Poultry Fortune

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April & May 2020

Inside...

Editorial: COVID-19 changed the outlook of people and trade world over!

Covid-19:
With projected losses of
Rs 22,500 crore, Indian
poultry sector seeks
Centre's intervention

Nearly 60 percent of US broilers now raised without antibiotics, but that number may have peaked

Govt to give 5 lakh tonnes of Corn @ Rs 1525 for poultry units in TS



New Leadership at Novus aims to Achieve Top Position in "Animal Health through Nutrition" Market



Skylark Group Develops Emergency Ventilator to Support Covid 19 Efforts

Growing
Management of
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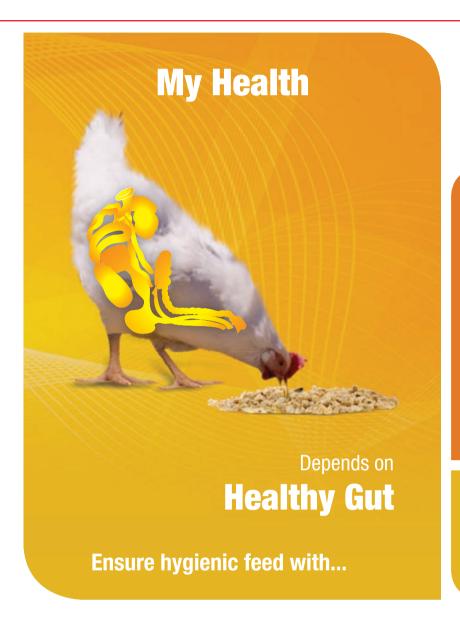
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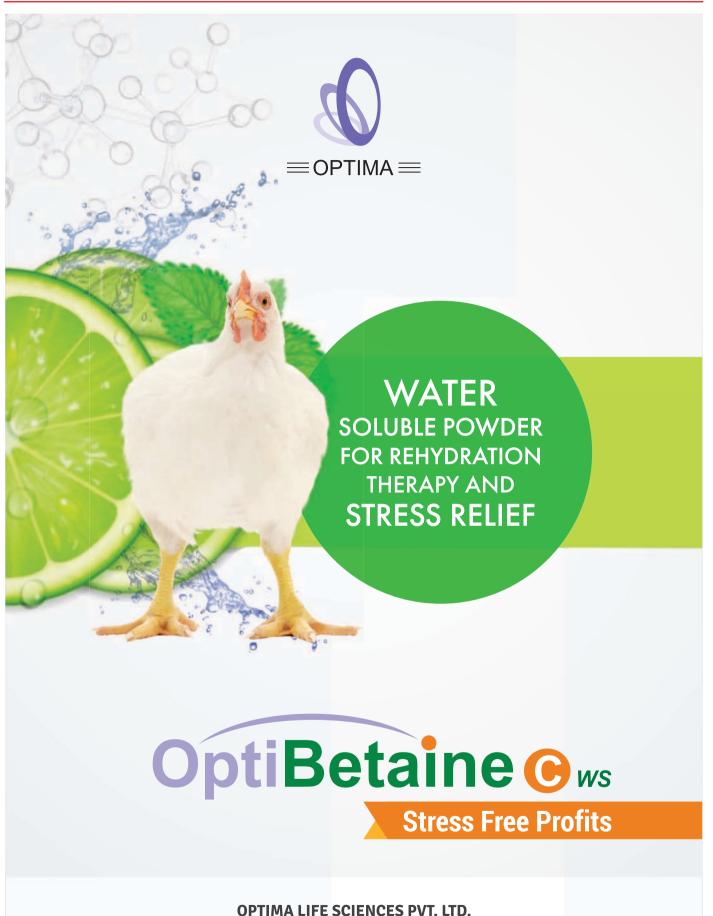
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8 • POULTRY FORTUNE • April & May 2020

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CONTENTS

Editorial:

11. COVID-19 changed the outlook of people and trade world over!

News:

- 14. Nearly 60 percent of US broilers now raised without antibiotics, but that number may have peaked.
- 16. How COVID-19 has hurt China's poultry industry.
- 18. Coronavirus will constrain US meat supply despite Trump order.
- 18. Poultry industry suffers Rs 13,000 crore loss due to Covid-19 pandemic.
- 20. Proteon Pharmaceuticals, the parent company of Vetphage Pharmaceuticals, joins Efforts to Fight Coronavirus.
- 20. ILDEX Vietnam postponed to December 9 11.
- New Leadership at Novus Aims to Achieve Top Position in "Animal Health through Nutrition" Market.
- 22. VICTAM and AHN Asia postponed to Jan 2022.
- 24. Aviagen India Research Laboratory Awarded R&D Status.
- 24. Govt to give 5 lakh tonnes of Corn @ Rs 1525 for poultry units in TS.
- 26. Skylark Group Develops Emergency Ventilator to Support Covid 19 Efforts.
- 26. Innovista appoints Vetina as distribution partners.
- 28. Covid-19: With projected losses of Rs 22,500 crore, Indian poultry sector seeks Centre's intervention.
- 30. Srinivasa distributes over 10 lakh Eggs, pledges support to the poor and the needy.
- 30. Dr Kasula Rajasekhar Celebrates Daughter Geetika's Wedding.
- 31. 'These viruses are susceptible to normal cooking temperatures... safe to eat non vegetarian food in India'.
- 32. Poultry industry begins providing free eggs to migrants, pourakarmikas in Mysuru.
- 32. Karnataka's poultry sector on road to recovery.
- 33. Beware, Broiler Producers.

Articles:

- 36. Effect of Postbiotic in Broiler Chicken.
- 38. How Bacteriophages and Feed Additives are transforming the poultry sector.
- 42. Role of Immunomodulators in Poultry Nutrition.
- 46. Role of Alternate Animal Protein Sources in Poultry Nutrition.
- 48. The benefits of in-line moisture management.
- 50. Evaluating Protease Enzyme.
- 52. Growing Management of Commercial Pullets.

ADVERTISERS'INDEX

A.P. Poultry Equipments	35	
	35 13 & 23	
Aviagen India	5	
Boehringer Ingelheim India Pvt Ltd	15 41	
BV Bio-Corp Pvt Ltd	41	
	10	
Indian Herbs Specialities Pvt Ltd	34	
Indovax Pvt Ltd	27 37	
Karamsar Poultry Appliances	37	
	ВС	
Novus Animal Health	FC	
Optima Life Sciences	6	
Perstorp Chemicals India Pvt Ltd	FC 6 19	
Provet Pharma Pvt Ltd	29	
Provimi Animal Nutrition India Pvt Ltd	4, 12 &	
	17	
Srinivasa Farms Pvt Ltd	17 2	
Team Agrotech Pvt Ltd	21	
Trouw Nutrition Pvt Ltd	21 63 8	
Vaksindo Animal Health Pvt Ltd	8	
Venky's (India) Pvt Ltd	62	
Ventri Biologicals	3	
Vesper Group	62 3 25 43	
Vibrant Remedies (I) Pvt Ltd	43	
Zhanjiang Hengrun Machinery Co Ltd	60 & 61	
Zeus Biotech Pvt Ltd	7 39	
Zoetis India Ltd	•	
Zoetis maia Eta	39	

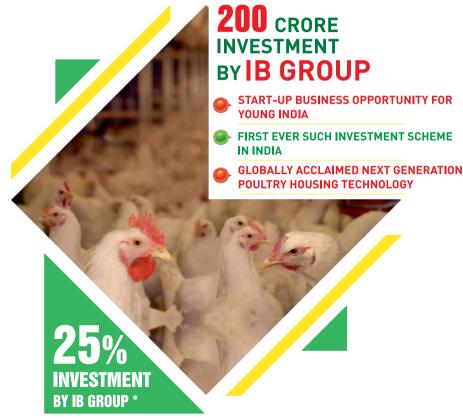
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10 • POULTRY FORTUNE • April & May 2020

PF APRIL & MAY 2020 ISSUE.indd 10 15-05-2020 17:44:23

COVID-19 changed the outlook of people and trade world over! Let us be fair with ourself and with others!



COVID-19
has changed
the outlook
of the people
and the trade
world over and
it has shaken
the confidence
and lives of the
people. The

unseen Corona virus made the people afraid of life and hide from it at home for months together. It is taking its toll on the world in about 184 countries causing deaths, illnesses and economic despair. It is estimated that about 45 - 55 million people are being pushed into extreme poverty.

Poultry sector in India was badly affected due to Corona virus and the industry lost hugely and the future is going to be tough if the pandemic disease continues without its cure.

Among Layer and Broiler segments, Broiler producers were the worst affected. Chicks and feed supply was badly affected due to lockdown. Due to non availability of sufficient feed egg and chicken farmers faced crisis. Owing to lockdown feed manufacturers felt it very difficult a few weeks for the raw material in feed.

Due to fear of Covid-19 as chicken sales came to almost negligible level, chicken producers during the last week of March to second week of April had to sell broilers at Rs 10 – 12 a kg farm gate price. Chickens were also offered at free in some places.

A positive thing happened due to lockdown is that Work from Home helped us all to streamline the things and get organised better, but if Lockdown continues longer period, sustainability will become difficult to smaller individuals and companies. Established companies with better funds and production may survive more.

Industry events have been postponed where people get an opportunity to update knowledge on various aspects of the industry and to promote business opportunities.

Let us be fair with ourself and with others

Some people responded on the editorial we published in March 2020 issue of this magazine titled "Stop hatredness, help people to live in peace". While some have appreciated the editorial content, a few expressed their displeasure, and some people also mentioned religious matters.

The intention of my writing the editorial was not to hurt any one's feelings. I express my regrets if any one felt hurt with my comments.

I gave my observations in the editorial on the happenings and how the actions of politicians and political parties are causing disturbance in the country. As I mentioned in the editorial, even after 70 years of Independence, still the rulers could not develop proper infrastructure facilities for the citizens in the country due to their attitude and insincerity.

There is a need of setting right economic situation of the country and solve unemployment issue, and increase production as well as productivity in agriculture and agri-based poultry -aquaculture and dairy sectors to give nutritious food to the people.

Whatever I mentioned is in the interest of all in the society and take it in a positive spirit. For me, peace and well being of the people of all the religions and regions in India and globally is pertinent. I feel that I am only a citizen in the country and in the globe. As I was born in a Muslim family, people may call me a muslim, but I am a peace and welfare loving person for me and for all.

In my 28 years of experience as a journalist and as the editor in poultry industry, I tried to work with all sincerity and honesty in my profession. I hope we gave a quality magazine and promotional as well as awareness creating events to poultry. This industry and its stakeholders gave me fame and fortune and I express my gratitude to the industry and to the people.

Communal hatredness and violence is more dangerous than corruption, and it will harm the growth and development of the country and its image in the world if we do not control it.

People and the rulers should be faithful to our constitution.

I do not believe in religious organizations of any religion because initially their objective is good, but later they start unhealthy practices of creating confusion and differences about each other religion leading to hatredness.

Whatever religion you belong to, please try to be moderate and reasonable. Religious extremism will not do good to any one. I always tell my family members, relatives, friends and others to be moderate in religious matters. For the mistakes of a few people, it is not appropriate to blame entire community. Due to political reasons people are being

Due to political reasons people are being divided on the basis of caste, religion and region. This division might be useful

to some people during election period, but it will not be helpful to bring all as united India. Great and successful people like Ratan Tata, Adi Godrej, Premji, Infosys Narayana Murthy and others through media interviews showed their great desire of seeing India as united country with equal opportunities. Instead of an Indian, people call as South Indian, North Indian or Punjabi, Gujarati, Tamilian, Andhra or Telangana etc. Country will be strong when we all become Indians first and inculcate positive thoughts in the minds of younger generations.

There are also good politicians who are working sincerely to make a mark in politics with good work like the freshers in politics Dr G. Ranjith Reddy, A. K. P. Chinraj and others who made a big mark in poultry sector and trying to make a fame in politics also.

I humbly suggest people to work hard and achieve excellence in whatever profession or trade you are in poultry or other sectors.

M.A.Nazeer Editor & Publisher Poultry Fortune



Poultry Fortune

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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 selfregulation.

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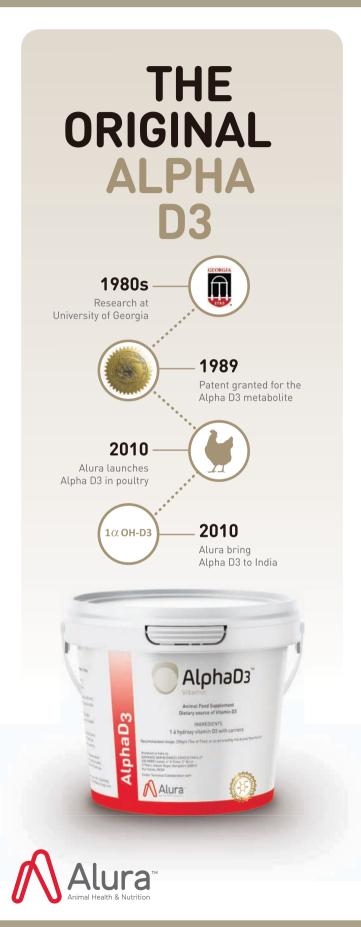
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12 • POULTRY FORTUNE • April & May 2020

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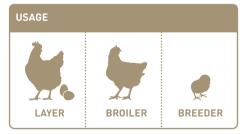


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Nearly 60 percent of US broilers now raised without antibiotics, but that number may have peaked

Almost six in ten US broilers were raised without antibiotics of any type in 2019, but that number may have peaked, according to Greg Rennier, PhD, President of Rennier Associates Inc., a company that tracks poultry-health markets in the US.

Broilers raised in no antibiotics ever (NAE) systems accounted for 58 per cent of total US production last year, a seven-point increase over the previous 12 months.

Increases in NAE systems in recent years have primarily come at the expense of "full-spectrum" programs that allowed the use of antibiotics deemed to be medically important.

But since full-spectrum usage has become almost non-existent, further growth of NAE production is unlikely.

Leveling off

"We have arrived to the point where we might expect less change in the next couple of years, primarily because full-spectrum production is essentially down to zero," Rennier told Poultry Health Today.

"Especially in the last couple of years, most of the growth in NAE was coming from the full-spectrum part of the business."

Rennier said reduced-use poultry programs - those that allow the use of non-medically important antibiotics - have held steady the past two years at about 25 percent of production, suggesting that NAE production is unlikely to pull any additional share from that moderate category.

A fourth group that Rennier calls "ionophores only"

has hovered between 15 percent and 18 percent over the past three years. That suggests there will always be producers who continue to use animalonly antibiotics to prevent ubiquitous challenges such as coccidiosis.

"I think we're down to a group of producers who are not going to go to NAE," he added. "For various reasons, they continue to use and rely upon non-medically important antibiotics like bacitracin, avilamycin and ionophores.

"These producers have weathered the NAE storm when everyone else was changing, and they held to a more traditional style of management that best fit their systems and their clients. I just don't see any indication they are going to, or need to, change."

Changes in the hatchery
One of the other notable
trends in this year's survey is
the number of broiler chicks
receiving an antibiotic in
the hatchery during in ovo
vaccination. That practice
has fallen to almost zero,
Rennier said.

"Only six or seven years ago, about nine out of 10 broilers were being administered an antibiotic in the hatchery," he added.

"So, not only do we have NAE going up, we're seeing the use of antibiotics in the hatcheries just falling off to nothing."

To manage the health implications of this reduction, Rennier said producers were focusing more on sanitation in the hatchery.

"Antibiotics covered small issues and took care of them," he said. "Not that good sanitation wasn't a priority in the past, but

they are really making sure the hatchery is clean so there aren't any problems antibiotics need to fix."

New approaches to coccidiosis

As producers eliminate antibiotics from their production systems, a large number are turning to nonionophore anticoccidials (NIA) to help prevent coccidiosis, Rennier said.

Almost 50 percent of the feed tonnage contained an NIA last year, up from just 19 percent in 2015. Meanwhile, feed containing ionophores, a class of antibiotics for coccidiosis prevention, almost halved from 2015 levels (27 percent in 2019).

Rennier also found that most NAE programs employed eubiotics - products that provide a healthy balance of the microflora in the gastrointestinal tract - whether that was a microbial, botanical, yeast, essential acid or combination.

Rennier pointed out that producers in the past had used a "kitchen sink" approach in which they tested and evaluated multiple eubiotics. He noted that many integrators had now settled on a few products, resulting in more consistent programs.

"Production and technical managers seemed to have settled on set programs. Some had a summer versus winter program, whereas others seemed to use different products when on coccidiosis vaccines," he said.

"It appears that after four or five years of tackling these issues, trying different products and evaluating the results, integrators were starting to get into a groove with what they were doingthey were down to the one, two or three products they thought worked best for them."

Outlook for 2020

Looking ahead to next year's survey, Rennier said he didn't expect to see any major changes in the numbers, provided the products available to producers continue to work as they have done.

"Obviously, we might get to a point where the nonionophore anticoccidials could become a little less effective as we use them more, but there's no indication we're there yet," he said.

"And I think people are now comfortable with how they're raising birds. I don't see anyone that stopped using antibiotics going back anytime soon."

The future for ionophores is a little more difficult to predict, however.

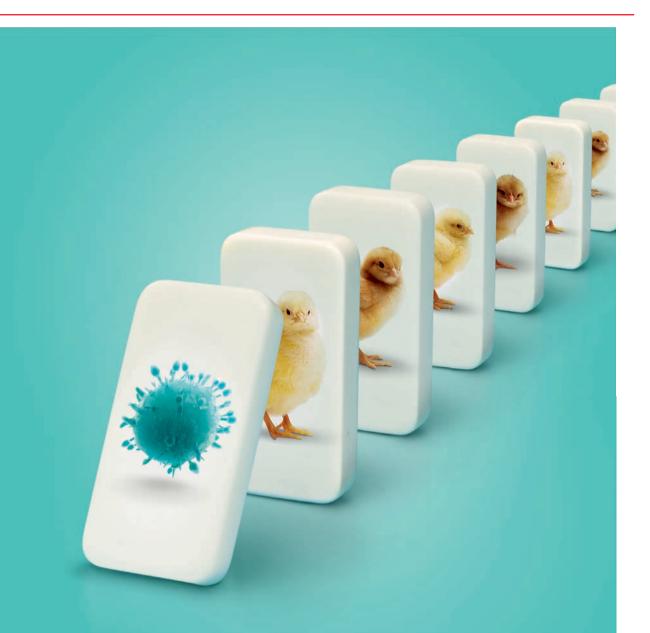
"As long as things are going the way they are now, I think ionophores have a place, and I think they will rebound at some point in the future. It's just difficult to say when we'll reach that point." he said.

"We have a limited number of products, and once we use one category, we need to switch to another.

"I'm guessing in three, four, five years you'll start to see ionophores creep up a little, but they'll probably never go back to what they were." For all the innovations and products associated with coccide is management in

broiler chickens, producers in Rennier's survey still ranked coccidiosis as the top disease of poultry, up from the second spot over the previous three years.

Conversely, necrotic enteritis - a disease long associated with shortfalls in coccidiosis control - was ranked No. 3 in 2019, down from the top position in 2018.



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How COVID-19 has hurt China's poultry industry

While the rest of the world battens down, the least affected areas of China are now functioning more normally, but it will take time for the poultry industry to recover.

The novel coronavirus, COVID-19, while not infecting poultry, has, nevertheless, had a significant impact on China's poultry industry.

While the rest of the world now suffers with lockdowns and selfisolation, the Chinese workforce is going back to work, with life gradually returning to normal. The outlook for China's poultry industry, however, remains particularly poor and is expected to worsen.

Gone are the favourable conditions enjoyed by China's producers last year. Despite the country's improving outlook, for the poultry sector, far from 2020 bringing widely expected good fortune, like the rest of the country, farmers have had to cope with movement restrictions and paralyzed supply chains, leading to large inventories and falling prices.

A tale of two viruses

2019 saw China's poultry producers enjoying the benefits resulting from the swine sector's difficulties. With African swine fever (ASF) decimating the swine herd, demand and prices for chicken rose dramatically, with producers unable to keep pace.

With no signs of ASF being brought under control, the chicken and egg production were set to keep rising throughout 2020, but COVID-19 changed everything.

The movement restrictions imposed by China on its population - now replicated in other countries - are all too familiar, with Wuhan and Hubei province becoming household names. We are all now aware of the impact that such restrictions have on business. Less well-known is that Hubei is China's sixth largely poultry producing province.

While not all of China has been as tightly restricted as Hubei, as of mid-February four provinces had issued official notices for lockdown policies, while numerous highways, railways and other transport systems were closed.

Little surprise, therefore, that, in late January, the **Hubei Poultry Association** wrote to the China Animal Agriculture Association (CAAA) saying that its members were "very distressed" due to a lack of feed. The CAAA, in turn, called on feed producers to send corn and soybean meal to Hubei.

By early February, there were reports that, without feed reaching Hubei "millions of chickens may soon perish" and that some farmers had had to euthanize young birds, while others had halved the amount of feed fed per bird.

According to the stateowned media outlet Global Times, there were approximately 348 million chickens in Hubei with the province also being an important egg producer. Similar situations have played out in other regions. Shutdowns in several

provinces stopped feed reaching farms, according to Chinese state media.

Beyond the immediate

Obtaining feed has not been the only problem facing China's poultry producers - the Chinese government again closed wet markets, and numerous food service outlets suspended trading. Combined with the impact of extended holiday and supply restrictions, poultry prices plummeted, leaving farmers with large inventories of birds and eggs.

China's agriculture Ministry has warned that the supply of chicken and eggs will continue to be hurt during the second and third quarters of this year. With much of China now returning to work, production could slowly return to normal across industries, even if China's overseas clients are in no position to purchase, but where animal production is concerned, returning to normal will be much slower

and more difficult.

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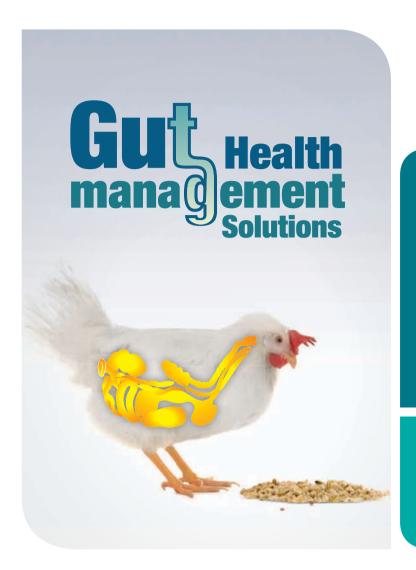
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I, Meer Abdul Nazeer, hereby declare that the particulars given above are true to the best of my knowledge and belief.

Date: 1 March 2020

M.A. NAZEER **Publisher**









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Coronavirus will constrain US meat supply despite Trump order

The corona virus crisis will continue to idle US meat plants and slow production, Tyson Foods Inc said recently, signaling more disruptions to the US food supply after US President Donald Trump ordered facilities to stay open.

Tyson reported lower-thanexpected earnings and revenue for the quarter ended on March 28, before processors shut massive slaughterhouses as the respiratory illness spread among workers. Shares fell more than 8 percent as Tyson also said meat sales will fall in the second half of the year because the outbreak has reduced restaurant demand, reported Reuters.

Trump last week deemed meatpacking plants "critical infrastructure" that must stay open, in an executive order to protect the nation's food supply.

"There have been some shortages in some specific categories," Chief Executive Noel White told analysts on a conference call.

Tyson is working with government officials to resume operations at a massive beef plant it closed in Dakota City, Nebraska, White said. The company over the weekend was receiving results for COVID-19 tests it performed on employees of another shuttered beef plant in Pasco, Washington, he said. Tyson also temporarily closed Iowa pork plants in Waterloo and Perry, and said recently it would re-open a pork plant in Logansport, Indiana. When

plants reopen, it is unknown how employees many will immediately return to work amid fears about the virus. One worker at Tyson's Waterloo facility told Reuters he planned to take three weeks of vacation time to stay away.

The country's capacity to slaughter hogs has dropped by about 50 percent from before the pandemic, Tyson President Mr Dean Banks told analysts. The company consolidated its product offerings to help keep supplies flowing to consumers, he added later on a call with reporters. Retail demand for Tyson's meat has increased 30-40 percent as consumers stay home, but the company said sales will decline in the second half of the year because of lost food service and restaurant business. Costco Wholesale Corp and

Tyson warned prior to Trump's order that millions of pounds of beef, pork and chicken would vanish from US grocery stores because of plant shutdowns. Its chairman said the US "food supply chain is breaking" as farmers began euthanizing pigs because they lost markets for them.

Kroger Co have limited meat

purchases.

Sales rose 4.3 percent to \$10.89 billion, in the second quarter ended March 28. Analysts had expected revenue of \$10.96 billion, according to IBES data from Refinitiv.

Excluding items, the company earned 77 cents per share, missing estimates of a profit \$1.04 per share.

Poultry industry suffers Rs 13,000 crore loss due to Covid-19 pandemic

The Union animal husbandry ministry recently said poultry industry in India had suffered ₹13,000 crore losses over the past month (till April) and the number was rising due to misconceptions that Sars-Cov-2 virus was being transmitted through consumption of eggs and chicken.

A letter from Mr O. P. Choudhary, Joint Secretary, Union Animal Husbandry Ministry urged states to start a vigorous campaign to stop misinformation and save poultry farmers during the crisis.

Recently Union Minister
Ms Maneka Gandhi said,
"I have checked with
concerned ministers of
these departments, and
they have denied giving any
such orders. This is a suo
moto letter written by the
joint secretary and does not
convey the government's
intent," said Gandhi.

Mr Choudhary, who is also the chairman of the Animal Welfare Board of India, said he had received verified videos from north India, Maharashtra and Telangana of farmers burying live birds. "No scientific body has found any evidence of the virus transmitted through poultry products. They are immunity boosters. This negative perception is dangerous. Relief measures are being planned to revive the industry," he said. A member of the Poultry Federation of India claimed losses stood at

₹22,500 crore for the entire lockdown period.

Meanwhile, animal welfare groups said they challenged contents of the letter before the Prime Ministers' Office, and will be approaching the Supreme Court. "The secretary cannot dictate what people should eat. Such directions, if needed, are issued by the Food Safety Standards Authority of India," said Ms Gauri Maulekhi from People for Animals.

"In India, there are filthy and dirty meat markets with slaughter practices that do not comply with food safety standards. Such areas are hotbeds for the emergence of infections," Maulekhi added.

The People for the Ethical Treatment of Animals (PETA) India said globally and in India people were beginning to value other forms of food and changing eating habits.

"Different types of animal farming are linked to the emergence and spread of novel zoonotic diseases. To avoid a future pandemic. we need to act on scientific facts about how new viruses come from factory farming and live markets. The science is clear. Unless we act now on intensive confinement in the rearing of animals for food, no future pandemic could be ruled out and more are likely," said Dr Manilal Valliyate, veterinarian and PETA India's chief executive officer.



Proteon Pharmaceuticals, the parent company of Vetphage Pharmaceuticals, joins Efforts to Fight Coronavirus

- Coronavirus has affected more than 4,70,000 people in the world and caused 21, 344 deaths
- ► Global lockdowns have been effective in arresting movement but to beat these epidemic countries need to ramp up testing
- WHO has asked countries to adopt its FITT strategy which is Find, Isolate, Test and Treat to put a stop to this outbreak?

Mumbai, March 26, 2020:

Poland based biotechnology **Proteon Pharmaceuticals** has joined efforts to fight the Covid 19 pandemic by tying up with leading research institutions of that country to set up new SARS-CoV-2 Coronavirus Detection Centre in Lodz, Poland. The new research facility will fast track the disease testing process in order to significantly improve the number of test conducted. Eventually it will result in fast diagnosis and stopping the Coronavirus spread.

The new SARS-CoV-2 Coronavirus Detection Centre in Lodz, Poland has been established to conduct large-scale tests for virus diagnosis. The new laboratory was created at a very fast pace with the involvement and cooperation of the Institute of Medical Biology of the Polish Academy of Sciences, the University of Lodz, the Medical University of Lodz and Proteon Pharmaceuticals. It is staffed by a team of microbiologists, geneticists, doctors and experts, including scientists from Proteon. The goal is to

conduct as many tests as possible in the shortest possible time to fast track the entire process of diagnosis, isolation and treatment.

"Our parent company Proteon Pharmaceuticals is partnering other research institutions to put in place a highly qualified team of scientists and biotechnologists to work on improved testing mechanisms. India can also learn from this model and rope in private research institutions and labs in a major way to conduct efficient testing and research mechanisms to study about the virus. This is a good opportunity to learn from other countries' experience and implement proven solutions on our local ground as well.

Private players can help by doing home collection of samples to avoid contact with people and learn from Coronavirus Detection Centres like that of Poland to take appropriate biosafety and bio-security precautions as well as allow only laboratories with real time polymerase chain reaction assay for RNA virus

to conduct Covid-19 tests as well as culture the virus," said Dr Ramdas Kambale, Senior Vice President, Vetphage Pharmaceuticals.

"Quick and mass diagnostics is currently the most important tool for stopping the growth of coronavirus infections. If it is possible to detect a virus infection faster and on a larger scale, the infected people will be isolated sooner and receive appropriate treatment. This will translate into a decline in infection dynamics," says Prof. Jarosław Dastych, CEO of Proteon Pharmaceuticals S.A.

India which is currently in a lockdown of 21 days that has restricted public movement too can adopt the same measure in cooperation

with Indian Council of Medical Research to create more and more Coronavirus Detection Centres so that more and more people are screened at a much faster pace. India's testing rate per one million people was lowest at 3 as of 13th March 2020.

In India, private lab testing has not become a wide scale operation yet and government institutes can only conduct 60,000 tests a week which is too low number for India's large population. Leading health experts have already asked India to be a little more aggressive in testing as it is the only way to emerge less scathed from this epidemic. According to WHO Director-General Tedros Adhanom Ghebreyesus "Allowing people to stay at home and shutting down population is buying time and reducing the pressure on healthcare systems but this cannot contain the epidemic. To defeat it we need to attack the virus with aggressive testing and isolation of those affected so that they get proper treatment and do not spread it further".

ILDEX Vietnam postponed to December 9 – 11

Due to the unrest COVID-19 crisis, the management team of ILDEX have decided to postpone ILDEX Vietnam 2020 in Ho Chi Minh City to 9-11 December 2020. The

emergency in Vietnam and other surrounding ASEAN countries have been eased, however, the spread of the virus continues in other parts of the world.



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New Leadership at Novus Aims to Achieve Top Position in "Animal Health through Nutrition" Market

SAINT CHARLES, MO (April 3, 2020): Dan Meagher has officially taken the helm as CEO and President at Novus International, Inc., with plans to lead the company to further success in the animal nutrition space.

"My goal is to be one Novus; one company focused on our core strengths," Meagher said. "We have a great technology in the HMTBa molecule (found in the company's methionine product, ALIMET® as well as other products), we will seek new and innovative technologies, and we will continue to build upon our history of research and development by creating more products and solutions. Our resolute vision remains to help feed the world wholesome, affordable food in a sustainable manner."

Meagher said that while the novel coronavirus pandemic (COVID-19) has delayed the finalization and implementation of the company's new strategy, the plans he and his team have for the company are sure to be visible to customers when they are fully realized later this year.

As the company welcomes Meagher's return to Novus following the six-years he spent as the head of ag-tech start-up Agrivida, Novus also congratulated former CEO and President François Fraudeau on his retirement, in addition to that of long-time leader and advocate Jeff Klopfenstein, Executive Vice President and President



Dan Meagher

of methionine business, who announced in March that he would retire from Novus and his 29-year career with the company, effective April 1.

"I've been with the company since the very beginning," Klopfenstein said. "I've been active in its growth and expansion, and what we've achieved as a company has made me proud. Helping our customers to feed the world has been an honor and I wish everyone at Novus, and those in the animal agriculture industry, a bright future."

Klopfenstein will continue to work with Novus as a consultant for an agreed period of time.

As Meagher takes the reins, he acknowledged that these changes, coupled with anxiety about the pandemic, can be stressful but said he is confident that his new Executive Leadership Team is positive in its outlook and plans to move the company forward.

"My request is that we keep

focused on serving our customers, working with stronger collaboration and maintaining an optimistic mentality towards our future," Meagher said. "I am excited about the future of Novus because I know we have the right people in this company to make a difference."

Novus International, Inc. is a global leader in Health and Nutrition solutions for the animal agriculture industry. The company is headquartered in Saint Charles, Missouri, US and is privately owned by Mitsui & Co. (U.S.A.), Inc. and Nippon Soda Co., Ltd. For more information, visit www. novusint.com.

VICTAM and AHN Asia postponed to Jan 2022

Due to the worldwide COVID-19 crisis, the management teams from the VICTAM Corporation and VIV worldwide had postponed VICTAM and AHN Asia in Bangkok to the second quarter of 2020.

As the worldwide situation is still very critical and a long way from being solved, we cannot take the risk of organizing an event as early as July. COVID-19 is still disrupting businesses around the world and we have concluded that being present at the exhibition is, at the moment, not our client's priority.

We evaluated an alternative date in the second half of this year, but as both health and financial situations in the world by then are very unclear, we believe postponing the event to the beginning of 2022 is in the interest of the market and the participants. This way there is more time to let the situation and business get back to normal. Another reason to choose January 2022, instead of the second half of this year, is the full event calendar, which could create a conflict of dates for our visitors and exhibitors.

Postponing the event to January 2022 will give all stakeholders room to breathe and pay attention to other vital issues.

Our mission is to present a strong, value-adding event to the industry with high benefits for all parties. Due to the consequences of the COVID-19 outbreak, we are unable to succeed in this mission and therefore we believe it is the right decision for the market and we will come back stronger together in 2022.

VICTAM and Animal Health and Nutrition Asia is rescheduled to 18 – 20 January 2022 at BITEC, Bangkok, Thailand. The objective remains the same: to realize the total animal feed and health event organized by VICTAM and VIV.

The Victam Corporation and VIV worldwide will also continue their partnership in Europe in 2022 by organizing VICTAM International and VIV Europe together at the Jaarbeurs exhibition grounds in Utrecht, the Netherlands, from May 31 - June 2, 2022. The set-up of this exhibition is different from the Asia event, as VIV Europe and VICTAM International will be co-located but with each exhibition in their own halls.

For more information, please visit the official websites: www. victamasia.comor www. vivhealthandnutrition.nl.

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alternative to antibiotic



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F. Coli

F4 (K88), F5 (K99), F6 (987P), F18, F41

Clostridium Perfringens Type A, C, B, D, E

Staphylococcus Aureus





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April & May 2020 • **POULTRY FORTUNE** • 23

PF APRIL & MAY 2020 ISSUE.indd 23 15-05-2020 17:44:29

Aviagen India Research Laboratory Awarded R&D Status



March 23, 2020 – Udumalpet, India. – Aviagen India's Research Laboratory was recently officially recognised as a Research and Development (R&D) facility by the Department of Scientific & Industrial Research, Ministry of Science & Technology, Government of India.

Road to certification success

The rigorous certification process was led by Aviagen's Head of Veterinary Services Dr Natarajan Kavitha and supported by Senior Management Advisor Dr Kandasamy Udayasurian, who guided a research panel that helped ensure the programme's success.

Paramount to certification were a well-defined and structured R&D program that leads to the development of innovative products and / or technologies, as well as a long-term R&D policy. Other qualifications included a separate and identifiable R&D infrastructure that is separate from other operations such as production and quality control. And, the laboratory must have qualified staff

engaged exclusively in R&D and headed by a full-time, qualified expert.

Dr Kavitha explained that the laboratory was built in 2016 according to a design specification that would enable the company to meet India's R&D registration criteria.

"Aviagen is committed to poultry health and welfare, and has extensive programs and procedures in place to take good care of our birds. While the registration and qualification process was thorough, detailed and complicated, I'm proud to say we passed," she commented.

She went on to say that the certification also allows Aviagen to extend its laboratory research to reallife trials in the field.

Dr Bill Stanley, Aviagen's Director of Global Health Monitoring, joined the Aviagen India team in congratulating Dr Kavitha and Dr Udayasurian on their hard work that led to this achievement. "This registration adds an important dimension to Aviagen

India's role in promoting India's poultry industry."

About Aviagen

Aviagen is a global poultry breeding company that develops pedigree lines for the production of commercial broiler chickens under the Arbor Acres, Indian River, and Ross brand names. The Rowan Range and Specialty Males are speciality breeding stock from Aviagen that offer greater flexibility for customers to meet specific or niche market requirements. The company is based in Huntsville,

Alabama, USA with a number of wholly-owned operations across the United Kingdom, Europe, Turkey, Latin America, India, Australia, New Zealand and the U.S.A., and joint ventures in Asia. Aviagen employs more than 5,000 people and has a distribution network serving customers in more than 100 countries.

For further information, please visit www.aviagen.

Govt to give 5 lakh tonnes of Corn @ Rs 1525 for poultry units in TS

Steps to be taken to stabilise Poultry sector, says Telangana Minister



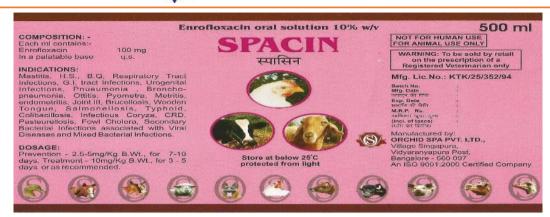
Hyderabad: The Telangana State government has resolved to supply 5 lakh tonnes of Corn, an essential ingredient in the poultry feed, to the sector in the coming days.

The assured commodity would be supplied at the rate of ₹ 1,525 a quintal to the sector and the government had decided in principle to supply corn to the industry on a regular basis through Markfed. A decision to this effect was taken at a meeting of the Cabinet sub-committee comprising ministers T. Srinivas Yadav, S. Niranjan Reddy and V. Srinivas Goud

held here on May 7.

Speaking after the meeting, Mr Srinivas Yadav said the poultry sector was expected to suffer huge losses after the outbreak of the Corona virus (COVID-19). But the initiatives launched by the government at the instance of Chief Minister K. Chandrasekhar Rao had helped in stabilising the sector. In the process, the government had constituted a Cabinet sub-committee to study different aspects relating to the industry and suggest remedial measures.



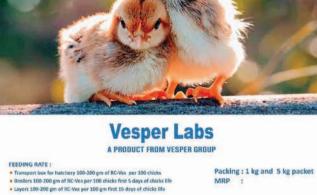


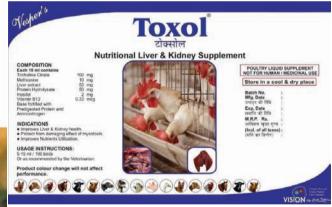














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Skylark Group Develops Emergency Ventilator to Support Covid 19 Efforts

Affordable and Easily Scalable Ventilator iMAVV aayu promises to be the key to saving lives.



(left to right) Mr Vikas Dhull, Mr Mihir Garware and Mr Jagbir Singh Dhull with iMAV Vaayu

Safidon, Jind, Haryana, April 5: Skylark Group and Garinno Global are proud to develop iMAVVaayu on April 5, 2020. iMAVVaayu is an Indian Motorised Affordable Ventilator. It is a reliable emergency ventilator which will give a huge impetus to the fight against Covid 19 pandemic.

This ventilator has been developed by the R&D teams of Garinno Global, an innovative poultry equipment company and Skylark Group, a complete vertically integrated poultry producer. The design is simple and user friendly. Some key features of this innovation are,

- 1. Three settable stroke volumes 450. 600, 800 ml
- Respiratory Rate is precisely settable digitally.
- 3. Pressure limiter and air filters are in built.
- One Master controller can drive 4 iMAV machines.
- 5. Runs Uninterrupted during power failure

- 6. Large lamp indicator for easy monitoring of machines.
- 7. All Parts are maintenance free and lubrication free
- 8. Compact design makes it portable.
- Easy to operate and install.



iMAV Vaayu

"The ventilator is the first prototype that has been produced within 3 days and that too with parts already available in our companies' factories. We have the capabilities to produce 25,000 pieces by ramping up our capacities. This innovation is a small contribution in aiding our healthcare workers during this unprecedented crisis that humanity is facing. We will donate these in

government hospitals and if need be will only charge the production cost," Dr Vikas Dhull, Director, Skylark Group said.

"iMAV is the Indian Motorised Affordable Ventilator made especially to fight the Corona Virus pandemic. This will increase the chances of survival during emergencies when hospital staff has excessive load," Mr Mihir Garware, Director, Garinno Global added.

About Skylark Group Skylark Hatcheries was

established by Mr Jagbir Singh Dhull and Mr Jasbir Singh Deswal in 1985. Today, the Skylark Group is one of the largest poultry producers in India. Through an unwavering commitment towards quality, excellence and strategic integration, we have built a diverse portfolio of operations that include grandparent stock, parent stock, hatcheries, broiler contract farming, feed production, poultry processing, large-scale mechanised farming and equipment fabrication.

About Garinno Global

Garinno Global is an innovative poultry equipment company based in Mumbai, Maharashtra. It has made a name for itself in the list of top suppliers of poultry equipment in India.

Innovista appoints Vetina as distribution partners

New Delhi: Innovista Feeding Solutions Pvt Ltd, animal feed additive company from New Delhi announced Vetina Healthcare LLP of Pune as their distribution partners for Indian subcontinent. Innovista over the last decade has primary focus on feedmillers in select territories. "With our new partnership with Vetina we will enhance our reachability and visibility to other territories within the subcontinent that we have not been catering to in the past", said Dr Sekhar Basak, Managing Director, Innovista Feeding Solutions. "We are very excited with this JV and we look forward to working with our new partner and co-exist in the marketplace to grow

together", added Dr Basak. Mr Prakash Khaire, CEO, Vetina Healthcare expressed excitement with the new association. "We will venture into the poultry industry with Innovista's complete range of AGPs, anticoccidials and NGPs supported by a dedicated team in the coming months", said Mr Prakash Khaire.

Vetina Healthcare LLP is already a reputed brand in companion healthcare products for the past 3.5 years having tie-up with Covertus, a fortune 500 company along with 5+ International players in Companion Product space, Ruminant business and Igusol, Spanish company in Poultry sector.



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April & May 2020 • POULTRY FORTUNE • 27

PF APRIL & MAY 2020 ISSUE.indd 27 15-05-2020 17:44:31

Covid-19: With projected losses of Rs 22,500 crore, Indian poultry sector seeks Centre's intervention

The All India Poultry Breeders Association (AIPBA) has sought restructuring of loans, interest subvention among others from the central government to help the industry tide over the crisis



New Delhi: The corona virus outbreak and the consequent lockdown have pushed the poultry sector in the country into a crisis with losses projected at Rs 22,500 crore beginning February this year, prompting the apex body of poultry breeders to seek Centre's intervention to bail it out.

"Poultry industry contributes Rs 1.3 lakh crore to the country's GDP directly"

The All India Poultry Breeders Association (AIPBA) has sought restructuring of loans, interest subvention among others from the Narendra Modi-led government to help the industry tide over the crisis.

Vice President of the Association, Suresh Chitturi said the industry suffered heavily, beginning February, owing to false information linking corona virus to the consumption of chicken and eggs and subsequently due to problems in movement of File photo of AIPBA members poultry during the lockout.

"Rumours began doing rounds in the first week of February, which affected us very badly. Some people spread false information that chicken and eggs should not be consumed. The adverse impact continued for about six weeks," Chitturi told PTI here.

Though poultry industry recovered a bit following the clarification issued by them that eating chickens were safe, issues relating to the inter-state movement of eggs and chickens at various parts of the country hurt the sector, he claimed.

According to the Association, the industry employs more than 10 lakh poultry farmers and contributes Rs 1.3 lakh crore to the country's GDP directly.

The sector provides a direct benefit to more than one crore maize and soya agriculture farmers.

Poultry farming offers direct and indirect employment to over five crore Indian

citizens engaged in poultry production, trading, feed manufacturing, agriculture crops, logistics, exports and others.

The AIPBA has submitted a memorandum to Prime Minister Narendra Modi on March 30 seeking "urgent financial assistance and rescue package" from the Centre.

"Poultry birds were being sold at a price of Rs 10 to Rs 30 per kg at the farm gate level due to fake news regarding Corona virus"

Chitturi said the Association requested a restructuring of loans allowing conversion of existing working capital loans cash credit (CC) limits to term loans with two years moratorium. He said the Association also requested the government for interest subvention and issuing fresh working capital.

All small farmers with less than 20,000 capacity farms should be provided with a compensation of Rs 100 per bird based on their chicks' purchase bill paid through banking transactions, the Association said in the memorandum.

The AIPBA appealed to the Centre to provide wheat and rice of 'Feed Grade' from the old stock of government at a subsidized rate of Rs 10 per kg.

"The sector provides a direct benefit to more than one crore maize and soya agriculture farmers. Poultry farming offers direct and indirect employment to over five crore Indian citizens"

It further sought exemption of GST on Soya Seed and Soya Meal which has added to the input cost on livestock feed to the farmers. The total loss to the poultry industry in two-and-half-months beginning February this year was pegged at Rs 22,500 crore.

"The current 2.5 months loss of poultry industry (broiler farmers and layer farmers, Integration companies and breeding companies) beginning February 1 to April 15, 2020, until the lockdown opens is of INR 22,500 CR," the poultry breeder's said.

On the current market scenario, the memorandum said poultry birds were being sold at a price of Rs 10 to Rs 30 per kg at the Farm Gate level due to fake news regarding Corona virus. Noting that the production cost of poultry in India was Rs 80 per kg, the Association stated that the prices of eggs have plunged to two rupees per egg at Farm Gate.

It pointed out that the cost of production of egg on an average was four rupees per egg, it said.

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April & May 2020 • POULTRY FORTUNE • 29

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Srinivasa distributes over 10 lakh Eggs, pledges support to the poor and the needy



Suresh Chitturi, IEC Chairman and Managing Director, Srinivasa Farms Pvt Ltd, giving 10 lakh eggs document to Telangana state IT Minister K. T Rama Rao in Hyderabad recently



Eggs distribution to Health workers at Hospital in Telangana



Srinivasa Farms Eggs distribution in Andhra Pradesh

Srinivasa Farms Pvt Ltd distributed over 10 lakhs of Eggs and pledged support to the poor and the needy with supply of eggs till the end of the Corona lockdown period.

Srinivasa Farms
commitment in response
to the COVID-19 pandemic
reaches out to the
community to feed the
needy by donating eggs
which not only provide the
nutrition but also the much-

needed immunity in these challenging times.

Mr Suresh Chitturi,
Managing Director,
Srinivasa Farms has pledged
to donate 5 Lakh eggs to
the Telangana Govt, while
meeting Mr K. T Rama
Rao, Minister for IT &
Municipal Administration
to help the poor and needy
with nutritious food. Mr
Chitturi said that they
stand committed to serve
the community and have

Dr Kasula Rajasekhar Celebrates Daughter Geetika's Wedding





Dr Kasula Rajasekhar, Vice President and Chief Nutrition Officer of The Wenger Group in Pennsylvania, USA, celebrated his daughter Geetika Kasula marriage with Harish Kumar on 19 January 2020 in Chennai. Poultry Fortune Editor M. A. Nazeer and other relatives and friends of Dr Kasula attended the wedding ceremony and blessed the couple. Wenger are a large feed manufacturers with over two million tonnes per anum, with pullet growing, egg marketing, ingredients trading and technical services.



Egg distribution in Narsapur, Telangana State

already donated 3 Lakh eggs in Andhra Pradesh villages and to the Police Personnel who are serving and protecting people during the lockdown period. And over 2 lakhs of Eggs have been donated in the villages of Telangana state and in the capital Hyderabad. The teams of Srinivasa Farms have all geared up to supply free egg distribution till the lockdown period in both the states of Andhra and Telangana.

30 • POULTRY FORTUNE • April & May 2020

PF APRIL & MAY 2020 ISSUE.indd 30 15-05-2020 17:44:34

'These viruses are susceptible to normal cooking temperatures ... safe to eat non-vegetarian food in India'

- Says Ashish Paturkar, Vice Chancellor, MAFSU

Mumbai: Dr Ashish Paturkar, Vice Chancellor of Maharashtra Animal & Fishery Science University (MAFSU), is an authority on veterinary public health. He was WHO expert review member for formulating standards on antimicrobial residues of animal origin foods. Vijay Pinjarkar speaks to him on zoonoses (disease passed from animals to humans):

In recent years hasn't zoonosis gained attention?

The total human pathogens identified till today are 1,407. Out of these around 60% are zoonotic, and out of the total new emerging pathogens identified during the last three decades, around 75% originated from animals. Many viruses which originated from animals have caused pandemics like influenza H1N1, avian flu (influenza H5N1), SARS (SARS-Cov-1) and MERS-CoV. The WHO's International Health Regulations (IHR)-2005 advocate 'One Health' approach, which is nothing but a multi-sectoral, multi-disciplinary, multiinstitutional and multispecialty coordination in all aspects of response to outbreaks.

Can infected people transmit this virus to pets or stray animals, wildlife or animals in zoo?

There are isolated cases of pet animals having Covid-19 virus. There is no credible evidence that dogs or cats and other domestic animals are playing a role in the spread of this human disease. Further studies are underway to understand



Ashish Paturkar, Vice Chancellor, MAFSU

if and how different animals could be affected by Covid-19 virus. It would always be better to take certain precautions to avoid contact between Covid-19 positive patients and pet animals. MAFSU has already issued an advisory in this regard.

If people don't show symptoms, how far are animals at risk?

As of now, there is no rapid test designed to screen pets or stray animals, wildlife or animals in zoos even if they are showing respiratory symptoms. Further, there is no policy decision to test these animals because there are isolated reports of Covid-19 positive animals which are asymptomatic. The same reverse transcription polymerase chain reaction (RT-PCR) is recommended by World Organisation for Animal Health to test these animals. Positive animals should be kept in isolation to avoid contact with other animals and humans. The government has to decide on this depending upon the risk analysis.

Is it true that the impact of humans on wildlife is responsible for these

viruses?

As of now we do not have any evidence to show that the Covid-19 virus has come from wildlife or any other species of animal. Therefore, it would be premature to comment on

Does corona virus spread through meat, milk, chicken and seafood?

The corona virus needs to infect animals to come into meat, milk and chicken. However, there are no such reports. The experiences from previous outbreaks of related corona viruses like SARS and MERS also show transmission did not occur through food consumption. Corona viruses need a host to grow and multiply and it cannot grow in food. However, concerns were expressed about the potential for these viruses to persist in raw foods of animal origin. These viruses are thermolabile - they are susceptible to normal cooking temperatures (70°C). Therefore, as a general rule, the consumption of raw or undercooked animal products should be avoided. Raw meat, raw milk or raw animal organs should be handled with care to avoid cross-contamination with uncooked foods. In general, because of poor survivability of these corona viruses on surfaces, there is very low risk of spread from food products or packaging that are shipped over a period of days or weeks at ambient, refrigerated, or frozen temperatures. There is a need to conduct elaborate food safety studies in this

regard. Therefore, general precautions are always to be taken while handling such products.

What precautions should we take with live animals or animal products?

Under the present scenario, WHO advises general precautions while visiting live animal markets, wet markets or animal product markets, which include regular hand washing with soap and potable water after touching animals and animal products, as well as avoiding touching eves, nose or mouth, and avoiding contact with sick animals or spoiled animal products. Any contact with other animals possibly living in the market should be avoided. Precaution should be taken to avoid contact with animal waste or fluids on the soil or surfaces of shops and market facilities. As per general good food safety practices, raw meat, milk or animal organs should be handled with care, to avoid potential cross-contamination with uncooked foods. Meat from healthy livestock that is cooked thoroughly remains safe to eat. Similarly, the other foods of animal origin including milk, fish and eggs should also be thoroughly cooked. It is completely safe to eat non-vegetarian food in India.

Do animals have receptive cells to get virus from humans?

Viruses need to attach to cells to infect them and they do this by binding to specific receptors on the cell. Some receptors are very specific to an individual animal species, while some are more general. These differences result in some viruses only infecting one species (or cell type) while others infecting more. In case of Covid-19, we do not have conclusive findings in this regard.

Poultry industry begins providing free eggs to migrants, pourakarmikas in Mysuru

Mysore: The poultry industry in Mysuru, which was badly hit from the twin scare of coronavirus and bird flu, had done distribution of free eggs to migrant labourers, pourakarmikas and other poor including slum dwellers.

About 11,000 eggs were distributed. Minister for Cooperation Mr S.T. Somashekar, who is also the Minister incharge of Mysuru district, launched the free egg distribution programme at a function on the Mysuru City Corporation (MCC) premises recently.

Mysuru Zone Chairman of National Egg Coordination Committee Satish Babu told the media that eggs will be handed over to the MCC at Town Hall every day from where the civic body has made arrangements for their distribution in different vehicles including autorickshaws. It went on 15 to 20 days and distributed eggs worth ₹10 lakh", he said.

Mr Babu claimed that the consumption of eggs will help build 'immunity' among the pourakarmikas, who toil every day to keep the city clean, and other vulnerable sections including migrant workers and urban poor. The poultry industry comprising egg producers and traders among others had come together to make the contribution.

Though sale of chicken and eggs, which had been

prohibited after an outbreak of bird flu last month, had resumed in the city, the poultry industry is yet to recover from hard times it faced. Chicken shops have been allowed to open for only three days a week for a restricted time duration.

But, Mr Babu said there is not enough supply of chicken. "The condition of the poultry industry is so bad that production had been stopped after people began shunning chicken and eggs due to a misinformation campaign. The bird flu added to our woes", he said.

A lot of poultry farmers had lost their birds due to various reasons including short supply of feed and barely 10 to 20 per cent of the regular supply is available now. As it takes about two months from the time of laying of the egg to a bird reaching its full size, the supply of broiler chicken is yet to pick up, he said.

However, a large number of poultry farmers are circumspect about resuming production on a regular scale in view of the extension of the lockdown and the possibility of a further extension. It may take a long for the poultry industry to recover.

However, he said eggs sector or layers in the poultry had not been as badly hit as the broiler industry. The wholesale price of an egg stood at 24.25 per egg in Mysuru recently, he added.

Karnataka's poultry sector on road to recovery

While chicken sale touched 368 metric tonnes per day, eggs crossed the 1-crore mark as on May 6. Before the lockdown, around 700 metric tonnes of chicken and 1.6 crore eggs used to be sold in a day in Karnataka.



Bengaluru: The poultry sector in Karnataka seems to be recovering nicely, with sales of chicken and eggs picking up pace.

But the numbers rapidly dipped to 85 metric tonnes and 37 lakh, respectively, in the first week of April, mainly due to the misconception that consuming chicken and eggs would facilitate Covid-19 spread.

"Though what we are selling is only 50 per cent of pre-lockdown sales, we are happy that business is picking up and hope to reach the previous level soon," said Animal Husbandry Minister Mr Prabhu Chavan.

Relief package for farmers

After announcing a Rs 1,600 crore relief package for unorganised sector workers,

Karnataka is likely to come out with one for farmers hit by the lockdown.

Hours before Chief Minister B. S. Yediyurappa held a meeting with farmer representatives on May 6 to discuss their problems and expectations, Agriculture Minister B.C. Patil said the government will soon announce a special package for vegetable and fruit growers who suffered heavy losses due to the lockdown. He appreciated the CM's decision to provide Rs 25,000 per hectare to flower growers.

At the meeting, farmer leaders urged the CM to get sugar mills to pay sugarcane dues and also ensure disbursement of fresh loans to farmers from cooperative societies and commercial banks.

BEWARE, BROILER PRODUCERS Place less, only 30 - 35 % of your regular placement!

There are many after-effects of the COVID-19 pandemic that will contribute to reductions in consumption and demand for chicken. Poultry Fortune gave below an interesting Whatsapp chat message among a Whatsapp group in poultry.

Many of us think that other players have either closed-down or they do not have enough capital to continue their business. And, since I have enough capital to continue, I will put more birds, expecting bumper rates that will help me recover my initial losses.

But placements are already high from all, big integrators, medium integrators, small and medium open seasonal farmers.

Also, since demand will be lesser than production in the coming months, there is a significant probability of another rate-crash.

Big companies like Venky's, Suguna, etc., should not be bullish and place more birds, they should also restrict themselves to just 30% - 35% of their regular amounts

Following are the reasons for lower demand:

- 1. Of the overall broiler consumption, only 30-35% is from household sales, the remaining 65-70% demand come from institutional sales from restaurants, marriages, parties and get-togethers, railway and air travel, corporate meetings, tourism, etc.
- Even after the lockdown ends, outings to restaurants and hotels will still not return to the normal level, out of fear and safety concerns.
- 3. Frequency, as well as the number of people attending public outings, parties, calling friends over for a meal, marriages, corporate events and meetings etc will be drastically lesser.



- 4. Domestic and international travels will also suffer from drastic reductions.
- 5. Corporate spending will be drastically reduced.
- 6. Work from Home culture will be more promoted.
- 7. The rural economy has already suffered and will continue to be in doldrums.
- 8. Fueled by the rumors of chicken not being safe for consumption, a percentage of consumers will still not buy and consume chicken.
- 9. Spending-power of the people has already taken a hit. Due to salary reductions, layoffs, and job-cuts, the unemployment levels have skyrocketed and spending-power of the people will stay reduced for the foreseeable future.
- 10. The general public will prefer not to spend and rather save all

their money.

- 11. Chicken and other meats are not considered as a part of staple diet by many. Thus they may choose to substitute it with other foods.
- 12. Migrant labour will not return to cities quickly.
- 13. The automotive, tourism, and construction industries will be drastically affected and will take longer time to revive.
- 14. Government funds are getting exhausted in Corona relief issues and funds for other development projects will see large cuts.

Because of all the above reasons, we poultry producers will have to be responsible and cautious while doing business.

RULE - To Make Profits, Production should be less than the Demand and Producers Should be Transparent with each other.

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34 • POULTRY FORTUNE • April & May 2020

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Effect of Postbiotic in Broiler Chicken

Highlight Points

Constant use of antibiotic growth promoter, at low dosage leads to development of resistance in bacteria and also leaves antibiotic residues in animal products. The emergence of antibiotic resistant pathogens through the spread of antibiotic resistance genes is an ecological problem that is exacerbated by the widespread indiscriminate use of antibiotics in livestock agriculture, veterinary and in human medicine. Therefore need of alternatives that would influence improvement of healthy production traits of chickens and safety for human consuming poultry products. Postbiotics refers to the metabolic by products like enzymes, peptides, teichoic acid, peptidoglycan derived muropeptides, exopolysaccharides, cell surface and secreted proteins, bacteriocins and organic aids generated by a probiotic organism during the final or intermediate stage of its metabolic process. Although there is dearth of information on the use of postbiotics in chicken many reported that postbiotic enhance immunity and growth performance in broiler chickens.

Bornalee Handique

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Introduction

Poultry farming has become one of the most widespread food industries and the size is expanding faster than other food producing animal industries. Due to the advances in the fields of avian genetics, nutrition, health and management, the broiler production has become a more popular, easy and credible enterprise to the Indian farmers with the increasing demand for this cheap source of well balanced animal protein. Increased growth rate, improved feed efficiency and prevention of sub clinical diseases are the main reasons why dietary antibiotic growth promoters have been practiced during the last 60 years in poultry production. However, their constant use, at low dosage, leads to development of resistance in bacteria and also leaves antibiotic residues in animal products. The emergence of antibiotic resistant pathogens through the spread of antibiotic resistance genes is an ecological problem that is exacerbated by the widespread indiscriminate use of antibiotics in livestock agriculture, veterinary and in human medicine. In India in context of use of antibiotics in poultry production has sought for withdrawal of antibiotics from poultry feeds and the need for alternatives that would influence improvement of healthy production traits of chickens and safety for human consuming poultry products. This situation, therefore, compelled researchers to investigate for other non-therapeutic alternatives to antibiotics and chemical growth promoters for poultry so that the ever increasing growth of this industry remains unaffected.

Probiotic Vs Postbiotic

Probiotics are beneficial bacteria that are able to colonize the host digestive system, increasing the natural flora and preventing colonization of pathogenic organisms and thus, securing optimal utility of the feed. Despite their proven ben-

efits, there are many concerns about their biosafety aspects; ease of microbial production, handling and storage; route of probiotic administration; stability and survival of the probiotic in the host and tolerance for bile (Reque et al., 2003). In addition, a recent study indicated that even probiotic bacteria have acquired resistance to antimicrobials that are commonly used in the human and animal health sciences (Shalini and Rameshwar, 2005). Given their shared microbial environment in the gastrointestinal tract, a risk of pathogenic microbes acquiring antibiotic resistance genes from probiotic microbes exists and vice versa (Mater et al., 2007; Gueimonde et al., 2013). The situation is further complicated by the fact that these acquired resistance traits can be transferred easily over species and genus borders by conjugative plasmids and transposons (Varankovich et al., 2015). If improperly cooked, livestock treated with probiotics that are consumed by humans as food may also pose as a possible source of antibiotic resistance genes for the human gut microbiota. As a consequence, probiotic as live bacteria might not be used anymore in the near future. Of late, the metabolite products synthesized from probiotics known as postbiotics have attracted attention to be applied in animal feed as growth promoter as a substitution to probiotics and in-feed antibiotics (Thanh et al., 2009; Loh et al., 2010; Kareem et al., 2017).

Advantages of postbiotic

Probiotics are living organisms, which eventually die but they secrete postbiotics as nutritive patrimony that continues to improve the health of the host. Thus Postbiotics refers to the metabolic by products like enzymes, peptides, teichoic acid, peptidoglycan derived muropeptides, exopolysaccharides, cell surface and secreted proteins, bacteriocins and organic aids generated by a probiotic organism during the final or in-

36 • POULTRY FORTUNE • April & May 2020

PF APRIL & MAY 2020 ISSUE indd 36 15-05-2020 17:44:36





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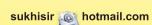
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April & May 2020 • **POULTRY FORTUNE** • 37

PF APRIL & MAY 2020 ISSUE.indd 37 15-05-2020 17:44:37 termediate stage of its metabolic process. Postbiotics avoids risks linked with the administration of live microorganisms and believed to have probiotic effects without living cells. Contrary to probiotics, metabolites are relatively more stable in terms of handling and storage and are unlikely to transfer antimicrobial resistance traits to other bacteria (Loh et al., 2009). Postbiotics also have advantage due to their clear chemical structure, safety dose parameters and longer shelf life which can influence the physiological function of host (Shenderov, 2013)

Effect of postbiotic on growth and immunity of broiler

The evidence of beneficial effects of soluble secreted products synthesized by different probiotic strains are progressively increasing and in recent years there has been an upsurge in research oriented to provide a better understanding of their underlying mechanisms, even if their precise composition is still under investigation. In this regard, most available literature concerns Lactobacilli. The metabolites produced from Lactic acid bacteria have been suggested as feed additives in animal feeding, showing beneficial probiotic effects on growth and gut health of animals (Loh et al., 2010; Kareem et al., 2016). One of the features of postbiotics is their ability to reduce pH value thereby inhibiting opportunistic pathogens in the feed and gut of animals. In addition, postbiotics display wide inhibitory activity against various species of pathogens such as Clostridium perfringens, Salmonella enterica and Escherichia coli (Savadogo et al., 2006; Liasi et al., 2009). Postbiotics play a role in general health and well-being and for improving host immune function. It is postulated that postbiotics induce changes in the gut microbiome and the altered gut microbial composition is associated with increased levels of innate and acquired immunity.

Conclusion

Postbiotics (metabolic products by lactic acid bacteria) and prebiotics have been established as substitute to antibiotics in order to enhance immunity and growth performance in broiler chickens. Inspite of its immense scope as an alternative to probiotics and antibiotic growth promoters, there is dearth of information on the use of postbiotics in chicken.

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How Bacteriophages and Feed Additives are transforming the poultry sector

Highlight Points

Consumers these days are very health conscious and choose to consume animal products which have been raised in a safe environment. This is why poultry farms need to take strict measures in prevention and control of infectious diseases by ensuring cleanliness and healthy diet

Nipun Gupta

Supervisory Board Representative, Vetphage Pharmaceuticals Pvt Ltd.

The global poultry market was valued at US\$ 267,332.3 million in 2018, and is expected to exhibit a CAGR of 3.0% over the forecast period 2019-2027, in terms of revenue. Rapid growth in consumer demand for livestock products in emerging economies such as China and India, owing to rising poultry meat and egg production and consumption is expected to fuel growth of the global poultry market. On the other hand, the Indian poultry market, consisting of broilers and eggs was worth INR 1,750 Billion in 2018. The market is further projected to reach INR 4,340 Billion by 2024, growing at a CAGR of 16.2% during 2019-2024.

Consumers these days are very health conscious and choose to consume animal products which have been raised in a safe environment. This is why poultry farms need to take strict measures in prevention and control of infectious diseases by ensuring cleanliness and healthy diet. However, it is difficult to keep poultry farms and stock completely disease free as new disease agents can emerge from time to time. Con-

38 • POULTRY FORTUNE • April & May 2020

PF APRIL & MAY 2020 ISSUE indd 38 15-05-2020 17:44:37



tracted diseases can reduce the egg production and growth rate of flocks which will in turn impact the economic output. Moreover, genetic changes in the birds have also made them more susceptible to diseases. Rising demand coupled with the need for greater generation of meat products, increasing awareness about the need for better hygiene and the rise of a more conscious consumer is gradually ushering in a series of changes in poultry rearing practices.

Rising awareness about the need to reduce Antibiotics usage

According to a recently concluded study it was established that most of the antibiotics used in the poultry industry are increasingly losing their efficacy against pathogenic microorganisms. Similarly, the use of antimicrobial agents in animal husbandry for therapeutic has been linked to the development of resistant bacteria. If the usage of antibiotics is not restricted in poultry there are chances that they may come in the final product that is eggs and meat which can further lead to increase in antibiotic resistance. This is because all microorganisms have an inherent capacity to resist some antibiotics which is why excessive use of antimicrobial agents has caused rapid surge and development of AR.

Antibacterial resistance is the ability developed in bacteria to combat against antibacterial agents. However, the main reason because of which antibiotics for animals are used is that they help treat infections and indirectly help in their growth and development. Chicken is one of the most farmed animal species in the world which makes it a leading contributor to the poultry industry. Nonetheless, use of antimicrobials in chicken plus other animal production will accelerate the development of AR in pathogens which poses danger to human beings.

This is because when an antibiotic is used in improper way, it may leave behind some bacterial strains that resist the drug which can multiply and become the dominating population. This dominating population can also be transferred to others. These resistant bacteria can transfer from poultry products to humans when they consume meat contaminated with these pathogens. This has prompted many countries to withdraw antibiotics from being used in animal production and set up regulatory authorities for selected antibiotics as well encourage the use of bacteriophages. This has also led to a surge in demand for healthier and safer alternatives to antibiotics for disease prevention and control.

Bacteriophages as a Better Alternative

Bacteriophages have emerged as a viable alternative to reduce antibiotic usage in poultry rearing. Bacteriophages are natural micro-organisms made up of only genetic material namely DNA and RNA plus protein. Moreover, they also do not damage the beneficial microbiome balance. These naturally occurring organisms only eliminate selected bacteria. More and more companies are embracing bacteriophages instead of antibiotics when it comes to poultry production. This is largely because bacteriophages are safe as they are only able to infect bacterial cells not human or animal cells. Without the presence of their bacterial host they become inactive within 48 hours. In comparison to antibiotics a single phage can destroy a multiple bacterium by multiplying in bacteria

itself which is why fewer doses are required per administration. Moreover, phages also do not dissociate from bacterial targets once irreversibly adsorbed.

Phage Therapy is now emerging as a useful tool in controlling bacterial infections and at the same time is encouraging the growth of healthy poultry. With the use of Artificial Intelligence, it can be determined whether the phages are lytic or not as only lytic phages are used in animal health. This is because lysogenic phages are dormant and embed themselves in the bacterial cell wall to live off it without destroying it. On the other hand, lytic phages cause lysis which is destruction of bacteria.

The Need for Quality Feed

When it comes to chicken it takes less than three hours for the feed to be digested and absorbed. To compensate for the relatively short digestive tract and rapid digestion transit time, high-performing birds need easily digestible nutrient-dense feed where nutrients are critical. The rates of genetic change in growth and feed efficiency over the years have also changed the physiology of the birds. Nutrient requirements and nutritional management have therefore changed to harvest maximum of the genetic potential of the new strains. The high genetic potential of current poultry strains can only be achieved with properly formulated feeds that are protein and energy-dense.

Moreover, the feed additives to use for destruction and prevention of bacterial infection in farmed animals as well as transmission to humans must be regulatory approved as well as should eliminate pathogens. It should also be non-toxic with no side effects on poultry and must be easy to apply and use. Other things which poultry farm owners and managers must keep in mind are the composition and quality of feed, nutrient value, digestibility, moisture retention, palatability as well as any possible hazards that long term consumption may cause.



Mr Nipun Gupta, Chief Commercial Officer at Proteon Pharmaceuticals S.A., Supervisory Board Representative for Vetphage Pharmaceuticals Pvt LTD

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Role of Immunomodulators in Poultry Nutrition

Highlight Points

- The poultry sector selects heavily on performance traits which adversely influence immune competence. Usually, they use antibiotics aiming to reduce the effect of microbial infections.
- ▶ But extensive usage has generated drug resistant pathogens and also increased concern about antibiotic residues in animal products, many countries have banned the use of antibiotic in diets.
 ▶ So, scientific based immune system modulation using immunodulatory agents could be an alternate solution to disease prevention and control of food-borne pathogens.

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Introduction

The poultry sector selects heavily on performance traits which adversely influence immune competence. Strengthening the bird's immune system against various infections and thus improving their growth output is important to sustain the health of poultry production in the context of the growing demand for animal protein (Farag and Alagawany, 2018). Generally, the poultry industry uses antibiotics to reduce the effect of infections. However, extensive use has resulted in drug-resistant pathogens and also due to increasing concern about antibiotic residues in animal products, many countries have banned the use of antibiotics in diets, consequently, forcing the industry to find alternatives to flock health management (Swiatkiewicz et al., 2013). Scientific based immune system modulation is an organized and integrated approach for the production of healthy birds which are safe and reliable to the consumer, which addresses ways of minimizing inflammation, improving a weakened response, managing gut health, an alternate solution to disease prevention and control of foodborne pathogens (Swaggerty et al., 2018). Diets are nourishing immune cells, modulating them, and promoting commensal microflora formation (Klasing KC, 2007).

The interaction between immune response and diet (immunomodulation) should, therefore, be a key area of interest. Immunomodulation can present as immunostimulation (substances that activate or induce the immune system's mediators or components) or immunosuppression (substances that inhibit the immune system), thus controlling or altering the duration, type or competency of the immune response (Jantan I *et al.*, 2015). To prevent the scenario of continuous immune system stimulation or a way of minimizing dietary expenses, the industry should consider developing a strategy that precisely targets, when birds are highly susceptible

to pathogens. During the first week of post-hatch, poultry is particularly vulnerable to pathogens many of which are usually found in poultry surroundings. This susceptibility to infectious diseases can lead to huge economic loss, which is due to an impairment of innate and acquired host defense. The most important features of this immune impairment are the functional inefficiency of the heterophil (polymorphonuclear cell), Functionally, heterophile are essential components of the innate immune response and involved in many activities such as adhesion, chemotaxis, phagocytosis, cytokine/chemokine production, and microbicidal action (Genovese, K.J et al., 2013).

Phytogenic feed additives

Phytogenics, also known as plant secondary metabolites, phytochemicals, phytobiotics, or botanicals, are plant-derived products/extracts (PEs) that comprise a wide variety of substances like essential oils, oleoresins, flavonoids, alkaloids, tannins, dried root powder of *Asparagus racemosus* and *Withania somnifera*, dried calendula (C. Officinalis), dandelion (T. officinale) and marigold (T. erecta) flowers, dried basil (O. basilicum 'Genovese') leaves.

Flavonoids associated with gut defense, anti-inflammation, anti-oxidation, maintenance of cellular and mucosal immunity and also modulate the endocrine and circulatory markers. The use of flavonoid dietary supplements can enhance the protection and health of broiler chickens (Kamboh et al., 2015). Dietary supplementation of genistein and hesperidin indicated a marked rise in cellular immunity i.e. neutrophil adhesion rate and cutaneous basophil hypersensitivity response, increased leucocytes and also improved antibody production against Newcastle disease and Avian Influenza antigens (Rasouli and Jahanian 2015).

42 • **POULTRY FORTUNE** • April & May 2020

PF APRIL & MAY 2020 ISSUE.indd 42 15-05-2020 17:44:51



Essential oils (EOs) are important aromatic components of herbs and spices besides their action on the immune system, also involved in appetite stimulation, improvement of enzyme secretion. Szigeti and their coworkers in 1998 reported the use of garlic and oregano derived essential oil in chicken diet enhanced antibody production against *Pasteurella multocida*, *Salmonella enteritidis*, and *Leptospira pomona*. Immunomodulatory effect of garlic could enhance antigen-presenting cells (APC), phagocytosis by peritoneal macrophages, production of interleukins, interferon (INF- γ), tumor necrosis factor (TNF- α) (Hanieh *et al.*, 2010). In broilers, EOs improve trypsin, amylase, and jejunal chyme secretion (Jang *et al.*, 2007), and also decrease adherence of pathogen to the intestinal wall (Jamroz *et al.*, 2006).

Cinnamaldehyde is associated with gene regulation, antigen presentation, humoral immune response and defense against inflammatory condition (Lillehoj HS et al., 2011), cinnamaldehyde could exhibit a suppressive effect on oligosaccharide induced production of cytokines such as tumor necrosis factor (TNF), interleukin 6 (IL-6) and IL-1 (Chao LK et al., 2007). A similar study using a mixture of capsicum and turmeric oleoresins on broiler chicken affected with avian necrotic enteritis showed an increase in resistance to infection (Lee SH et al., 2013).

In 2011, Kumari and their coworkers conducted a study to know the immunomodulatory effect in immune-deficient or immunocompromised birds using **herbal feed** containing W.somnifera and A. racemosus dried root powder in a specific dose showed a significant increase in both humoral and cell-mediated immune response and also skin thickness was more in both immunocompromised and normal birds which are fed with herbal diet. The use of dried plants in layers resulted in greater whole blood leucocytes and T lymphocyte proliferation (Balenovic *et al.*, 2018).

Astragalus membranaceous (AM) is a member of the Leguminosae family that has been commonly used as an immunomodulatory agent. Dried roots contain various biologically active compounds like polysaccharides, flavonoids, astragalosides and trace elements (Zhao et al., 2012). Astragalus polysaccharides (APS) have positive biological functions such as immune enhancement, anti-oxidant, antiviral, anti-microbial, and anti-parasitic activity (Farag et al., 2019). Feed diet containing APS increases the growth of chickens infected with Mycoplasma gallisepticum through enhancing the count of beneficial bacteria like Lactobacilli and Bifidobacterial spp and also reduces harmful pathogens (Escherichia coli, Bacteroides spp). APS also showed a synergistic effect with prebiotics which promotes lymphocytic proliferation and also enhances New castle disease antibody titre (Li et al., 2009).

Probiotics

Probiotics are live microorganisms which when administered in appropriate amounts confer health benefits on the host. Lactobacillus-based probiotics are most commonly used in birds, which promote the colonization of beneficial intestinal microflora to stimulate the immune system and thereby help in developing resistance to the pathogen. The immunomodulatory aspect of probiotic supplementation could result in the enhancement of intestinal immunity through a significant

increase in the level of cytokines (IFN- α and IL-2) and intraepithelial T lymphocyte population (Dhama et al., 2006).

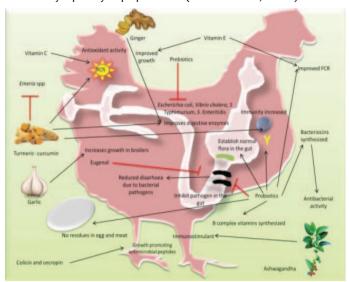


Fig. 1: Supplementation of natural ingredients as an alternative to antibiotics, which can stimulate immune system preventing problem with antibiotic resistance (Yadav et al., 2016).

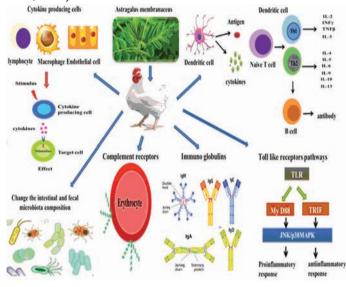


Fig. 2: Mechanism of action using **Astragalus** species as an immunomodulatory agent (Farag *et al.*, 2019)

Nucleotides

Nucleotides play a key role in almost all biological processes. They are considered as semi-essential nutrients, though cells can synthesize nucleotides themselves, under certain conditions synthesizing capacity is too low in animals (Rutz et al., 2008; Sauer et al., 2011). Supplementation of nucleotides with feed result in improved egg production, egg fertility, hatchability, increased body weight, reduced mortality during stress conditions, improved meat quality (Rutz et al., 2008; Bonato et al., 2014) and also results in healthier gut flora as shown by increased concentration of lactic acid bacteria (Jung and Batal, 2012). This influence is especially pronounced in young chickens. Since, nucleotides stimulate the

immune system resulting in an increased number of immune cells and antibodies, thereby reducing the impact of pathogenic organisms. Dietary yeast nucleotides induced a stronger and rapid antibody response to regular vaccines in chickens (Wu et al., 2018).

Beta-glucans

Beta-glucans are a structural component of bacteria, fungi, algae, and yeast as well as cereal grains that enhances immune response without negatively affecting production trait, which made it an ideal immunomodulator. Supplementation with a prebiotic beta-glucan function as microbe-associated molecular patterns (MAMPs) and trigger innate immune cells such as heterophils, natural killer cells, monocytes/macrophages. They are associated with cytokine production, oxidative burst (free radical production), phagocytosis and also antigen presentation to lymphocytes which in turn stimulate the adaptive immune system (Guo Y et al., 2003). Enhanced heterophile lead to increased resistance to Salmonella enteric enteritidis and Escherichia coli (Lowry VK et al., 2005). However, Salmonella Typhimurium affected the integrity of intestinal mucosa, and the severity of damage was reduced after dietary supplementation of (123)(126) β-glucan. There was also an improvement in both the number of goblet cells and the secretory IgA (Jacob and Pescatore, 2014).

Vitamins and minerals

Balanced feed containing vitamins and minerals should be ensured to maintain the nutritional and immune status of the flock. Feed diet containing immunostimulatory nutrients such as minerals (Zn, Cu, Cr), vitamins (A, C, E) and amino acids (arginine, methionine, and choline) can modulate cell-mediated and humoral immune responses in poultry. Vitamin A, E, C involved in the improvement of immune status by increasing antibody production and T cell proliferation. Vitamin E is effective in preventing free radicals from oxidizing unsaturated lipids. It serves in coordination with selenium (Se) to suppress active peroxidases and help in the integrity of the membrane of immune cells. Zinc increases T cell proliferation and its deficiency leads to a decrease in cell-mediated immunity and NK cell activity in birds. Copper involved in the development of white blood cells (WBC) and magnesium helps in the maturation of lymphocytes. Methionine plays a crucial role in cell-mediated immunity (Dhama et al., 2006). Thus dietary composition in poultry plays a significant role in the maintenance of the immune system.

Fermented feed

To mitigate the colonization of gastrointestinal pathogens in broilers, fermented feeds should be used as strategic resources. A fermented feed with low pH and lactic acid bacteria (LAB), which exhibit a positive effect on gut health and performance of birds. LAB (lactobacilli) induces Th2 cytokines (IL-4, IL-10), which stimulate B cell and immunoglobulin class switching (Kabir, 2009). Feeding fermented diet in chickens also enhances cell-mediated immune responses (Zhang et al., 2007; Gao et al., 2009). This also associated with reduced heterophil to lymphocyte ratio in broilers, suggesting that alleviated oxidative stress could lead to immunosuppression (Sugiharto et al., 2017)

Conclusion

To maintain the nutritional and immune status of the flock, balanced feed supplementation should be necessary; a good immune status will portray the defensive ability of the bird to fight against pathogens. Traditionally, the poultry industry has been using antibiotics aiming to reduce the effect of microbial infections, but the advent of antibiotic resistance has generated the need to substitute antibiotics with other products that could modulate the immune system to enhance the immune response, decrease stress and microbial load. An immunomodulator can be described as any biological or synthetic substance, capable of stimulating or suppressing the arms (innate and adaptive) of the immune system. Implementing immunomodulatory strategies using prebiotics, probiotics, plant-derived extracts, nucleotides, vitamins, minerals and fermented feed supplements, reported exhibiting growth-promoting as well as therapeutic properties.

The usage of immunomodulators has many benefits over antimicrobials, which do not interact with microbe directly that can prevent the emergence of resistance. Exploiting new tactics with this immunomodulator may take poultry economy in the right direction by reaching the expectations of the consumer, comply with the production efficiency and animal welfare.

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Role of Alternate Animal Protein Sources in Poultry Nutrition

Highlight Points

Indian poultry feeds are commonly formulated based on conventional feed ingredients i.e., corn soya based feeds. ➤ Animal protein sources are normally used in poultry diets to balance the amino acid contents, raise quality, palatability of diet, and to their important role in building animal protein tissues to produce meat and other poultry products. ➤ The main conventional animal protein sources used in poultry diets are fish meal and meat meal. ➤ In general, animal protein sources are high in protein, lysine and methionine, calcium and phosphorus than vegetable protein sources. ➤ Limited availability of conventional animal protein sources in recent years, lack of uniformity, and higher cost relative to plant protein sources has limited its inclusion in poultry diets. ➤ Poultry nutritionists to look for various novel locally available cheaper alternative animal protein sources for their use in poultry feed formulations to reduce the feed cost. ➤ Inclusion of alternate animal protein sources in poultry ration is discussed.

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Recently, the global and domestic consumption of animal protein continues to grow and much of the future supply of meat protein will come from poultry. To meet the increased demand for animal proteins among the consumers, there is a need for increased animal protein production. Among the various animal protein production, poultry occupies an important role and therefore there will be increased demand for poultry feed and, in particular, a demand for ingredients high in protein and energy. Feed is the single largest item of expenditure, accounting for more than two-thirds of the total cost of production of poultry farming. Indian poultry feeds are commonly formulated based on conventional feed ingredients i.e., corn soya based feeds. The cost of feed mainly depends on its protein level and quality. There are a variety of different protein sources that are suitable for use in poultry diets. Protein is provided from both vegetable and animal sources. Vegetable protein sources usually come as meal or cake, the by-product of oilseed crops. The main conventional animal protein sources used in poultry diets are fish meal, meat meal, meat and bone meal, poultry byproduct meal, blood meal and feather meal.

Animal protein sources are normally used in poultry diets to balance the amino acid contents, raise quality, palatability of diet, and to their important role in building animal protein tissues to produce meat and other poultry products (Cheeke, 2005), for that feed manufacturers always keep the animal protein sources on required levels in poultry diets, especially

for young birds due to high amino acid requirements during this critical period of age. In general, animal protein sources are high in protein, lysine and methionine, calcium and phosphorus than vegetable protein sources. There is ever increasing demand for conventional animal protein sources for feeding of poultry. Fish is the major contributor of animal protein in human diets. The availability of good quality fish meal is not adequate. However, limited availability of conventional animal protein sources in recent years, lack of uniformity, and higher cost relative to plant protein sources has limited its inclusion in poultry diets. Additionally, the presence of trimethylamine in fish meal creates a residual fish smell and flavor in meat and eggs. These conditions have forced the poultry nutritionists to look for various novel locally available cheaper alternative animal protein sources for their use in poultry feed formulations to reduce the feed

Animal protein supplements are superior to plant protein supplements, as sources of essential amino acids particularly of lysine, the first limiting amino acid in cereals and are desirable components in poultry feed formulations. For this reason, and owing to their high prices, they are normally used to balance the amino acid contents of diets rather than as major sources of protein. Plant proteins are generally nutritionally imbalanced. Unless supplemented with animal proteins or synthetic compounds, plant-based diets may not meet the requirements of certain critical amino acids and

46 • **POULTRY FORTUNE** • April & May 2020

PF APRIL & MAY 2020 ISSUE.indd 46 15-05-2020 17:44:54

vitamin B12 for the production of eggs and meat. In India, feed manufacturers ensure that the level of animal protein supplements does not fall below a minimum in poultry diets, especially for the young chicken whose protein and amino acid requirements are high. The requirements for essential amino acids are progressively reduced as the birds grow older and it is possible to satisfy the needs of older birds on diets containing lower levels of animal protein supplements and relatively higher levels of oilseed meals.

Alternate animal protein sources

Deoiled silkworm pupae meal

Deoiled Silkworm pupae meal is a good source of protein (about 65%) and phosphorus. The protein is rich in lysine, methionine, arginine, tryptophan and isoleucine, but low in threonine.

Hatchery byproduct meal

Hatchery byproduct meal is a good source of protein and energy. The protein quality is also good. However, if not properly processed, it is a source of pathogenic microorganisms for poultry.

Poultry byproduct meal

Poultry byproduct meal is prepared from inedible parts of carcasses of slaughtered poultry such as head, feet, Intestines and viscera (without contents) by conventional dry-rendering methods. Good quality byproduct meal contains about 60% crude protein and 16% ash. Protein quality is lower than that of fish meal, but comparable to that of meat meal. Methionine and lysine are the limiting amino acids in poultry byproduct meal. Feeding value of the meal is similar to that of meat meal. Poultry byproduct meal is remarkably rich in choline and up to 5% can be included in poultry diets. The primary constraint to its use is the lack of homogeneity.

Poultry offal meal

Poultry offal meal is made by the steam pressure cooking of poultry offal (various parts of carcass and feathers) as they occur in the processing plant. The product is similar to a mixture of about 45% poultry byproduct meal, 40% hydrolysed feather meal and 15% poultry fat. Poultry offal meal contains over 65% crude protein, 23% fat and 8% ash, and can be used as poultry feed ingredient. The protein is low in methionine. The composition of offal meal varies depending on the proportion of various parts of carcass and feathers. Poultry by-product meal is similar to meat and bone meal but is a by-product of the chicken and turkey meat industries rather than beef and pork.

Hydrolyzed Feather meal

Hydrolyzed feather meal is high in protein (80%) and is low in lysine methionine and tryptophan. Feather meal is not easily digestible. Hydrolyzed poultry feathers or feather meal is produced by hydrolyzing clean, undecomposed feathers from slaughtered poultry. Hydrolysis is accomplished with steam and pressure which break the keratinous bond and increases the digestibility of the protein in the feathers. The quality of feather meal is affected by the length of time that it is hydrolyzed. The protein is rich in cystine, but deficient

in lysine, histidine, tryptophan and methionine. The overall amino acid availability in hydrolysed feather meal is only 65%. Various researches indicate that, with methionine and lysine supplementation, up to 40% of the dietary protein could be supplied by hydrolysed feather meal with no adverse effects on egg production or growth of poultry. In practice, more than 5% hydrolysed feather meal should be included.

Hydrolysed hair meal

Significant quantities of hair are available from the slaughter of cattle and pigs. Hair can also be processed through steam hydrolysis, although it is relatively more difficult to hydrolyse than feathers. Hydrolysed hair meal contains 85-90% crude protein and is similar in amino acid composition and feeding value to hydrolysed feather meal. Up to 6% and 9% hog hair meal has been successfully included in broiler and growing pullet diets, respectively, with no ill effects on performance.

Hydrolysed leather meal

Hydrolysed leather meal is a byproduct of the tanning industry. Tanned leather scraps can be hydrolysed in the same way as feathers. Hydrolysed leather meal contains over 65% crude protein, but the protein is of poor quality consisting largely of collagen. In combination with meat meal or fish meal, up to 8% has been included in poultry diets without any adverse effects Possible chromium poisoning is a concern when tannery byproducts are used. This arises from the use of chromium compounds during the tanning process. The chromium content of the meal should not exceed 2.75% if it is to be utilized in animal feeding. The metal, however, does not appear to accumulate in the meat or fat of birds fed diets containing hydrolysed leather meal.

Milk products

Off-quality milk powder and skim milk powder, unsuitable for human use, can be utilized in feed formulations. Milk powder is not only a good source of amino acids, but also provides an excellent supply of vitamins and minerals. Poultry are apparently unable to utilize high levels of lactose, the major carbohydrate in milk. Lactose is only slowly digested and absorbed due to an insufficiency of lactase enzyme in avian species. Due to this insufficiency, use of high levels of milk products in poultry diets causes diarrhoea and has detrimental effects on growth. Skimmed milk powder can be included up to 16% in broiler diets without any adverse effects. When available, milk powder is perhaps more useful in starter and breeder diets. Levels of 3-5% are recommended for best results.

Animal wastes

In general, animal wastes contain a moderately high content of crude protein (high non-protein nitrogen) and a level of true protein that is comparable to those of common cereal grains (NRC, 1983). Other constituents present at relatively high levels are fibre and ash. Consequently, available energy content of animal wastes for non-ruminants is low. All these features indicate that animal wastes are more suitable as ruminant feeds. Poultry waste is composed of undigested food residues, mainly structural carbohydrates and unabsorbed constituents (calcium and phosphorus),

microorganisms from the lower digestive tract and metabolic faecal and endogenous urinary components. It also contains spilled feed and external body waste such as feathers.

When poultry waste is mixed with bedding materials, as in the case of deep litter poultry houses, it is referred to as poultry litter. The common bedding materials used are paddy husk, sawdust, wood shavings, groundnut hulls and cereal straws. The litter, once fully mixed with excreta and usually after 9-12 months, is removed and can be processed for feed use. Since poultry wastes commonly contain pathogenic organisms (NRC, 1983), dehydration and adequate processing are essential before they can be used. The abundance of non-protein nitrogen in poultry wastes (50-65% of total nitrogen) limits their protein value for non-ruminants. The protein in poultry waste may be available to a considerable extent for the growth and nitrogen in poultry waste is 53% digestible to chicks. The low metabolizable energy content is the primary factor limiting the feed use of poultry waste for non-ruminants. Dried poultry waste up to 25% levels have supported satisfactory growth, where the energy levels have been maintained and it is more useful in layer diets (5%) than broiler diet. The value of poultry litter as a poultry feed is much lower than that of dried poultry waste, due to its higher fibre levels. Blair and Herron (1982) reported that dried broiler litter could be included up to the 10% level without depressing performance of broilers. Although production and feed efficiency are reduced, economic returns may justify their usage whenever non availability of other animal protein sources occurs.

Novel animal protein sources

Meals from insects, Fly larvae and pupae, Silkworm pupae, Grasshoppers (locusts), Mormon crickets, Termites, Bees, earthworms and snails offer examples which could lead to cheaper proteins from non-food animals.

Challenges

Food safety is the most important concern people have about the recycling of animal protein meals back through animals as feed ingredients. It is possible for animal protein meals to be contaminated with high levels of heavy metals, dioxins and PCBs (pesticides); however, meals are monitored and regulated to minimise this contamination. In feeding of the animal protein meals, the important practical issue is the variability in available nutrients and limits to incorporation to maintain a diet balanced for all nutrients, particularly calcium and phosphorus.

Current concerns

It is clear that the feed industry and others must continue to look for alternative and enhanced animal protein sources for poultry feeds to meet the growing demand for animal protein (meat and egg) consumption among consumers. More attention should be focused on the sources of animal protein and their suitability, quality and safety for future supply in poultry feed formulations.

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The benefits of in-line moisture management

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Producing feed with consistent nutrient value, moisture content, and overall quality can be challenging. A selfregulating, in-line system to monitor and adjust moisture levels can help to step up feed quality and milling efficiency.

Moisture losses and mould growth in feed can be a challenge for feed millers. External factors, such as high temperatures combined with high humidity, and fluctuations in day and night temperatures pose ideal conditions for microbes to grow and degrade the quality of nutrients in compound feed. Additionally, the feed production process reduces moisture content, leading to process losses, such as decreased pellet durability and reduced throughput (also referred to as shrinkage or loss of bulk).

Optimising moisture helps support feed safety

Simply adding water to feed during processing might seem like a plausible solution to increase the moisture content of feed. However, this increases water activity (aW), resulting in higher availability of moisture for spoilage organisms to grow. In order to combat this negative consequence, it is necessary to optimise the moisture level in the feed through a hydrated solution of water and feed additives. This approach helps prevent moulds from contaminating feed. Including specific



Optimising the moisture level in feed can be done through a hydrated solution of water and feed additives.

buffered organic acids within the hydrated solution ensures protection against spoilage organisms, even after the feed production process, supporting increased shelf life of feed.

Why self-regulating dosing?

To influence moisture levels in feed, a dosing system is generally utilised within the feed production line. In most cases, the system doses a set amount of moisture to correct for standard moisture losses. However, lacking real-time data, the moisture level tends to be corrected for average or theoretical losses, with the risk of adding too much or too little moisture. This can result in variations in feed quality, pellet durability and energy consumption. In-line moisture management is a self-regulating solution that helps address issues causing variability and feed safety concerns during feed processing. A microwave sensor is generally installed either inside the mixer or downstream of the mixer. When in use, the sensor sends a signal, which is interpreted by software, and the dosage of the hydrated solution is adjusted immediately. This system poses several advantages: realtime optimisation of moisture in the production process, reduction of quality variability and lower susceptibility of mould contamination. Furthermore, it improves feed mill efficiency by reducing friction in the pelletiser, resulting in an average of up to 10% reduction in energy consumption at this production step.



Data about moisture levels are analysed using microwave sensors, and the MMS immediately adjusts the amount of hydrated solution when moisture falls outside of optimal thresholds. Photo: Trouw Nutrition

Microwave versus NIR

Near Infra-Red (NIR) and microwaves are the most commonly used tools for moisture analysis. These technologies analyse moisture content in different ways. NIR utilises multiple wavelengths to measure multiple organic concentrations, such as moisture, fat/oil, protein, sugars, and others. Therefore, NIR is a valuable tool for feed millers to utilise

for quality control. When it comes to moisture detection however, it tends to be less capable than microwave sensors. Whereas NIR focusses on light reflection, and thus only measures the surface moisture on a feed particle, microwaves penetrate feed particles. Since feed particles also contain moisture within, microwave sensors yield a more accurate total moisture measurement.

Implementing self-regulating dosing

Although industry data is not available, the general assumption is that less than 10% of feed millers globally currently utilise selfregulating dosing. There is a great opportunity for feed millers to take a significant step in staying ahead of competitors and increasing regulatory demands. Trouw Nutrition designed the Moisture Management System (MMS) to battle various challenges described above. Within the boundaries set by the feed mill, the MMS regulates itself to reach set moisture targets. Using microwave sensors, data about moisture levels are analysed and the system immediately adjusts the amount of hydrated solution when moisture falls outside of optimal thresholds. This self-regulation mechanism requires minimal efforts from feed mill personnel. Real-time data analysis allows for accurate and flexible dosage. Finally, this precision approach to managing moisture during feed processing helps support feed mills' sustainability efforts by reducing energy consumption. What are the findings from feed mills employing the technology? In addition to the improvements in energy consumption described above, users are witnessing other positive results with automatic dosing. On average there is an overall improvement of 0.5 - 1 % in terms of overcoming moisture content losses in raw material that occur during the feed production process. Improved consistency, reduced energy consumption and a higher level of accuracy are some of the precision improvements that allow in-line moisture management to support enhanced efficiency during and beyond the feed production process.

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Evaluating Protease Enzyme

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Over the past 20 years usage of feed enzymes have become an important tool to increase the nutritional value of feed ingredients, reduce feed costs, improve the environment, all while maintaining or improving animal performance. Three classes of enzymes (phytases, carbohydrases, and proteases) are typically considered for use in poultry feeds. This article will briefly discuss the correct evaluation of protease enzymes and their applicability to poultry feeds.

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

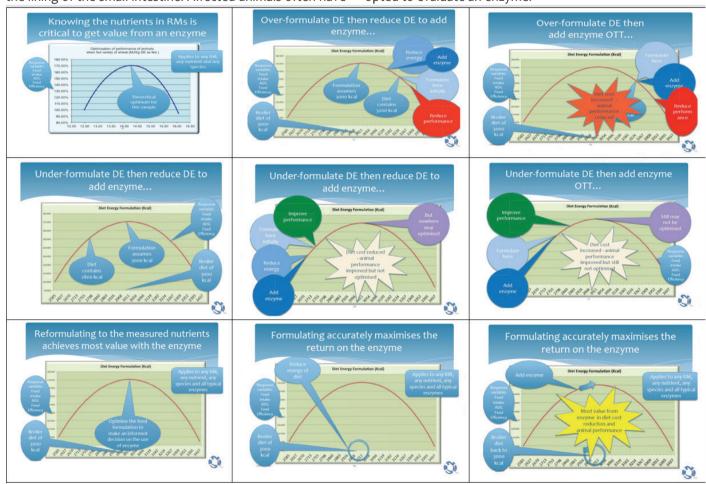
Typically, broilers are only able to digest around 80 percent of amino acids in feed. The rest make their way to the hindgut, where they serve as food for harmful pathogens that proliferate and cause inflammation, which in turn compromises the lining of the small intestine. Affected animals often have

to be culled, and even those that recover lose a significant amount of weight in the effort to get well.

Since the introduction of protease feed additives in the market is fairly recent when compared to phytase or carbohydrase enzymes and customers have various commercial protease products from which to choose, we offer some guidance on how to evaluate the best fit protease which will work best for their operations.

Enzymes increase nutrients available in feed ingredients. Since enzymes are substrate specific, the benefit of the enzyme in the diet is dependent on the mix of raw materials and the amount of substrate available.

Assessment of added value of enzymes isn't simple. The most accurate method is to use in vivo techniques with animals consuming semi-purified diets. Using this method, the direct effect of an enzyme can be understood for each raw material. As this method is expensive and not available to do it for everybody, the matrix approach based on nutrients contribution values given by the supplier has been widely adopted to evaluate an enzyme.



Adapted from Howard Simmins, Insci Associates Ltd, UK.

One principle to be kept in mind that Good enzymes always work.

Using a set of nutrient matrix values for an enzyme is a practical approach, and providing unique matrix values to a given enzyme ensures it can be applied simply to any kind of diet, regardless of the raw materials or the amount of substrate. This approach has been easy to adopt in practical formulations, but has consistently demonstrated enzymes failing to meet expectations. These failures have been due to the lack of or an excess of substrate, and/or over-formulation.

When evaluating enzymes, a few concepts need to be made clear

- Substrate: the specific substance on which an enzyme acts
- Enzyme Effect: nutrients that a given enzyme will make available due to the direct enzymatic effect and the additional benefits accrued by the reduction of the substrate in the diet
- Avoid over-formulation or under formulation: enzymes need "nutritional space" to express and thus diets need to be near the deficiency point to make a good estimation of the enzyme's potential.

The More Accurate the feed formulation, the more consistent the response from the enzyme.

The value of any enzyme is money. But how much money one can save depends on the accurate feed formulation. Understanding the optimum nutrition for animals to perform efficiently is the key to maximise the performances. The following slides show the effect of mis-formulating (under/over) energy based on book values versus the actual energy for a sample of raw material (RM) is shown. The principle could apply to any RM, any species, any nutrient and any enzyme. How enzymes work even when we might think they are not working are illustrated and also the importance of must having negative control in any enzyme trial.

Trials for evaluating enzymes:

The test of an enzyme requires being aggressive in the formulation and pushing the limits. Under-performing chickens will help provide a better evaluation of the enzymes and understand how accurate the formulation is.

Challenge Model: In this model, the diet with significant reduction of nutrients, that the enzyme will liberate and make available to the birds, needs to be formulated. Different enzymes can then be added on top.

Table 1: Challenge Model - Proteases - 10% Reduction of the CP and AA from the specifications.

T1	T2	T3	T4	T5
Control	Negative Control	Protease A	Protease B	Protease C
Current Diet	Reduc- tion of CP&AA by 10%	T2 + Pro- tease A	T2 + Pro- tease B	T2 + Pro- tease C

Objectives of the trial:

- "AA room" is created for enzymes to show their potential.
- Each supplier has different recommendations of how proteases affect the feed. This trial allows simplifying the comparison.
- Proteases can't increase the AA digestibility 10% linearly.
 As a result, the AA ratio will be unbalanced and subsequently the performance of negative control as well as treatments will be lower than that of the control group.

- The most aggressive protease will have the best performance compared to T2.
- If any of the enzyme groups shows the same performance as the control group (T1), it signals some over formulation as no protease can increase 10% linearly on all the AA.

Response Model: The model is a variation of the 'Challenge model' discussed in the previous section. In this model, two control diets will be used; the current diet (this group is optional if there aren't enough treatments) and a diet group with anywhere between 5% to 10% lower AA specifications. The control 2 specifications will be used for the treatment groups. There will be a reformulation following the matrix value recommendation of each protease supplier.

Table 2: Response Model - Diet reformulation.

T1		T2	T3	T4	T5	
Contro	I	Control 2	Protease A	Protease B	Protease C	
Curren	t	Reduc-	Reformu-	Reformu-	Reformu-	
Diet	tion of	tion of CP	lation of	lation of	lation of	
		& AA by	T2 + Pro-	T2 + Pro-	T2 + Pro-	
	5-10		tease A	tease B	tease C	

Objectives of the trial:

- Having T1 compared to T2 will assist in acknowledging any over-formulation or amino acid imbalance.
- Having lower specifications in AA and CP creates enough space for the enzyme to express to potential.
- This design allows each supplier to give their ideal recommendations.
- If the enzyme recommendation is too aggressive, the enzyme group will clearly show lower performance than T2 as long as there is a gap of performance between T1 and T2.
- If the enzyme recommendation is conservative and the enzyme can deliver additional benefits it will be reflected in greater performance than T2 as long as there is a gap of performance between T1 and T2.

Conclusions:

When testing the efficacy of an enzyme, its logical to test the additive against some control group. There are lot of factors inherent to experiments involving animals that may influence the outcome, such as age, genetics, environment etc. it is important to be able to discount these as having influenced the results. Here lies the importance of having negative control (NC) in any enzyme experiments. NC takes out the nutrients that the additive (in this case enzyme) is expected to release. The performance of the NC is therefore expected to be significantly worse than that of Positive Control (PC). As discussed earlier we are intending to do several things here: (i) test the reduction of CP & AA have a negative impact on the outcome (say growth) by comparing the PC & NC and (ii) evaluate whether the testing protease enzyme product can regain that lost outcome by comparing the treatments to both the PC & NC, separately. In some cases, it has been seen that by there are no differences in performance between PC & NC even though we reduce the CP & AA in NC, this indicates that there is some kind of over formulation in PC diet which prevents the added enzyme to get any space to work on. In this case the NC should be a true NC with more aggressive challenge to show the reduction in performances.

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Technical Update



GROWING MANAGEMENT OF COMMERCIAL PULLETS

Productive and profitable layers begin with good quality pullets. Having the correct body weight and body type at the start of egg production will enable pullets to achieve their genetic potential. Problems that develop during the growing period cannot be corrected after egg production begins. This paper will highlight the components of a good pullet development program.

HOUSE PREPARATION

The brooder house should be cleaned and disinfected well in advance of chick delivery. A minimum of 3 weeks "down-time" between flocks should be scheduled for house preparation. Before cleaning and disinfection, all manure and feed should be removed, and a rodent control program implemented (or preferably the ongoing program should be continued). This is the time to make necessary repairs to the house and equipment. The house should be cleaned with a high-pressure wet wash with detergent to remove all organic matter.

Washing should move from the ceiling downwards through the cages or system equipment to the floor and finally, manure pit. After thorough cleaning, the house should be sprayed or foamed with an approved disinfectant. Increasing the temperature inside the house will improve the effectiveness of the disinfectant. Additionally, fumigating the house within 5 days of chick delivery will help ensure sanitary conditions. The effectiveness of the cleaning, disinfection and fumigation should be checked by environmental testing of the house surfaces for coliform and *Salmonella* bacteria.

Day	Management Schedule
-21 days	 Remove old feed and manure Clean and disinfect the growing house Rodent control program Make repairs to equipment (broken drinkers, perches etc.) Wet wash and disinfect grower house
-5 days	Fumigate growing houseVerify cleanliness by bacterial culture of environment
-2 days	 Start brooders in cool and cold climates Clean and disinfect water system Place paper inside cages
-1 day	 Start brooders in hot climates Ensure that the proper brooding house temperature is provided (see table on p. 2) Minimum humidity of 40% Set lights for 20 hours of light at 30 lux Fill feeders to their highest level with fresh starter feed Adjust feed guards Adjust drinkers to proper level Flush water lines and check that all drinkers are working
+1 day	 Fill cup drinkers or let nipple drinkers drip to stimulate water consumption Add vitamins and electrolytes to drinking water Place starter feed inside cage on cage paper (in front of feeders) Fill feeders to their highest level; floor rearing use brooder rings or partial house brooding with paper on the floor area with supplemental chick feeders and drinkers



Technical Update — growing management of commercial pullets

BEFORE CHICKS ARRIVE

The house preparation should be completed 48 hours before delivery of the chicks. Allow enough time for the temperature of the air and equipment in the house to be brought to the proper brooding temperature. Be aware that air temperature rises faster than the temperature of concrete floors, litter, system equipment and water in the house. Set the light clocks to 20 hours of light at 30 lux of intensity. Lights in the red-orange wavelength (warm fluorescent) are appropriate for growing and laying birds. An intermittent lighting program for chicks should be considered. Use a well -balanced light (3500K) or a cool light (>4000K) in growing birds. To improve growth, cool light in the greenblue spectrum is preferred as it improves weight gain and helps calm birds.

Feeders should be filled to the highest level with fresh, good quality starter crumble. Adjust the feed guards to allow chicks to access feeders from day one. Ensure that all drinkers are working properly. Adjust the drinkers to the proper height to facilitate drinking by the newly arrived chicks. The birds' drinking water should contain vitamins and electrolytes to replace losses during delivery. Feed should be placed on the cage paper before chick arrival or immediately after they are placed in the cages. Chicks brooded on the floor should be provided extra feed trays or be fed off cardboard.

CHICK QUALITY - IN THE BEGINNING

Layer pullet chicks must be sourced from breeder flocks that are healthy and free of vertically-transmitted diseases important for bird and human health. Chicks should possess adequate levels of maternally-derived antibodies for early protection against challenges of infectious bursal disease (Gumboro, IBD), Newcastle disease, infectious bronchitis and other diseases. The chick should be of adequate body weight with a well-healed navel (umbilicus) and free of physical defects.

All chicks should be vaccinated against Marek's disease in the hatchery using the Rispens + HVT strains. In the hatchery, other vaccinations can be administered by using HVT-vectored vaccines containing infectious laryngotracheitis (ILT) or IBD (Gumboro) protective genes. If HVT-vectored vaccines are used, do not combine with another HVT strain vaccine, although Rispens may be used in combination. For more information on vaccination programming, see the "Vaccination Recommendations" technical update. Chicks may also receive an infrared beak treatment in the hatchery (see the "Infrared BeakTreatment" technical update). The transportation time of the chick delivery from hatchery to farm should be kept to a minimum. Chicks derived from different breeder flocks should be kept separate and mortality records maintained for each breeder source.

BROODING PERIOD – GETTING OFF TO A GOOD START

Pullet chicks arriving to the farm from the hatchery should be alert and active. Chicks must be vigorous enough to explore their new environment and quickly find feed and water. Eating feed and drinking water quickly will speed the development of healthy intestinal microflora and build resistance to enteric pathogens such as Salmonella and E. coli. During the first week of life, chicks must be provided with constant attention by the manager to ensure optimized temperature, humidity, lights, feed and water availability. The first 2 weeks of life are when the most significant problems for proper chick development can occur. The newly hatched chick is unable to regulate body temperature and must be provided the proper environmental conditions. Relative humidity during the first week should be above 40% to prevent dehydration, drying of mucous membranes and vent pasting. The use of heaters to maintain brooding temperature will reduce relative humidity.

RECOMMENDED BROODING TEMPERATURES

Days of	Hy-Line Brown, Silver Brown, Pink and W-80		Hy-Line W-36 and Sonia		
Age	Cage	Floor	Cage	Floor	
1–3	33–36°C (40–60% relative humidity)	35–36°C (40–60% relative humidity)	32–33°C (40–60% relative humidity)	33–35°C (40–60% relative humidity)	
4–7	30-32°C	33–35°C	30-32°C	31–33°C	
8–14	28-30°C	31–33°C	28-30°C	29–31°C	
15–21	26–28°C	29–31°C	26–28°C	27-29°C	
22–28	23–26°C	26–27°C	23–26°C	24-27°C	
29–35	21–23°C	23–25°C	21–23°C	22–24°C	
36+	21°C	21°C	21°C	21°C	

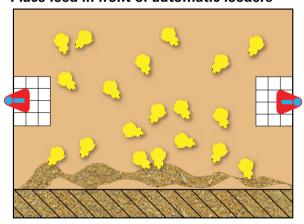
GROWING SPACE RECOMMENDATIONS FOR CHICKS (0-3 WEEKS)

(check local regulations regarding space)

	Colony/Cage	Floor
Bird space	100-200 cm²/bird (16-31 in²/bird)	835 cm²/bird (0.9 ft²/bird)
Feeder	5 cm/bird (2 in/bird) 5 cm/bird (2 in/bird) or 1 pan per 50 birds	
Cups or nipples drinking system	1 per 12 birds	1 per 15 birds
Fountain drinking system, 46 cm (18 in) diameter	_	1 per 125 birds

Brooding chicks in cages requires strict management of temperature and humidity as the chicks cannot migrate to an area of comfort like chicks grown on the floor. Chicks started in cages should be placed on paper for 7 to 10 days to help their movement within the cage, temperature control, prevent drafts and allow supplemental feeding on the paper. Feed should be placed in front of the feed trough to train chicks to move toward the permanent feeders.

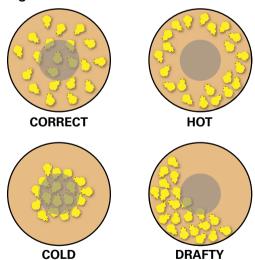
Place feed in front of automatic feeders



During the first week, chicks benefit from bright light conditions in the house. Minimum light intensity should be 30 lux with clocks set to 20 hours. Alternatively, if local regulations allow, an intermittent lighting program can be used (4 hours of light followed by 2 hours of darkness, repeated for the first 7 to 14 days). In order to encourage water consumption, keep cup drinkers full of water for the first 3 days or adjust water pressure to cause a hanging drop of water in nipple drinkers. Chicks that fail to adapt to their environment and are delayed in finding feed and water will die at 4 or 5 days of age when the yolk sac is depleted.

Chicks raised on the floor in houses heated with brooder stoves or whole-house heating should be confined in brooder rings. Observe chick behavior to determine if the temperature is correct. Chicks should be uniformly distributed in the brooding area. Closely grouped chicks indicate low temperatures or excessive drafts. In cold environments chicks will often chirp with a distressed tone. Chicks that are too warm will appear lethargic and will try to move away from the heat source. Both heat and cold-distressed chicks can have pasty vents.

Brooding Temperature, Floor Brooding in Rings





Technical Update — growing management of commercial pullets

ADDITIONAL CONSIDERATIONS FOR FLOOR-RAISED BIRDS

Floor-raised pullets may use pan or chain feeders. For both feed systems, it is important to start chicks by feeding on paper, cardboard, or trays that are placed near the feed line. When the chicks first arrive, be sure either the pans or troughs are completely filled to help the chicks find the permanent feed source. Carefully monitor the control panel to ensure that all feeders on the line remain full.

When using brooder rings, there may not be sufficient access to water. Provide supplemental water with chick drinkers for the first week or two, or until the rings are opened up to full water access.

If perches are integrated onto the feed or water lines, it is important to minimize manure build up. Water lines with perches should use small or no-drip cups, as large drip cups tend to collect manure from perching birds.

Many diseases affect floor-raised birds more than cage-raised birds. In particular, infectious bursal disease and coccidiosis must be well controlled to ensure good uniformity and weight gain. Veterinarians with knowledge of the local disease burden should be consulted to implement an appropriate control program.

TEACH GOOD BEHAVIOR EARLY

Pullets going into enriched colony, barn or aviary laying environments should be provided growing environments containing perches, water platforms or multi-tiered environments. While chicks are usually started on the floor, it is important to set up the platforms or enriched environment by 3-4 weeks of age. If water platforms are used, it is important that pullets continue to have access to water on the floor until the flock learns to jump.

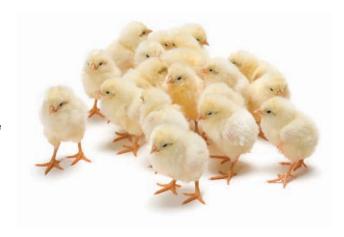
Complex environments teach pullets jumping and exploratory behaviors. Pullets raised in enriched growing environments adapt better to complex laying environments. By learning to jump and explore at an early age, adult behavioral problems such as piling or not utilizing all levels in a multi-tiered system can be reduced.

Human contact during the growing period socializes pullets and reduces stress. Walking the house perimeter multiple times daily during the growing period aids socialization and can improve nesting behavior in layers. Using the same type of drinkers in pullet and layer houses improves adaptation in the layer house.



PULLET DEVELOPMENT AND WEIGHT

The pullet develops according to a well-orchestrated sequence of physiologic events. Pullets reaching or exceeding breed body weight targets during these developmental phases have the best chance to perform to genetic potential as layers. Interrupted growth during any of these developmental phases will result in hens lacking the body reserves and organ function to sustain high production as adult layers.



Weekly Body Weight Gain and Organ Development during the Growing Period



The growing period can be divided into the following periods:

0TO 6 WEEKS OF AGE

During this period, the organs of the digestive tract (supply organs) and the immune system undergo much of their development. Problems during this period could have permanent negative effects on the function of these systems. Birds stressed during this period might have lifelong disability in digestion and the absorption of feed nutrients. Immunosuppression could also result from problems during this period leaving the bird more susceptible to disease and less responsive to vaccinations.

6TO 12 WEEKS OF AGE

This period of rapid growth is when the pullet attains most of the adult structural components (muscles, bones and feathers). Poor growth during this period will prevent the pullet from attaining sufficient bone and muscle reserves needed to sustain a high level of egg production and maintain good shell quality. The skeleton is 95% developed by the end of the 13th week of life. At this time the growth plates of the long bones calcify and no further increases in bone size can occur. Any compensatory growth occurring after this period will not increase the size of the skeleton. The amount of mineral reserve available for egg shell formation is directly related to the hen's skeleton size. Reactive vaccinations, beak trimming, bird handling and other stressful management practices can delay development during this period of rapid growth.

12 TO 18 WEEKS OF AGE

During this period the growth rate slows and the reproductive tract matures and prepares for egg production. Development of muscle continues and proliferation of fat cells occurs in this period. Excessive body weight gain during this period can result in pullets with an excessive amount of fat pad. Low body weights and stressful events during this time can delay the onset of egg production. Seven to ten days prior to the oviposition of the first egg the medullary bone within the cavities of long bones can be increased by feeding a pre-lay ration with increased levels of calcium.

TARGET BODY WEIGHTS AT CRITICAL POINTS OF DEVELOPMENT

	W-36	W-80	Brown	Silver Brown	Sonia	Pink
6 WEEKS Development of immune and digestive systems	410–	410–	450–	470–	490–	480–
	430 g	440 g	470 g	490 g	500 g	500 g
12 WEEKS Development of skeleton and muscle	950–	920–	1050–	1060–	1110–	1110–
	970 g	990 g	1110 g	1120 g	1120 g	1130 g
17 WEEKS Development of the reproductive tract	1230–	1170–	1400–	1500–	1440–	1440–
	1270 g	1250 g	1480 g	1580 g	1450 g	1480 g
40 WEEKS Evaluates adequacy of layer nutrition	1520–	1590–	1870–	1960–	1900–	1870–
	1560 g	1710 g	1990 g	2080 g	1950 g	1950 g



Technical Update — growing management of commercial pullets

BODY WEIGHT UNIFORMITY

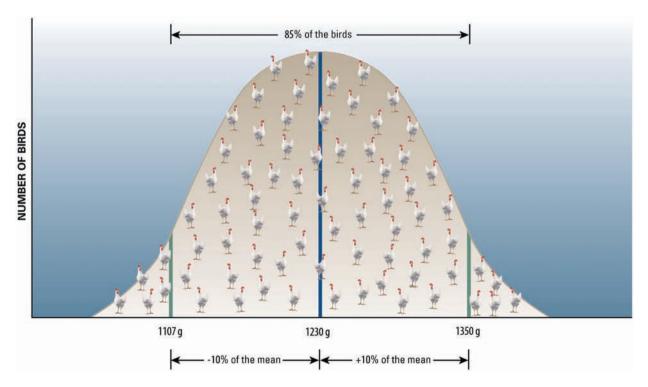
Uniformity of body weights within a flock is as important as achieving the target average body weight. The proper goal during the growing period is 85% uniformity (85% of the individual bird weights are +/- 10% of the average). Poor pullet body weight uniformity complicates the proper feeding of the flock both in grow and lay, and is the most important factor causing poor peak of production and substandard egg production. Another challenge resulting from poor uniformity is pullets coming into production at different times, with underweight hens producing small eggs.

Reasons for pullet poor uniformity include:

- Enteric diseases such as coccidiosis, infectious bursal disease (Gumboro, IBD), spirochetosis, viral or bacterial enteritis, runting/stunting
- 2. Overcrowding leading to competition at feeders and drinkers
- Inadequate nutrition because feed formulation does not match actual feed intake

- Feed refusal due to poor quality, mycotoxins or abrupt changes in feed ingredients disrupting intestinal microflora
- 5. Feed management
 - a. Not enough feedings or stimulations
 - b. Slow movement of feeders leading to selective feeding
 - Not allowing the feeder to be emptied daily, leading to accumulation of fine feed
 - d. Improper feed particle size (see the "Feed Granulometry" technical update)
- Stress from vaccination, excessive bird handling, heat stress
- 7. Poor beak trimming technique
- 8. Any restriction of water consumption will also reduce feed intake. Water must be freely available at all times. Causes of water intake problems include:
 - a. Overcrowding or equipment failure
 - b. Improper height of drinkers

GOOD BODY WEIGHT UNIFORMITY GOAL





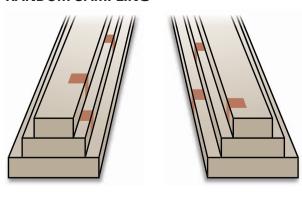
In flocks with poor uniformity it may be necessary to segregate the birds by weight and then feed separately. Birds on the floor can be separated into pens of different weight classes. When the birds cannot be separated, the flock should be fed according to the requirements of the lighter birds in the flock.

A weight monitoring program should begin when the flock is 1 week old. During the first 4 weeks when the birds are still small, bulk weigh random samples of 20 birds. After 4 weeks of age, individual bird body weights should be taken weekly from at least 100 birds. Continue weighing weekly until mature body size is reached at 32 weeks, then at least every 5 weeks during the remainder of the production period. For pullet flocks raised in cages, a selection of cages from all levels and positions within the house should be marked. All the birds in these cages should be weighed separately with the birds from the same cages weighed every week. Select cages at the beginning and end of feed lines, as well as from upper and lower levels.

Flocks raised on the floor can only be weighed randomly, but can be collected from several different locations. Platform scales can be used to continuously monitor growth, in addition to manual weighing.

Weekly monitoring of body weights is preferable as the producer can identify growth problems quickly. It might be possible to associate the growth problem with a change of feed or a stressful management practice, allowing corrective action to be taken.

RANDOM SAMPLING



Weigh birds prior to a scheduled change in feed formulation, such as from starter to grower feed. Scheduled changes in feed formulations should always be based on achieving target body weights and not the age of the flock. Underweight pullet flocks or flocks with poor uniformity should be retained on the more nutrient rich formulation. Flocks that will be receiving a harsh vaccination involving handling the birds for injection or during peak heat waves (acute heat stress) should be placed back on more concentrated feed formulations to compensate for loss of appetite.

BREAST MUSCLE DEVELOPMENT

Pullets should be examined for breast muscle development as a good indicator of proper pullet development and a predictor of future layer productivity. Muscle contains glycogen, a rapidly available source of energy used for egg production. Pullets coming into egg production with insufficient muscle will not have sufficient energy available to sustain high egg production.

PROPER BREAST MUSCLE DEVELOPMENT





LIGHTING PROGRAMS

Step-down lighting programs modulate growth, determine age of sexual maturity and affect egg size and egg mass (within the genetic limits of the layer variety).

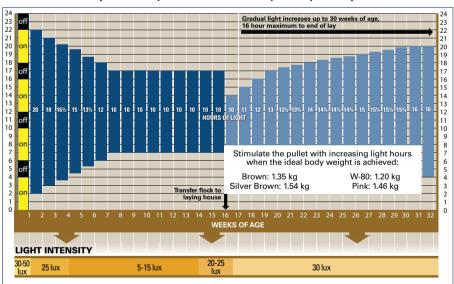
In a typical step-down lighting program, the hours of light are gradually decreased over the first 8-12 weeks. This provides the young growing flock additional hours of feeding time to promote growth. Age of

sexual maturity and egg size is not affected if the stepdown period is 12 weeks or less. When the step-down period is extended beyond 12 weeks, sexual maturity will be delayed and egg size increases. Step-down periods longer than 12 weeks are appropriate in commercial egg markets requiring large eggs or in breeder flocks requiring larger egg weights for hatching. On the contrary, fast step-down (< 8 weeks) can be used to stimulate rapid onset of lay and to reduce egg size, but this system needs to be applied only if pullet body size is on target.

In open housing, the artificial lighting programs must complement the natural day length. After the initial step-down in lights over the first 12 weeks, the artificial lights are set to the longest natural daylength the flock will experience during the growing period. This will negate the influence that changes in natural daylength would have on pullet development and the age of first egg. A lighting program web tool is available at www. hyline.com that provides a customized lighting program for any location.

HY-LINE COMMERCIAL LIGHTING PROGRAM (W-36, SONIA) 23 22 21 20 19 18 17 16 15 off 13 12 11 10 9 8 7 6 5 19 18 off Stimulate the pullet with increasing light hours when the ideal body weight is achieved: off W-36: 1.25 kg Sonia: 1.45 kg WEEKS OF AGE LIGHT INTENSITY 30-50 25 lux

HY-LINE COMMERCIAL LIGHTING PROGRAM (BROWN, SILVER BROWN, W-80, PINK)



CONCLUSION

Careful attention to the principles of pullet management is fundamental for success and profits in laying flocks. Growing a pullet flock of the correct weight and body conformation will usually ensure success in the laying period. Problems such as low egg numbers and poor egg shell quality during lay can often be traced back to problems occurring in the growing period.



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60 • **POULTRY FORTUNE** • April & May 2020

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PF APRIL & MAY 2020 ISSUE.indd 61 15-05-2020 17:45:00



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