programme, and a key ingredient of good biosecurity is proper mortality disposal.

#### 34 • POULTRY FORTUNE • February 2019

### Monthly Average Egg Prices all over India and Prevailing Prices at Various Production Centres (PC) and Consumption Centres (CC) - Source: NECC

#### For January 2018

#### **NECC Prices**

Name of the Zones	Month Average Price in Rs
Ahmedabad	469
Ajmer	422
Banglore (CC)	438
Chennai (CC)	444
Chittoor	437
Delhi (CC)	453
East Godavari	434
Hyderabad	423
Mumbai (CC)	478
Mysore	441
Nagapur	419
Namakkal	430
Pune	466
Punjab	439
Vijayawada	434
Vizag	436
West Godavari	434
Warangal	426

#### **Prevailing Prices**

Name of the Zones	Month Average Price in Rs
Allahabad (CC)	477
Barwala	421
Bhopal	452
Hospet	403
Indore	442
Jabalpur	444
Kanpur (CC)	453
Kolkata (CC)	469
Luknow (CC)	486
Raipur	454
Varanasi (CC)	484



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- Nutrase P 5000 & 10000 [Bacterial 6-Phytase]
- Nutrase BXP 500 [Multienzyme complex with Phytase]

### Toxin Binder

Free-Tox [ Polyvalent mycotoxin binder & mould inhibitor ]

### Pigments

- Colonut Yellow [Natural Yellow Pigment from Marigold]
- Colonut Red [Natural Red Pigment from Red Pepper]

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- BroClear

   [Essential oil based mucolytic and bronchodilator for respiratory distress]

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### **Summer Stress Management in Poultry**

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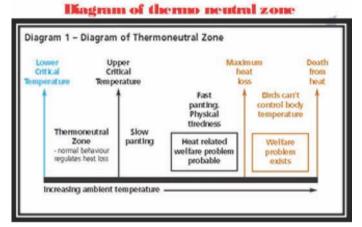
National Dairy Research Institute, Karnal, Haryana

#### Introduction

India is 3rd largest producer of eggs with annual production of 57 billion eggs & 5th largest producer of poultry meat with a production of 2.5 million tonnes of Poultry meat. The poultry sector in India has undergone a paradigm shift in structure and operation from a mere backyard activity into a major commercial agricultural based industry over a period of four decades.Heat stress is one of the most important environmental stressors challenging poultry production worldwide. The detrimental effects of heat stress on broilers and laying hens range from reduced growth and egg production to decreased poultry and egg quality and safety. Different management to reduce the heat stress are discussed below.

#### Effect of temperature onbirds

▶ 55 ° - 75 ° F (12.7 ° - 23.8 °C) - Thermal neutral zone.The



temperature range in which the bird does not need to alter its basic metabolic rate or behaviour to maintain its body temperature.

- ▶ 65 ° 75 ° F ( 18.3 ° 23.8 °C)- Ideal temperature range
- ▶ 75° 85° F (23.8° 29.4°C) A slight reduction in feed consumption can be expected.
- ▶ 85 ° 90 ° F (29.4 ° 32.2 °C)- feed consumption fall further. Weightgains are lower, production may be reduce,mortality occur in heavy bird.
- Cooling procedures should be started before this temperature range is reached.
- 90° 95° F (32.2° 35.0°C)- Feed consumption continues to drop. At these temperatures, cooling procedures must be carries out.
- 95° 100° F (35.0° 37.7°C) Feed consumption is severely reduced and mortality willincrease in heavy birds.Water consumption is very high. Emergency measures may be needed. Above 100° F (Above 37.7°C) Emergency measures are needed to cool birds.

#### Heat stress

• Birds are 'heat stressed' if they have difficulty in achieving a balance body heat production and body heat loss.

• The body temperature of the broiler must remain very close to 41°C (106F). If body temperature rises more than 40°C above this, the bird will die.

#### Body heat production

- Heat is produced by metabolism within the body, which includes maintenance, growth and egg production.
- Heat production is affected by body weight, species and breed, level of production, level of feed intake, feed quality and, to a lesser extent, by the amount of activity of exercise.

#### Heat loss in birds

Heat can be lost in a variety of ways. Three normal methods of heat loss are listed below. Birds modify their behaviour to stay in the 'thermo-neutral zone'.

- **Radiation** Heat will be lost from the body by radiation if thesurrounding surfaces are below bird surface temperature. Converselyhot walls and roofs may radiate heat to the bird surfaces.
- **Convection** Heat loss will occur from the natural rise of warm air from around a hot body. Providing moving air can assist convection, but onlyif the air moves fast enough to break down the boundary layer of stillair that surrounds the body.
- **Conduction** Heat will transfer from one surface in contact withanother surface, for example, if the birds are seated on litter that iscooler than their bodies. However, the litter immediately under the birds soon assumes a temperature close to that of the body. After a bird can no longer maintain its body heat balance by one of these three methods (upper critical temperature), it must use "evaporative heat loss", or panting. Evaporative heat loss, whilst essential to the bird, doesn't contribute to heating the house.
- **Evaporation** This is very important at high temperatures as poultry do not sweat but depend on panting. This is only effective if the humidityis not too high.Because hot, humid conditions are much morestressful than hot dry conditions.

#### Bird's response to increase in temperature

- Try to move away from other birds.
- Move against cooler surfaces, such as the block walls or into moving air streams.
- Lift their wings away from their bodies to reduce insulation and exposeany areas of skin that have no feathers.
- Elect to pant slowly.
- Rest to reduce heat generated by activity.
- Reduce feed intake.
- Increase water consumption.
- Divert blood from internal organs to the skin, which darkens skin colour.
- Begin fast panting.

#### Management of heat stressor what is needed???

#### 1. Housing Management

Poultry shedorientation: Long axis should be East-West

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**Shade:** Trees Air movement:-Perpendicular to Prevailing Wind direction.

- **Spacing:** Recommended design spacing should be given.
- Building width: 10-12m is preferable.
- **Roof:** Gable or shed roof along with ridge vent to provide an escape for hot air at roof peak is desirable.
- Floor: Concrete floors are desirable for easy Cleaning & Disinfection.
- Wall: Should be water proof and poor conductor of heat.
- **Insulation:** Should be placed below the roof as it will prevent influx of heat into the building.
- **Painting and White washing:** Outside of walls & roofs should be painted white or covered with material which will reflect heat.
- Ventilation: For elimination of already heat produced proper ventilation is necessary. Not more than 13m wide and 4m in height
- **Evaporative cooling:** Most effective method of cooling in low humidity. Air is drawn through adsorbent, porous cooling pads or through fan pad system. Cooling of warm air is attained by its contact with water.
- Fan Fogger System: The foggers inject fine water particles into the warm inside air. As the water vaporizes, heat is absorbed from the air, lowering its effective temperature. Foggers reduce air temperature in the house on hot days (90 o to 95 o F)
- Covering the roof of the shed with agro waste for 3 inches thickness which will help to insulate the heat in to the shed



#### Green vegetation around the shed

- Shade giving trees at distance of 30 feet without obstructing airflow in the house. It will reduce shed temperature around  $5^\circ F$
- Allow the grass to grow outside the shed up to 6 inches height to reduce the heat radiation.

#### 2. Genetical selection

• Techniques to selection for heat tolerance effect of heat stress is more in Commercial broiler stocks with high growth potential compared to slower growing chicks. Fast producing broilers produce more heat & have high heat load & high mortality. Therefore comparatively slow growing lines are chosen.

#### 3. Feed management

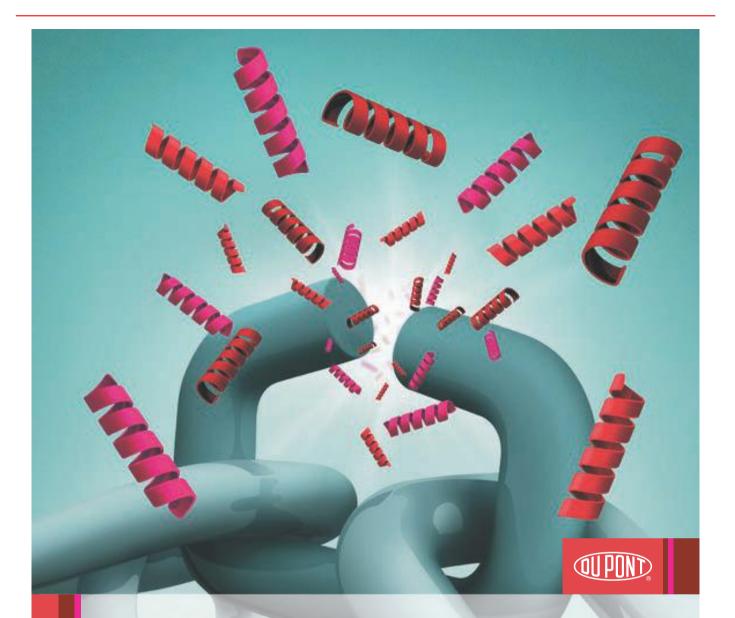
- Change the feed type from mash to pellet.
- Start feeding cooler hour of the day.
- Higher fat content of feed also contribute to lower heat production.
- Protein contributes more metabolic heat than fats and carbohydrates, so a correct energy: protein ratio is important. Dietary vitamins and minerals can be reformulated.
- Vitamin C Under heat stress, birds are not able to synthesize the sufficient amount therefore, Vit C @ 1000mg/kg should be given. Act as antioxidant and reduces oxidative injuries, reduce mortality.

- Detrimental effect on egg production by heat stress can be reduced by dietary supplementingvitamin A @ (8000 IU/Kg.
- Dietary supplementation of Vit E is beneficial for egg production in hens..
- Supplementation of probiotic lactobacillus strains may enrich diversity of micro flora in chicken. Restore microbial balance in jejunum & caeca of chicken. Reduce harmful effects of heat stress.
- 4. Water management:
- Water requirement increase during hot periods. 6% water intake increase per degree rise in temperature from that at 20 oc temperature. 25% more drinking space should be provided.
- Supplementations of electrolytes in water enhance water consumption.
- Avoid tank water getting heated by direct sunlight during summer. Water below body temperature will certainly aid in heat dissipation.
- To allow the cool water in the pipeline, clean the drinkers flush out the water from pipeline frequently in the nipple system.
- Adjust the nipple line height & monitor all the birds are drinking water comfortably. Provide extra drinkers to motivate the birds to drink more water. Walk gently inside the shed to avoid disturbance, it will motivate birds to drink water.



#### 5. Miscellaneous Management

- De-feathering and de-winging of broiler done to make birds more heat tolerant. Wings cover wide surface area & their presence reduce efficacy of evaporative heat loss. Body temperature and mortality was lower in dewinged group. Mortality was found to be lower in dewinged groups.
- Beak trimming is vital to prevent feather picking and cannibalism which is more in stress.
- Litter management is paramount important step in broiler management during summer. Litter should be at least 5 cm depth.
- tocking density should be reduced by 10%.
- Early detection and management of poultry disease are crucial.
- Stress activities such as grading, vaccination, deworming has to be carried out in the cool hours only.
- Do not open cool room door frequently.
- Spray disinfected waterinside the cool room to maintain the required RH and temperature.
- Maintain sufficient summer medicine stock i.e. electrolyte, glucose, vitamin C, vitamin E, vitamin K and vitamin B-complex in water.
- Keep one extra person inside the farm for managing foggers, fans and checking thewater availability in nipple, tank etc.



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## Enzymes, Feed Additives and Non Additives in Feed Production

#### R. Shirisha, R.Purshotham, K.Prashanth Kumar and P. Radhika

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#### Enzymes

- Enzymes, are chemicals or catalysts released by cells to speed up specific chemical reactions. This definition accounts for enzymes released in the digestive tract to aid in the digestion of food.
- Today, these same enzymes can be effectively manufactured and added to animal feeds. Three classes of enzymes (phytases, carbohydrases, and proteases) are typically considered for use in poultry feeds.
- Phytase products were first introduced in the early 1990's. Most producers are aware of and are typically using phytase in poultry diets. Legislation to decrease phosphorus pollution in some states has contributed to the increased usage of phytase.

Phytase works by releasing some of the non digestible phosphorus (and other nutrients) found in commonly used feed ingredients and making the nutrients available for productive purposes.

Phytase is a proven technology used to reduce feed cost by reducing inorganic phosphorus supplementation and has the added benefit of decreasing phosphorus excretion in manure.

Carbohydrase enzymes have been proven to be effective in increasing the amount of energy available from feed ingredients. Key carbohydrase enzymes include amylase and xylanase and are used to improve the digestibility of carbohydrates in feed ingredients. This improved digestibility increases the availability of energy in the small intestine to help promote growth and other productive processes.

Corn provides a majority of the energy in a typical poultry diet. Amylase is a starch digesting enzyme that helps to digest more of the starch found in corn. Amylase increases starch digestibility, thus providing more available energy.

Xylanase, on the other hand, releases energy from the

fibrous portion of grains and grain byproducts.

Protease is a protein digesting enzyme that breaks down storage proteins binding starch within feed ingredients. This makes the energy from protein bound starch available to the bird to be used for productive purposes. Proteases are also effective in releasing protein anti-nutrients found in ingredients like soybean meal. This function of proteases makes proteins more available.

A combination of amylase, xylanase, and protease enzymes working together to each attack different poorly digestible portions of feed ingredients increases energy available for growth and/or egg production. The addition of these three enzymes to the diet in combination typically increases energy available to birds by 3 to 5%.

#### Non-starch polysaccharides

- Non-starch polysaccharides are a large variety of polysaccharide molecules, comprising some of the most representative compounds of the cell wall. They can be insoluble or soluble in water.
- Barley and oats are rich in β-glucans, which are responsible for the low nutritive value of the diets based on these raw materials. Feed supplementation with β-glucanases decrease the polymerization degree of β-glucans, allowing a better use of the nutrients released, and leading to an increase in feed intake and to a decrease in the feed conversion ratio.
- Arabinoxylans are the major contributors to soluble nonstarch polysaccharides released from wheat, rye and triticale. In the same way, also xylanases can depolymerize this substrate and improve its nutritive value.

## According to the purpose of application, feed enzymes can be fundamentally divided in to

a.bEnzymes which are to quantitatively supplement endogenous digestive enzymes of mono gastric animals Eg. Proteases, lipases, Amylases.

b. Enzymes which are not produced by mono gastric animals Eg.  $\beta$ -glucanases, Pentosanases , Phytases.

Addition of suitable multienzyme preparation improve animal performance:

a. Increasing the effectiveness of host (endogenous) enzymes

### **Highlight Points**

- Modern intensive poultry production has achieved phenomenal gains in the efficient and economical production of high quality and safe chicken meat, eggs and poultry bio products.
- At the same time as making gains in production and efficiency, the industry has had to maximize the health and well-being of the birds and minimize the impact of the industry on the environment

Breaking down the gel form characteristic of soluble fibres allows the birds digestive enzyme to function more efficiently. This improves starch, protein, fat, amino acids and energy digestibility.

## b. Alteration in feed passage rate

The enzymes reduce the water holding capacity of the gut contents thus

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increasing the dry matter content stimulating feed intake. c. Effect on Excreta characteristics

Addition of enzymes also reduces the dry matter outside the body thus has marked impact on excreta volume and composition. Due to protein digestibility lowering of excreta output is observed.

#### d. Effect on litter problems

Reduced viscosity improves nutrient digestion, lower water intake and help to reduce litter problems.

#### **Release of Nutrients**

- Enzymatic depolymerization renders the NSP free releasing nutrients in the gut and it available to the animal.
- Starch masked by cell structure is released leading to increase in metabolisable energy.
- Proteins are also released by action of proteases. This release leads to maximum absorption of minerals and results in improvement in nutrient utilization.

#### Availability of phosphorus

- Cereals and oilseeds contain 1-2% of phytate, and 60-90% of total phosphorus present in the seeds in this phytate phosphorus.
- Phytase hydrolyses phytic acid to myoinositol and phosphoric acid in step wise manner forming myoinositol phosphatic intermediates (IP5, IP4, IP3, IP2, IP1).
- The nutritive effect of B-glucans in the gastrointestinal tract of young chicks can be eliminated by adding B-glucans of microbial origin to barley based diet, thus making it acceptable for broiler fattening diets.
- The addition of B-glucanase has allowed barley to be used as major ingredients in broiler diets and xylanase supplementation has been claimed to improve the economy of wheat based diets/ the litter condition and consequently welfare of the birds.
- The beneficial effect of enzymes in barley/oat, wheat and rye in diets is based on the hydrolysis of the viscous non starch polysaccharides. Improvement in live weight gain and feed conversion efficiency and reduced sticky dropping in broilers due to me inclusion of enzymes in the diet have reported by several workers (Raghavan, 1990; Arora et al 1991; Wenk, 1992).
- Nahm and Karlson (1985), used cellulose obtained from Trichoderma viridae @ 0.008% in the broiler diets containing wheat bran at 0,10 and 20% levels and noted significant improvement in body weight gain and phosphorus availability.
- Supplementation of multi enzymes in low, moderate and high fiber diets and the resultant performance of broilers were investigated by Nagalakshmi and Devegowda (1991). They found a significant improvement in body weight and feed conversion in low and high fiber diets and a reduction in the moisture content of droppings
- Increase intestinal viscosity is generally associated with reduced growth performance-Supplementation of wheat diets with an enzyme reduced gut content supernatant viscosity which was accompanied by improved performance (Bedford, 1996).
- ▶ Feeding of certain grain and grain by products leads

to incidence of sticky droppings. Wet dropping is a big problem especially in laying hens because of increase in percentage of dirty eggs. It may also increase gas production (i.e. ammonia), fly and rodent population in the shed. Supplementation of P-glucanase enzymes was found to be successful in reducing the adverse effect (hessIman and Amon, 1985).

- Recently interest in the use of phytase as a feed additive concern over phosphates in animal wastes. Phytic acid is generally regarded as being resistant to hydrolysis in the avian gut because of lack of endogenous phytase.
- Unfortunately, many grains, oilseed meals and plant derived products contain high level of phytic acid, which in turn contains 60-80% of total phosphorus present the phosphorus contained in phytate is not available to poultry because they lack the enzymes needed to hydrolyze-e phytate.into inorganic phosphorus and inositol.
- Besides being an indigestible constituents, the phytate phosphorus markedly reduced the bio-availability of several multivalent cations mainly calcium, manganese, zinc, ferrous and ferric iron by forming insoluble phytate metal complexes. The use of exogenous phytase can significantly enhance phosphorus digestion through destruction of plant derived phytate.
- There are several studies which indicate that microbial phytase supplementation increase the body weight gain and feed intake in broiler chickens (Den bow et al. 1995; Sebastian et al. (1996). Simons et al. (1990) reported that microbial phytase supplementation of low phosphorus maize-soybean diet increased the availability of phosphorus to over 60% and decreased the amount of phosphorus in the droppings by 50%.

#### Benefits of enzymes To Poultry: In Digestibility

- 1. Enhances the feed intake and efficiency, growth rate and productivity.
- Increases the energy value of cereal feed stuffs. More nutrients are made available by hydrolysing fibrous material.
- 3. Better digestibility of feed ingredients by better feed conversion.
- 4. Enzymes act as supplement to the normal digestive enzymes especially during stress condition.
- 5. Reduces antinutritional products like tannins, saponin and goitrogen.
- 6. Promotes weight gain and overall improved performance.
- 7. Release minerals for assimilation eg: Ca, Mg, Zn, P etc.
- 8. Stabilization of microbial flora by making these nutrients readily available to them.
- 9. Checks chelating of minerals such as Zn, Mn, Fe, Ca, K with phytic acid, less chelation means more mineral availability.
- 10. Prevents precipitation of pentacalcium phosphate and there by improves absorption of calcium and phosphorus.

#### In Poultry Product

- 1. Increases egg production and hatchability in layers.
- 2. Egg quality is also maintained. More cleanly eggs and with thick shell is maintained.
- 3. Improves flock uniformity leading to more consistent

### Think out-of-the-box



## Ideas leads to innovation that optimizes poultry production



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- Significant decrease in occurence of loose droppings associated with Bacterial infections or prolonged use of antibiotics
- Proven efficacy against Salmonella / E.coli
- Reduction in non specific bacterial infections thereby reducing stress and maintaining better health of digestive system





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sized birds.

- 4. mproved slaughter results, high carcass weights and better grading.
- 5. Genetic Potential of birds can be explored enabling them to consume more quality of feed to achieve maximum growth and production.

#### **Feed additives**

It is an ingredient or a mixture of ingreidients added to the basic feed mix or parts there of, usually in small quantities, to fulfill a specific function, nutritive or non nutrtive. These includes:

**Eg:** Antibiotics, antioxidants, aromatics, flavourers, anticoccidials, emulsifiers, colouring agents, pellet binders, anticaking agents, herbal preparations, hormones, probiotics, mannan oligosacharides, mineral proteinates, arsenicals, copper sulphate, grits, pigments, adsorbents, mould iinhibitors, enzymes.

#### L-carnitine

- ▶ L-carnitine exists in animal and plant cells and microorganisms. In animals, it is synthesised almost exclusively in the liver.
- Two essential amino acids, i.e., lysine and methionine serve as primary substrates for its biosynthesis, and vitamin B6, nicotinic acid, vitamin C and folates are also required as cofactors.
- L-carnitine plays a key role in energy metabolism of cells, mainly, by transferring acyl groups from cytoplasm to mitochondrial matrix for β-oxidation
- L-carnitine promotes the lipid redistribution in organism, mainly in broilers, by increasing intramuscular fat and by decreasing subcutaneous and abdominal fat deposits and by lowering plasma cholesterol and triglyceride concentrations.
- In laying hens and quails, L-carnitine supplementation slightly improves egg production and hatchability, but it mainly modifies egg composition.
- Albumen quantity and quality is improved and also albumen and yolk carnitine concentrations were enhanced, promising embryo development.

#### **Non-Nutrient Feed Additives**

- This group of feed additives do not have any direct nutritional role, but are added to the feed to reduce mortality and morbidity caused by various diseases and stress factors; to improve feed efficiency by better digestion, absorption and utilisation of nutrients; to enhance colour, flavour, consistency and quality of feed, and to improve the shelf life of the feed by curbing, caking, moulds, mustiness, oxidation and other physical, chemical and micro-biological degradation.
- Non-antibiotic anti-microbial feed supplements: Check bacterial infections and promotes performance. Examples: Furazolidone, chlorhydroxy-quinoline.
- Antimycotic agents: Prevent mould growth and production of toxins. Examples: Gentian violet, copper sulphate, propionic acid, calcium propionate and sodium benzoate.
- Coccidiostats: Prevent outbreaks of coccidiosis. Examples:

Dinitro-ortho-toluamide, salinomycin, robenidine, nicarbazine, monensin and maduramycin.

- Anti-parasitic additives: Check various parasitic infestations. Examples: Dichlorophan, Niclosamide and Praziguantel.
- ► Anti-oxidants: Prevent oxidative rancidity of fats and oils. Examples: B.H.T., B.H.A. and Ethoxyquin.
- Hormones: Promote growth rate, feed efficiency and egg production. Examples: Caseated iodine, melengestrol acetate, ethylestranol and stanazol.
- Arsenicals: Promote growth rate, feed efficiency and carcass finish.Examples:3 Nitro-4-hydroxy phenyl arsanilic acid.
- ► Adsorbents: Adsorb or bind toxins and prevent their absorption from the intestine. Examples: Zeolites, activated charcoal.
- Pellet binders: Used for pelleting the feed in preparation of crumbled feed for broilers. Examples: Bentonite, sodium alginate, carboxy methyl cellulose, gelatine, lignosulphonate, carragenan and guargum.
- Deodorising agents: Reduce the ammonia production in the litter. Example: Yucca extract.
- Flavouring agents: Improve feed flavour and thereby feed intake, growth rate and production. Examples: Essential oils, fish oils, etc.
- Pigments: Impart attractive colour to the feed as well as to the products like egg yolk and skin. Examples: Canthaxanthin, leutin, zeaxanthin, etc.
- Immuno-stimulants: Stimulate anti-body production, cellmediated immunity and general resistance to disease. Examples: Tetrahydrophenylimidazole, immogen, levamisole,etc.
- Herbal preparations: Tone up the liver, improve the appetite and increase disease and toxin resistance power of the birds. Examples: Extracts of herbs.
- ► Enzymes: Help in better digestion of the food. Examples: Protease, lipase, cellulase, amylase, phytase and pectinase.
- Performance boosters: Improve overall performance of the birds by various means. Examples: Nitrovin, avoparcin etc
- Other miscellaneous feed additives: Perform certain specific functions in the body or feed and thereby improve the performance. Examples: Electrolytes, egg-up, egg toner, etc.

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## Controlling enteric challenges in broilers: Feed additive combinations can support growth performance and healthcomparable toin-feed AGP

**Trouw Nutrition** 

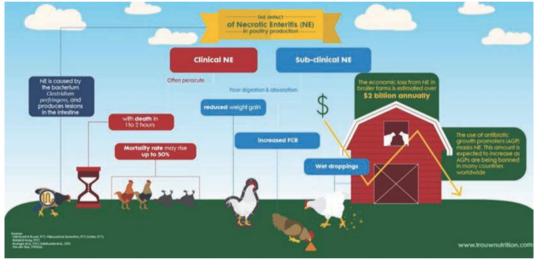
As antibiotic-free production systems become increasingly common in poultry operations around the globe, challenges such as Necrotic Enteritis require alternative solutions without compromising productivity and welfare. Research conducted by Trouw Nutrition finds that a combination of feed additives can support broiler growth performance and health at levels comparable to in-feed antibiotics, even when birds are exposed to a necrotic enteritis disease challenge.

Trouw Nutrition conducted two studies to evaluate the efficacy of combinations of feed additives olutions to support bird health and performance. The test results of the feed additive The research findings come at a time when legislativebans on the use of antimicrobial growth promoters are contributing to anincreasing prevalence of economically important diseases such as necrotic enteritis. Caused by *Clostridium perfringens*, necrotic enteritis outbreakshavebeen estimated to cause more than \$2 billion in economic losses annually. Consequences associated withenteric disease include increased mortality, reduced bird welfare and an increased contamination risk for poultry produced for human consumption.

combination were compared to the performance of birds receiving an antibioticgrowth promotor (AGP).Both studies found that birds receivinga combination of applied feed additives performed comparable to birds receiving an AGP.

#### Two studies proving combinations of feed additives perform as good as in-feed AGPs

The first study examined the effect of replacing infeed AGPswith blends of organic acids via feed and



water andhydroxytrace minerals via feed. Broilers under a *Clostridium perfringenstype* A challenge received a synergistic blend ofgut health improving feed additives, a blend of free and buffered organic acids applied in drinking water, and copper hydroxylchloride. Under diseasechallenge conditions, the feed additive group had similargrowth performance compared to the AGP treatment, while showing a numerically reduced Clostridium count in the intestine.

In the second study, researchers used the synergistic blend of gut health improving feed additives in combination with free and buffered organic acids via feedto replace in-feed AGP. Researchers evaluated the effect on growth performance, carcass quality and the oxidative status of broilers under a Clostridium Perfringens type A challenge, compared to birds receiving an AGP. Again, the study found the use of organic acid blends resulted insimilar growth performance compared to birds receiving an AGP. Additionally, an increase in breast meat percentage and lower oxidative stress wereshown in birds receiving the organic acid blends.

The business impact of Necrotic Enteritis

"Antibiotic-free production systems are becoming an integral part of the poultry production chain as governments respond to the threat of antimicrobial resistance and consumers demand more transparency on food production and safety," said Dr. Emma Teirlynck, Global Poultry Gut Health Manager of Trouw Nutrition. "This research shows that by responding to the challenge with an integrated approach, it is indeed possible to achieve growth performance and health goals even when a disease challenge is present."

#### **About Trouw Nutrition**

Trouw Nutrition, a Nutreco company, is a global leader in innovative feed specialties, premixes, feed additives and nutritional services for the animal nutrition industry. It provides products, models and services to boost productivity and support animal health through all life stages. With unique, species-specific solutions, Trouw Nutrition has been meeting the needs of farmers and home-mixers, feed producers, integrators and distributors since 1931. Headquartered in the Netherlands, the company has locations in 28 countries and employs approximately 8,000 people.

## Effective Solutions for Mycoplasmosis



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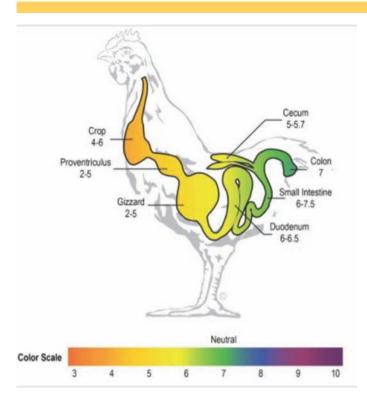


Tylosin phosphate-10%



## **Role & Scope of Exogenous Enzymes in Poultry Feed**

Dr Rajesh Kumar Singh, Livestock & Poultry Consultant



- Exogenous enzymes supplementation on diets improves the production efficiency of poultry by increasing the digestion of low-quality products and reducing nutrient loss through excreta, allowing the reduction of diets nutritional levels with likely economic advantages.
- Enzymes are added to animal ration with the goal of increasing its digestibility, removing antinutritional factors, improving nutrient availability, as well as for environmental issues.
- A large number of carbohydrases, proteases, phytases, and lipases are used for this purpose. Usually, commercial enzymes used as additives do not contain a single enzyme, instead, they are enzymatic preparations containing a variety of enzymes, which is eligible and once rations are composed by ingredients of different constitution.
- As a result, the non-conventional and cheaper feed ingredients should be used which have NSPs at a higher percentage along with the starch.
- Non-starch polysaccharides are polymeric carbohydrates, which vary from starch in structure and composition and therefore, are not completely digested by birds.
- Poultry does not produce enzymes that hydrolyze NSPs of the cell wall in grains and they remain without decomposition and cause a reduction in feed efficiency.
- Supplementation of preparations of the favorable exogenous enzyme in the diets is considered modifications to overcome the adverse effects of NSP's.
- Enzymes break down the NSPs, reduce intestinal viscosity, and subsequently get better nutrients digestibility by improving gut performance.

NSP's ENZYME				
ENZYME	SUBSTRATES	TARGET FEED STUFF		
β-Glucanase	β-Glucan	Barely, oats and rye based diets		
Amylase	Strach	High Starch cereal diets		
Xylanase	Arabinoxylan	Rye, Barely and wheat		
α- Galactosidase	oligosaccharides	Soybean and other legumes		
phystase	Phytate	Many Different Diets		
protease	Protein & ANF's	Wheat By-Products, Legume		
lipase	Fat	Animal and vegetables fats		

The poultry industry in developing countries is facing some challenges due to high costs of conventional feed ingredients like yellow corn and soybean meal which are mainly used in poultry rations. Thus, there is an urgent need for nutritious and affordable feeds. Nowadays, the feed represents about 75% of the total costs of animal production. Increasing prices of poultry feed ingredients caused us to look closely at other crops and agricultural by-products which are less costly than conventional feedstuffs. Therefore, the wastes of fruits and vegetables after harvesting and handling could be used as alternative sources of energy, protein, amino acids, vitamins and other nutrients in feeding poultry.

The inclusion of feed ingredients containing anti-nutritional factors may adversely affect poultry performance. Supplementation of commercial enzymes can enhance the nutritional value of crops containing high contents of soluble non-starch polysaccharides (of NSP's). The NSP's digestibility is very low in poultry and a large amount is voided via the excreta. The NSPs are able to bind large quantities of water and as a result, the fluid viscosity increases. Increasing viscosity may cause some problems in the small digestion of carbohydrate, protein, and fat.

Furthermore, the high viscosity of intestinal content increases the sticky dropping amounts. These problems can be resolved by the addition of enzymes to poultry diets. Increased use of exogenous enzymes is expected not only from the nutritional and economic aspects but also from the health and environmental point of view. Since enzymes improve nutrient digestibility and utilization, thereby mitigating the excreta output and lowering nutrient excretion, particularly excess nitrogen, phosphorus, zinc, and copper Enzymes, which may not be produced in large levels by the birds, are suggested to be supplemented to the diets. The antinutritional activity of cell wall NSPs had impaired impacts on growth rate and feed efficiency.

**ENZYMES ACTIVITY:** Enzyme is a functional protein that stimulates or accelerates the rate of specific chemical

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For further information please contact: Vibrant Remedies (I) Pvt Ltd Tel: 080-65353837, 9902071269 marketing@vibrantremedies.com www.aivlosin.com reactions. Enzymes activity is reliant on the substrate in a random way or at a very particular site on the substrate. The high content of fiber limits usage of sunflower meal (SFM) in poultry diets. The solution for this problem may be using exogenous enzymes and hydrolyze the NSPs, which could be used by avian and increase energy utilization.

**SOURCES OF ENZYMES:** Enzymes are created in each living organism from the simplest unicellular forms of life to the highest developed plants and animals. Most of the enzymes presently used in the beverage and food industry are from Aspergillus, but cellulases and hemicellulases are derived from Trichoderma. Newly, genes encoding has been used in cloning for various enzymes, including phytases, xylanases, and  $\beta$ -glucanases and expressed in various commercial systems (plants and microorganisms). Probably, large amounts production of an inexpensive enzyme by permanently selecting suitable microbes, increasing them in systems of modern fermentation and by efficient regulation of the enzyme extraction and purification.

**THE BENEFICIAL ROLE OF EXOGENOUS ENZYMES:** Poultry industry is becoming increasingly receptive to the use of exogenous enzymes supplementation. Enzyme supplementation to the poultry rations has a positive effect on feeds digestibility and leads to better productivity and performance. Moreover, supplementation of commercial enzymes can increase the nutritive value of feed ingredients and diets as well as allow greater flexibility in diet formulation. It has also a potential effect on the mitigation of environmental pollution by reducing the excretion of some elements such as nitrogen and phosphorus in poultry manure.

### WE CAN SUMMARIZE THE BENEFITS UNDER FOLLOWING HEADS

- 1. Flexibilization of low-cost diets formulation
- 2. Higher nutrient digestibility and better poultry performance
- 3. Improvement of litter quality
- 4. Improvement of birds' health

5. Environmental impacts of exogenous enzymes utilization on poultry feeding.

HEALTHY ENZYME BENEFITS: Enzymes have been shown to work both in the foregut and hindgut of chickens. During the transit of digesta in the duodenum, jejunum, and ileum, they remove fermentable substrates that could impact digestibility and impact gut microbiota balance. During the caecal phase, degradation products of sugars, such as xylose and Xylo-oligomers, are fermented by caecal bacteria. Enzymes xylanase not only reduce digesta viscosity through the hydrolysis of soluble arabinoxylans in the small intestine but this process also generates arabino-xylo-oligosaccharides (AXOX) to be fermented, particularly in the caecal phase. These act as prebiotics, selectively stimulating the growth of beneficial bacteria. They also produce short chain fatty acids (SCFA) in the intestine, which in turn can be utilized as an energy source by the animal. In chickens, they have also been shown to reduce Salmonella in the bird's caeca, cloaca, and spleen, increments in caecal production of volatile fatty acids (VFAs) due to the application of xylanase in wheat and corn-based diets.

Bans are already in place on the use of the antibiotics as growth promoters (AGPs) like the EU and many developed countries, and it seems increasingly likely that market

pressure for AGP removal in poultry production in places like the US, India will limit their use. The time is therefore right to identify an alternative means of improving liveability, as well as performance and profitability. With pressure constantly on the poultry industry to reduce production costs without compromising bird performance or gut health, the use of multienzymes, with or without other additives such as probiotics, appears to offer good opportunities to unlock the potential nutritive value and healthy potential of feed, and offer associated cost savings. Exogenous enzymes show up as tools on poultry diets formulation flexibilization, allowing the utilization of non-conventional ingredients without impairment to birds' performance, with a consequent reduction on production costs. Additionally, enzymatic supplementation can reduce environmental problems, improve livestock surrounding, reducing wounds and improving, therefore, birds' welfare.

and improving, t		
DIET	POULTRY	IMPROVEMENT OVER CONTROL
Sunflower Seeds	Broiler	Increase On BWG
Wheat- soy Bean Meal	Broiler	Growth Improved, Heath promoter
Guar Meal	laying hens	Increased FCR
Corn-Soy Bean Meal	Broiler	Improve CTT AD
Corn-Wheat	laying Hens	Improve the digestion of sylans and arabinoxylans
Multi Diet	Broiler	Improved relative growth, energy effciency and protein efficiency
Corn-Soy Bean Meal	Broiler	Increase CTTAD
Multi Diet	Broiler	Improved the feed conversion ratio
Corn-soy Bean	Broiler	Improve content in protein digestibility
Corn-Soy Bean Meal	Broiler	Increased Ideal digestibility of nutrients, increasing on minerals consistent in tibia ash
Whole	Broiler	Improved BWG and feed conversion ratio
Wheat and soybean Bean	Broiiler	Improved Perforrmance
corn Soya Bean	Broiler	Reduction of phytate
corn Soya Bean	Poultry	Increase Protien Digestibility
Sorghum- Wheat	Broiler	Improve IDE 1.5%-2.9%
Yellow corn and SoyaBean	Laying Hen	Increasing release of organic Phosphorous



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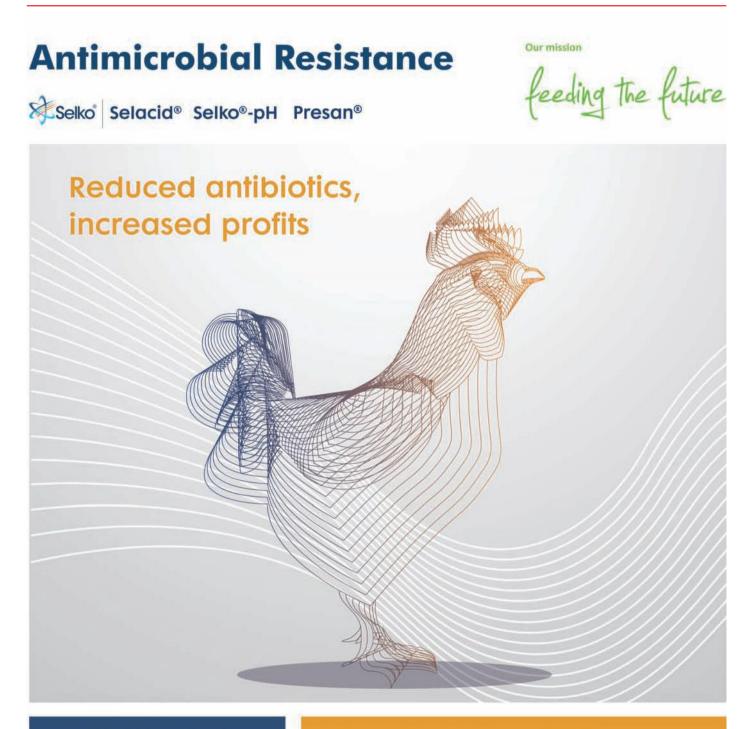
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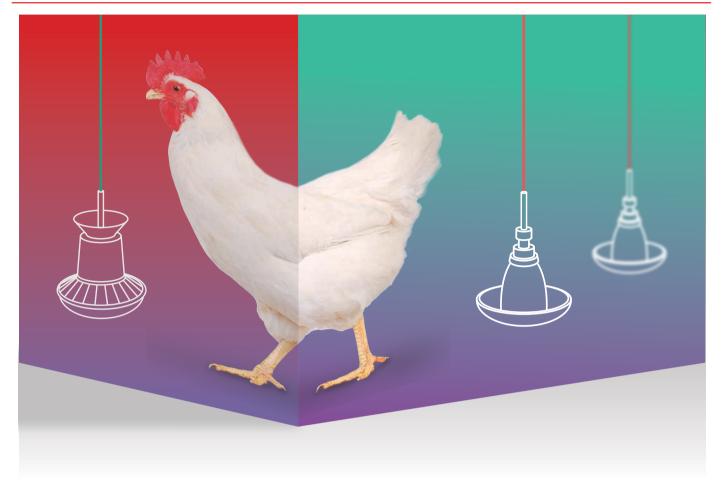


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