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SPACE will be the key event of the agricultural season. All the professional of animal production will be able to reconnect after this long period without physical meetings. SPACE 2021 is eagerly awaited, as shown by the high level of exhibitor registration and the enthusiasm every participant expresses to finally meet up at the Show.In 2020, SPACE organizers have once again shown their ability to innovate and adapt to the context, however different, by setting up a virtual edition. Based on the vast experience, SPACE is offering even more digital content this year. Of course, it will be offering presential sessions during the first three days, but even more content will be available virtually on Friday 17 September.This year, SPACE's mobile application will be enhanced with new services. The powerful app will help visitors and exhibitors to connect up and continue their conversations after the expo, as well as to find all the information they need: The new SPACE format now includes a virtual day on Friday 17 September, which can be attended via the mobile application, the SPACE website and social media. The content of this unique day will be mainly aimed at international visitors, and in particular those who could not come to the Expo due to the pandemic.

Animal Welfare and Farmer Well-being

For this year's SPACE, the organisers and their partners have chosen animal welfare as the central theme of the Espace for the Future. For more than 20 years, this topic has been regularly addressed at Europe's leading livestock trade show. This year will be an opportunity to provide concrete answers, but also to open up discussions, debates and visions on this subject with members of civil society. SPACE decided to address this theme based on the 5 freedoms defined by the Farm Animal Welfare Council. The World Organisation for Animal Health defines animal welfare as 'the physical and mental state of an animal in relation to the conditions in which it lives and dies'. The ANSES defines positive welfare as 'the satisfaction of its physiological and behavioral needs, as well as its expectations'. In Western France, a land of livestock farming, concerns about animal welfare are not being ignored. The Chambers of Agriculture, the Technical Institutes, and the economic and technical organizations that support livestock farming incorporate this concept into their research and development programmes. Production systems are diversifying and technical innovation is supporting the changes.The SPACE organizers, who are very attentive to the needs of livestock farmers and their partners, began focusing on the subject of animal welfare in early 2000, addressing the theme on numerous occasions in the 'Research and Development Village'. Animal welfare is a key concern of farmers, as evidenced by their farming practices. But what about the well-being of the farmers in this context of sometimes contradictory requirements? In 2019, France's Economic and Social Council stated that 'there can be no welfare of animals used in food production without satisfactory living and working conditions for the human beings in charge of their farming, transport and slaughter'. This notion guided us in developing the Espace for the Future 2021: Animal Welfare and Farmer Well-being. The Espace for the Future is also designed and run by SPACE and the Brittany Chambers of Agriculture with the support of the following partners: AGRETIC BDI, GIE Elevages de Bretagne, IDELE - Livestock Institute, IFIP - Frenck Pork and Pig Institute, ITAVI - Poultry Technical Institute

Innov' SPACE Awards are a remarkable showcase of innovation for all livestock farmers. This year, SPACE 2020 cannot go forward in its usual form due to the ongoing global Covid-19 pandemic. One of the first requests made by the companies registered to this 34th edition was to maintain the Innov'Space operation. We naturally made the decision to respond favorably, as SPACE is the reference show for innovation in livestock farming. The applications submitted to Innov'Space were carefully examined by a multi-disciplinary jury, independent of SPACE, consisting of engineers from Chambers of Agriculture, specialists from technical institutions, INRAE (National Institute of Agricultural Research) and INPI (National Institute of Industrial Property), livestock veterinarians and specialist press journalists..Mrs. Quemener said that she would like to acknowledge and congratulate the consistently high level of commitment demonstrated by the companies choosing SPACE to showcase their innovations. A big thank-you to the 70 applicants and congratulations to the 26 award-winners! For 25 years now, Innov'Space is a valuable asset for our sector. The winning selection of products, equipment and services demonstrates just how efficient, innovative and creative our sectors are. We can all share and be proud of this dynamic energy and capacity for innovation, she added. SPACE 2021 will also give an opportunity to witness the Conferences, Animal Presentation as a show for genetics, European Simmental Challenge and ten interregional competitions, The SPACE 2021 Genomic Elite Sale. The National Bleu du Maine competition will be held on Tuesday 14th September. Given the progress of vaccination campaigns and the improved health situation, events can now be scheduled in September. However, we will still need to impose health protocols. Participants in the expo will need to show a health pass.

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ADVERTISEMENT INTERACTION SECTION

Contents

HIND POULTRY - JULY 2021

RESEARCH ARTICLE

by Gina Medina, L. Jungbauer and K. Wendler, Delacon Biotechnik, Steyregg, Austria and C.W. Kang, Konkuk University, Seoul, South Korea

The effects of Phytogenic Feed Additives Naturogen-510 on performance

The poultry industry today faces challenges such as rising feed and production costs apart from the demand of being one major source of animal protein in response to the growing global human population in the perspective of food safety and security.

The ban on the use of in-feed antibiotics in Europe has influenced the increasing awareness of the consumers for food safety and health risk. Documented negative effects of using antibiotic growth promoters in feed triggered the continuous evaluation of in-feed natural growth promoter as an alternative. For the last 10 years, the studies on the use and benefits of natural products in the animal industry increased significantly.

Phytogenic feed additives (PFA) are products of plant-origin that includes herbs, spices, essential oils and other plant extracts. PFA are known to stimulate digestive processes and to improve gut health. Increased nutrient digestibility is reflected in better animal performance.

Different effects of PFA compounds like antioxidative properties (especially monoterpenes thymol and carvacrol, flavonoids, anthcycanes), antimicrobial actions (phenolic compounds being the prin- cipal active components), growth promoting efficacy (for example stabilising feed hygiene, by affecting the ecosystem of gastrointestinal microbes, improving digestibility) and improvement of flavour and palatability of feed are reported for broilers.

In several publications Awaad et al. (2010), Jafari et al. (2009) and Liu et al. (2010) show positive effects of plants and plant extracts on the immune response and antibody titers to NDV of broilers. The aim of the study was to determine the effects of phytogenic feed additive (Naturogen- 510) on zootechni- cal performance, immune response and nutrient digestibility in broilers.

Materials and Methods

A total of 840 male day-old Ross 308 male broilers were randomly distributed to four experimental treatments based on a 2x2 factorial design, supplemen-tation of commercial phytogenic feed additive (Naturogen-510) and the recommended and reduced dietary nutrient levels respectively.

Each treatment was replicated seven times with 30 broilers per replicate. The birds were fed with corn/soy starter (1-21 days) and finisher (22-35 days) mash rations for 35 days based on the following treatments:

- Basal/control diet (T1).
- Diet with reduced nutrient level (T2).
- T1 plus 150g of phytogenic feed additive (T3).
- T2 plus 150g of phytogenic feed additive.

Table 1. Zootechnical performance results

Treatments	Day 1-35			
	ADG (g/d)	ADFI (g/d)	FCR (g/g)	Final body weight (g)
T1 (Control/ basal diet)	48.01^{bc}	91.88^{a}	1.92^{a}	1721
T2 (reduced nutrient density diet	47.56^{c}	89.16^{ab}	1.88^{ab}	1656
T3 (T1 + PFA at 150g/mt feed)	50.41ab	91.71a	1.82^{ab}	1754
T4 (T2 + PFA at 150g/mt feed)	48.75^{bc}	87.68^{b}	1.80^{b}	1698

Values with different superscripts differ significantly at P<0.05

Table 2. Effect on protein digestibility and energy availability

Treatments	Protein digestibility %	Energy availability %
T1 (Control/basal diet)	91.90	84.00
T2 (reduced nutrient density diet	91.50	81.30
T3 (T1 + PFA at 150g/mt feed)	94.80	86.20
T4 (T2 + PFA at 150g/mt feed)	96.80	85.90

Table 3. Approximate calculated nutritional content of the starter and finisher diets

Calculated nutritional content	Starter (1-21 days)		Finisher (22-35 days)	
	T1/T3*	T2/T†	T1/T3*	T2/T4†
TMEn (kcal/kg)	3,100	3,045	3,150	3,100
Crude protein (%)	21.50	20.50	19.64	19.00
Ca (%)	1.00	1.00	1.00	1.00
Available P (%)	0.40	0.35	0.30	0.25
Lysine (%)	1.13	1.07	1.02	0.97
Cys+Met (%)	0.90	0.86	0.73	0.70

Table 4. Effect on antibody titer and mortality.

	ND titer (log2)	Mortality (%)
T1 (Control/basal diet)	2.29	7.62
T2 (reduced nutrient density diet	2.00	5.71
T3 (T1 + PFA at 150g/mt feed)	2.57	6.67
T4 (T2 + PFA at 150g/mt feed)	2.43	4.76
Basal diet (control)	2.14	
Diet w/ PFA	2.50	

The nutritional matrix of the tested PFA was considered in the formulation of the reduced nutrient density diet. Feed and water were provided ad libitum. Parameters measured were feed intake, body weight, feed conversion ratio, mortality, Newcastle disease virus antibody titer and protein and energy digestibility.

Broilers were inoculated with commercially available live NDV vaccine by intra- muscular injection on the 14th day of the experiment.

Blood was taken from the jugular vein from two weeks after injection. Serum samples were analyzed for anti-NDV antibody titers by ELISA with commercial kits, following the manufacturer's directions.

Feed samples were analyzed for nutritional content. Data were analyzed using a randomized complete block design following.

GLM procedure of SAS and statistical signifi- cance at P £0.05.

Results and discussion

The overall zootechnical performance effect on body weight, daily gain, feed intake and feed conversion ratio are shown on Table 1.

The treatment diets with PFA (T3 and T4) showed numerically higher final body weight than diets without PFA (T1 and T2) by 1.9% and 2.5% respectively.

Reduction on nutrient density level low- ered feed intake and daily weight gain which resulted in significantly better feed conversion ratio (T1 vs T2). The addition of commercial PFA product either at the recommended /normal basal diet or at reduced nutrient density diet (Table 3) showed significant improvement in feed conversion ratio after 35 days by 5.2% and 4.2% respectively. The higher protein digestibility and energy availability on diets supplemented with PFA either at recommended or reduced nutrient density as reflected in (Table 2) might contribute to the better body weight and FCR.

An overall statistical analysis has shown that the addition of tested PFA (Naturogen-510) significantly improved (p=0.006) feed conversion ratio from 1.89±0.09g/g in the control groups to 1.80 ± 0.05g/g (-5%) in the groups with PFA on day 35. The results supported other studies conducted demonstrating the beneficial effect of phytogenic feed additives. PFA have shown to stimulate secretion of digestive juices, enhances activity of digestive

enzymes and reduces intesti-nal ammonia formation. The increased secretion of digestive enzymes might improve nutrient breakdown and thus, increase availability and absorption of nutrients.

Based on the blood serum analysis for antibody titer against Newcastle disease virus, the addition of tested PFA at both control/basal diet and reduced nutrient density diets increased the amount of antibody by 12.2% and 21.5%, respectively.

Similarly, the same positive effect on mortality was reflected in diets with the PFA as shown on Table 3. The results demonstrated that PFA added to broiler diets can enhance immunological activity.

Liu et al. (2010) showed that the addition of plant extracts (Radix astragali, Radix codonopis, Herba epimedii, Radix gly- cyrrizae) to the drinking water improved immune response and increased antibody titers to NDV.

Awaad et al. (2010) showed that eucalyp- tus and peppermint oils are able to implement humoral immune response in chicks against ND. While Jafari et al. (2009) reported that the addition of fresh garlic to broiler diets has the potential to increase serum - globuline in broilers vaccinated against common broiler pathogens.

Conclusion

This study has shown the beneficial and promising effects of phytogenic feed additive (Natutogen-510) on zootechnical performance, immune response and nutrient digestibility in broiler production.

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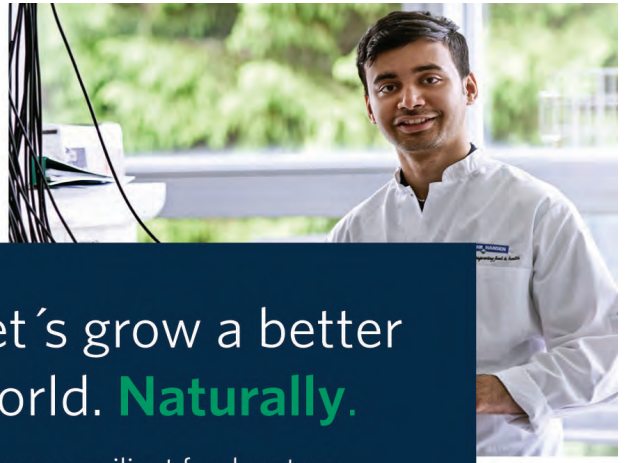
APPOINTMENT

Novus Animal Nutrition India Hires Dr. Shaveta Sood as National Sales Manager for North, West & Central India

Novus Animal Nutrition (India) Pvt. Ltd. hired Dr. Shaveta Sood as National Sales Manager – North, West & Central India. Dr. Shaveta will be responsible for sales function for North, West & Central India region reporting to Neeraj Kumar Srivastava, Managing Director – South Central Asia. Dr. Shaveta brings with her13 years of experience working across the sales, marketing, and product management functions with companies like Vetina Healthcare, Pranav Agro, Polchem hygiene and Animal Husbandry department, Himachal Pradesh. In her last assignment she was titled Business Unit Head – Poultry Business with Vetina Healthcare. She holds a master's degree in animal nutrition from college of Veterinary and Animal Sciences, Palampur and completed Senior Management Programme with IIM, Kolkata. Dr. Shaveta, said I am delighted to be part of a wonderful Novus family and would like to express my deep gratitude. A great place with good work culture and wonderful team. I look forward to bringing my experience, skills, and network of contacts to help build on its sterling reputation. Neeraj Kumar Srivastava, MD of Novus Animal Nutrition (India) Pvt. Ltd., said we are very excited to have Dr. Shaveta on board, with her experience, technical knowledge, and management capabilities will complement our growing team. Novus International, Inc. is a leader in scientifically developing, manufacturing and commercializing gut health solutions for the agriculture industry. Novus's portfolio includes ALIMET® and MHA® feed supplements, MINTREX® chelated trace minerals, CIBENZA® enzyme feed additives, NEXT ENHANCE® feed additive, ACTIVATE® nutritional feed acid, and other specialty ingredients. Novus is privately owned by Mitsui & Co., Ltd. and Nippon Soda Co., Ltd. Headquartered in Saint Charles, Missouri, U.S.A., Novus serves customers around the world. For more information, visit www.novusint.com.



Let´s grow a better world. **Naturally.**

For more resilient food system
from farm to fork
powered by good bacteria.

#goodbacteria

When You Need A True Specialist in Microbial Science

WE ARE EXPERTS

We put our 145 years of expertise in bacterial solutions for food and health at your service.

WE TOUCH LIVES

Our good bacteria help farmers raise healthy animals to feed the world with nutritious and plentiful animal protein products sustainably.

WE KNOW GOOD BACTERIA

We are the global market leader in bacterial cultures for food.
Actually, every second cheese in the world contains at least one of our natural ingredients.

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CHR HANSEN
Improving food & health

CHR HANSEN
Improving food & health

Chr. Hansen expands its business into Indian Livestock

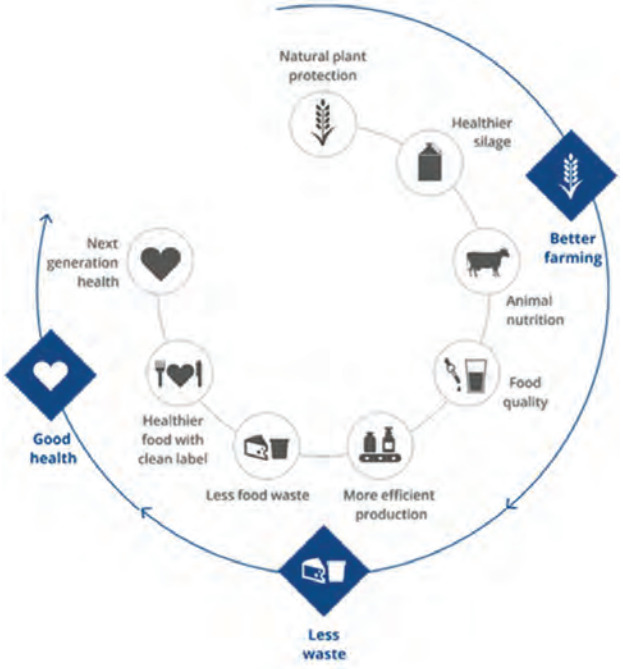
Discover how good bacteria in livestock farming can improve animal health and feed conversion, through Chr. Hansen's science based sustainable solutions.

Chr. Hansen is a global, differentiated bioscience company that develops natural ingredient solutions for the food, nutritional, pharmaceutical and agricultural industries. Uniquely positioned to drive positive change through microbial solutions, Chr. Hansen has worked for over 145 years to enable sustainable agriculture, fewer additives and healthier living for more people around the world.

Chr. Hansen's microbial and fermentation technology platforms, including a broad and relevant collection of around 40,000 microbial strains, have game-changing potential. Matching customer needs and global trends, Chr. Hansen continues to unlock the power of good bacteria to respond to global challenges such as food waste, global health and the over use of antibiotics and pesticides. As the world's most sustainable biotech company, Chr. Hansen touches the lives of more than 100 Crore people every day. Driven by its legacy of innovation and curiosity to pioneer science, the Company's purpose – To grow a better world. Naturally. – is at the heart of everything that Chr. Hansen does.

Pioneering Science

Backed by more than 145 years of innovation and its curiosity to pioneer, Chr. Hansen constantly seeks to anticipate global trends. This is put into action at its major research facilities in Denmark and 19 application and development centres worldwide, including one in Pune, India where Chr. Hansen works closely with customers to bring new exciting products to the market and advance fermentation beyond the borders we know today.



Chr. Hansen offers natural solutions at every step of the value chain from farm to fork. With its probiotic range, the Company contributes to several parts of animal protein delivery chain.

Chr. Hansen India was established in 2004. With its regional office in Mumbai and more than 40 employees, Chr. Hansen has proven a valuable innovation partner to many of India's leading dairies and nutraceutical companies over the past 17 years, and Chr. Hansen collaboration with leading industry players is well acknowledged.

Closer and direct contact with the customers

Chr. Hansen has now taken the decision to enter directly into the livestock sector in India with its innovative probiotic solutions for the poultry and dairy markets. This decision is in line with Chr. Hansen's approach to be directly present in the market with its own probiotic products. With the flagship probiotic products portfolio, namely the GalliPro® and SiloSolve® brands, Chr. Hansen sets out to have a closer and more direct contact with customers, demonstrating its technical and scientific competences. There is an increasing awareness within the livestock sector of the need to optimise health and well-being of the animals to improve performance and toreduce the need for antibiotic intervention in production. Chr. Hansen is perfectly positioned to tap into this trend as the probiotic partner-of-choice to the feedmillers and farmers. Moreover, Chr. Hansenis actively supporting the industry through its recent collaboration with both the CLFMA and INFAH organisations.

Strong global network at the customers' service

With its own global network of laboratories, as well as many 3rd party partnerships, Chr. Hansenis strongly positioned to demonstrate the efficacy of its probiotic portfoliofor customers.This is further supported by a strong centralised innovation team in Europe, where more than Chr. Hansen 300 scientists are working specifically on the different platforms of microbial research and development.

Strain differentiationbacked back solid science, mode of action and commercial viability are critical to the success of a probiotic application. This is where Chr. Hansen raises the bar in the world of microbial solutions and supports its customers with extensive scientific and technical proof of its specific probiotic strain combinations. As the Company says, "Strain Matters" and this will be a topic that Chr. Hansen will address in more detail very soon.

Working for a sustainable future

Sustainability is key strategic focus forChr. Hansen and the Company has been listed for four consecutive years onthe Global 100 Most Sustainable Companies by Corporate Knights. In 2019 and 2020, Chr. Hansen ranked no.1 and 2 respectively. The Company was also recognised with the Golden Peacock Global Award for Sustainability in 2019, an Indian award that is regarded as a benchmark of excellence worldwide. Such recognition is a great tribute to all the sustainability efforts by the Company and a result of its many collaborative partnerships with its customers. Chr. Hansen believes that a sustainable future is achievable if they continue to develop natural and innovative solutions for generations to come.

In 2019 and 2020, Chr. Hansen ranked no. 1 and 2, respectively, on Corporate Knights' list "Global 100 Most Sustainable Companies" in the world. Today Chr. Hansen is recognized as the world's most sustainable biotech company.

APPOINTMENT

New EVP for Perstorp Animal Nutrition AartMateboer to realize ambitious plans

Perstorp is proud to announce that AartMateboer has been recruited to lead its Animal Nutrition business, which is going through a rapid transformation to fortify its position as a true solutions provider for the Animal Nutrition industry. AartMateboer has been appointed EVP Animal Nutrition for Perstorp as of August 1. He is a senior executive with a solid background in the chemical as well as animal nutrition industry. In his latest position he was Vice President Animal Nutrition at IFF – International Flavors & Fragrances Europe, and has prior had several senior positions in companies such as Akzo Nobel, Cargill and Danisco. "I am excited to join Perstorp, a company known for bringing innovative and sustainable solutions to the animal nutrition industry. The recent investments in the business have laid a solid foundation for the future and together with the team we will make the ambitious growth plan happen," says AartMateboer. AartMateboer holds a master's degree in organic chemistry from the Free University in Amsterdam, and will be based at Perstorp's production unit in Waspik, the Netherlands.

Jan Secher, Perstorp President & CEO says:

"I am very pleased to welcome Aart to Perstorp. The Animal Nutrition business is continuing to be one of Perstorp's focus segments, and with our ongoing investments as well as product innovations in the area, we have high expectations on even better serving the animal nutrition market. With Aart's solid track record and background, I am confident that we will continue to serve and lead change in the animal nutrition industry." The ongoing investments at the production unit in the Netherlands enable growth in production capacity to meet the increased demand and shifting customer requirements. The investments will also be used to make sure that the new portfolio that is currently in the innovation pipeline can be produced when it goes to market in 2022. This portfolio of gut health solutions is based on years of efforts in R&D, using unique inhouse developed production technologies.

PRODUCT LAUNCH

2-in-1 system meets consumers' high demand

I-Cut 122 TrimSort will sort it all out : Supermarkets and QSRs (Quick Service Restaurants) are asking poultry processors for high volumes of typical portioned products such as crispy tenders, medallions, burgers, uniform fillets, strips, nuggets, cubes and more. The production of these portions needs to be automated to handle the demand. Marel offers a big help in responding to this high demand by introducing I-Cut 122 TrimSort. Now processors, besides making multiple cuts, can split two streams of cut products, adding considerable value to off-cuts in this way. From a single stream of incoming products, I-Cut 122 TrimSort can cut various high-value boneless products, accurately distributing them to two streams at the highest speeds. The integrated TrimSort functionality and smarter software allow for the distribution of many combinations of cut product to the two integrated belt pairs. This further reduces giveaway with no need for human intervention. All of this is done in one smart system with a small footprint, without the need for additional machines.

A smaller fillet, cutoffs and trim : I-Cut 122 TrimSort can portion a fillet into a smaller fillet, useful off-cuts and trim, while sorting the cut items properly on two conveyor belt pairs. The smaller cut fillet - which stays on the top belts - can be used for many supermarket and QSR products such as fixed-weight fillet packs or whole muscle meat burgers. The cut-off medallions, strips or cubes, together with trim, land safely on the second, lower internal conveyor belt. This lower outfeed belt will take these portions to another process, so that they can end up in QSR whole muscle chicken wraps, chicken salads or 'crispy tenders'.

A meticulous job : The super-fast opening and closing belts do a reliable, meticulous sorting job, in close cooperation with the cutting knife which has an accuracy of 5 grams. To illustrate this, Marel's product specialist Morten Dalqvist says, "When a tenderloin is your input product, TrimSort can drop the tip, leave perfect cubes on the upper belt and drop the tail too. Such a job needs no operators to separate quality products from trim, making the I-Cut 122 Tr

Intelligence : Equipped with the latest handling and communication software, I-Cut 122 TrimSort is now able to keep the collected data connected to each product on the belt, allowing the distribution to its best destination. Sharing product data through the process allows Marel machines to work together. This makes the portioning process an intelligent hub in the product creation chain and greatly helps processors meet the requirements of retail, QSR and catering customers. Their voluminous orders for high-quality portioned products will be easier to fulfill.

TECHNICAL ARTICLE

Trypsin Inhibitor, the hidden enemy in Soyabean Meal

Dr. Koushik De, Director-Technical Services, SCANovus International

As global animal production has rapidly shifted towards reduced Antibiotic free, "Gut health" has become a popular expression and all-encompassing concept in the scientific community. The gastro-intestinal tract must provide a barrier function protecting against harmful environmental elements (e.g. toxins and pathogenic microbes), while simultaneously permitting appropriate nutrient absorption. Successful animal performance depends on the interplay between the intestine, microbiota, diet, and a multitude of environmental factors.

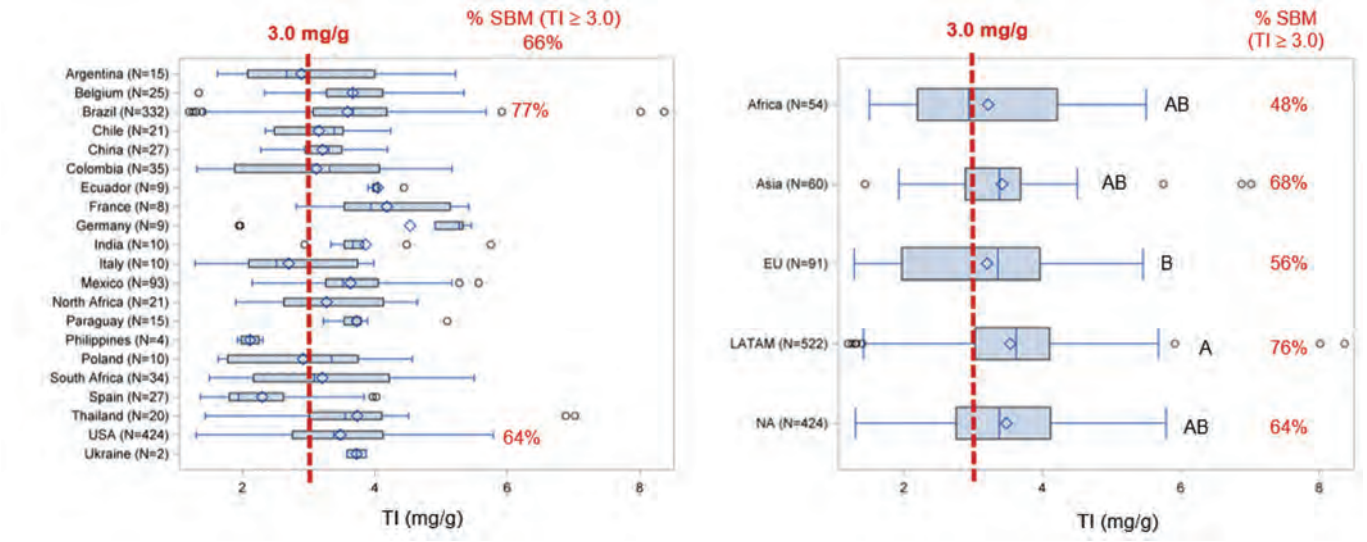
The shift to antibiotic free production or better gut health often results in the increase of soybean meal inclusion as there are limited in the number of efficacious protein sources that successfully reduce soybean meal content. Soybean meal is the most widely used major protein source in poultry production across the world. However, SBM contains various anti-nutritional factors that may affect intestinal homeostasis and impair nutrient utilization in poultry. The main anti-nutritional factors in SBM, are trypsin inhibitors (TI), oligosaccharides, such as raffinose and stachyose, and the antigen Glycinin, â-conglycinin and Lectins. Diets that include high levels of soybean meal contain proportionally higher anti-nutritional factors and may pose the risk of impaired performance. Chen et al. (2016) analyzed the content of TI and Urease Activity (UA) in more than 1000 samples of SBM from all over the world and observed a high degree of variability in the reported ANF values, both within the same country and amongst different origins. The levels of trypsin inhibitor (TI) of solvent-extracted soybean meal samples from different countries and world areas. The elevated variability and its potential negative impact on performance highlights the importance of knowing the content of anti-nutritional factors in SBM for poultry formulations.

In this article, we will review mainly the role of Trypsin Inhibitors (TI) in broilers.

Why Should we care about TI?

Trypsin and chymotrypsin are important digestive enzymes that are secreted by the pancreas as the inactive enzyme precursors trypsinogen and chymotrypsinogen. Trypsin activates itself via positive feedback and converts chymotrypsinogen and other inactive enzymes into their active forms. As Tis are protein in nature and one of the most anti nutritional components of SBM, they compete to bind to trypsin therefore affecting the digestion process.They

The levels of trypsin inhibitor (TI) of solvent-extracted soybean meal samples from different countries and world areas.



Chen et. al., The Journal of the American Oil Chemists' Society, 2020

have been correlated with rapid feed passage and decrease in digestibility of broilers with a relevant economic impact.The analysis is still more expensive, complex and time consuming for TI,for this reason, other parameters are commercially used as indirect SBM quality indicators, such as Urease activity and Protein solubility.

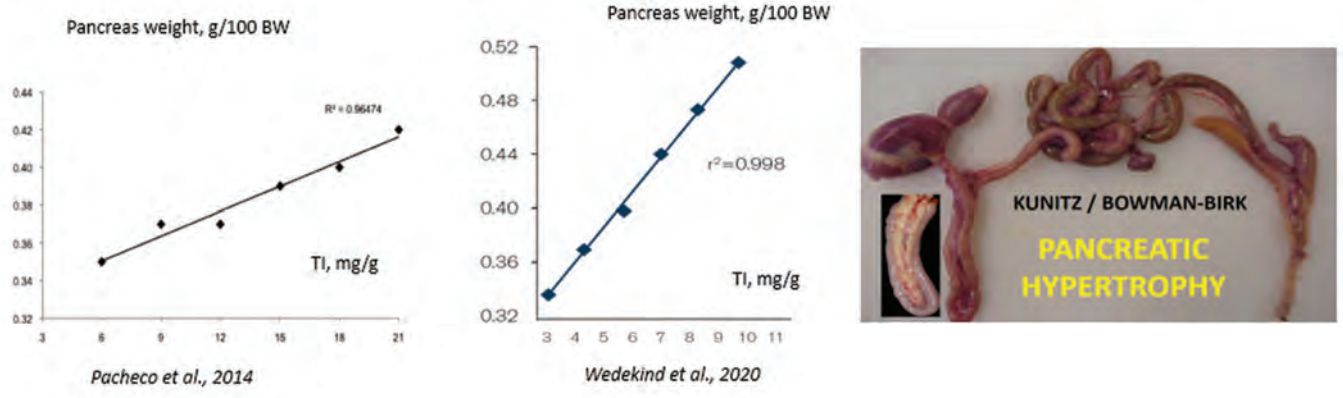
There are two types of TI present in Soya, Kunitz TI which is larger molecule & Bowman-Birk TI which is smaller molecule. But soyabean seed contain around 14% more Bowman Birk TI than Kunitz TI.

Consequence of TI for Soya Bean and bird performance:

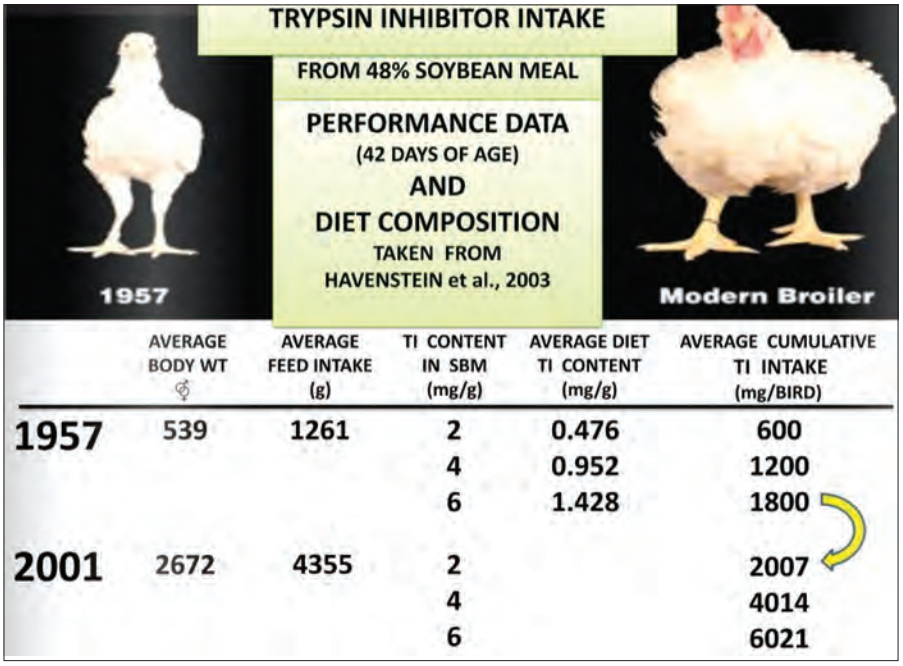
Excessive quantities of TI in feed will cause pancreatic hypertrophy leading to poor growth and decreased performance (Pacheco et al. 2014; García-Rebollar et al. 2016; Rada et al. 2017). This pancreatic hypertrophy is a compensatory modulation by the body to offset the effect of ingested trypsin inhibitors (Liener 1981; Waldroup et al. 1985).

TI also affect the nutritive value of SBM. Because of loss of endogenous protein there is reduced digestionwhich affects the nitrogen balance, gut viscosity resulting into reduced live weight and negative impact on feed efficiency.Palliyeguru et al. (2011) demonstrated dietary soya TI elicited an increased severity of sub-clinical necrotic enteritis. When amino acid digestibility is compromised, the ileal ingesta will have a relatively high content of undigested amino acids that pass into the large intestine and cecal

Linear increase in pancreas size with increasing TI content in SB



Erdaw et al., 2018: "Anti-nutrients Reduce Poultry Productivity: Influence of Trypsin Inhibitors on pancreas"



	AVERAGE BODY WT ♂	AVERAGE FEED INTAKE (g)	TI CONTENT IN SBM (mg/g)	AVERAGE DIET TI CONTENT (mg/g)	AVERAGE CUMULATIVE TI INTAKE (mg/BIRD)
1957	539	1261	2	0.476	600
			4	0.952	1200
			6	1.428	1800
2001	2672	4355	2		2007
			4		4014
			6		6021

tonsils, where microbial fermentation will occur. C. perfringens, a pathogenic agent of necrotic enteritis, needs specific amino acids and peptides for its proliferation (Nakamura et al., 1968).

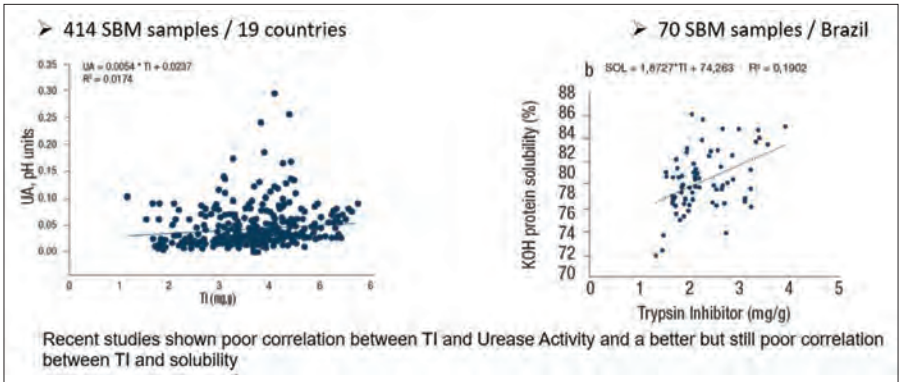
Using the Data from the simulation conducted by Havenstein et al.(2003) with "1957" broilers versus '2001" broiler it is possible toestimate the TI intake of the "1957" birds fed 1957 diets and compare it with the estimate of TI intake by the "2001" birds fed 2001 diets. Because of improvement of modern broilers in terms of average feed intake and body weight they consume more thanthree times TI than 1957 birds considering the same amount of TI in SBM. The effects of TIA are particularly strong in young animals. It has been shown that overcooking of soybean meal decreases digestibility of amino acids (Lee and Garlich, 1992; Parsons et al., 1992). The explanation for the decreased amino acid digestibility and reduced growth responses appear to be related to the Maillard reaction with cross-linking involved to a lesser extent.

Correlation of TI (AOAC) & indirect Parameters for SBM quality:

Currently, the analytical technique most commonly used to measure soybean meal quality is protein solubility, perhaps combined with the urease test. The urease test has been used for some time as a measure of soybean meal processing. Trypsin inhibitors (TI) and urease activity (UA) are the two most relevant quality measurements for soybean products as feed ingredients for animals. TI were reported to be correlated with UA, so feed processing plants use UA as an indicator of TI in soybean meal (SBM). Chen et.al (2019) conducted a study to determine the levels of TI and UA in 414 SBM samples from 19 different countries and to validate whether TI and UA are correlated. They found that TI were poorly correlated with UA in solvent extracted SBM samples, suggesting that UA should not be used as a surrogate indicator for TI content in soybean products.

How to deal with TI in SBM?

Soybean meal (SBM) is the most important source of dietary protein for poultry. Although TI is reduced by heat treatment,

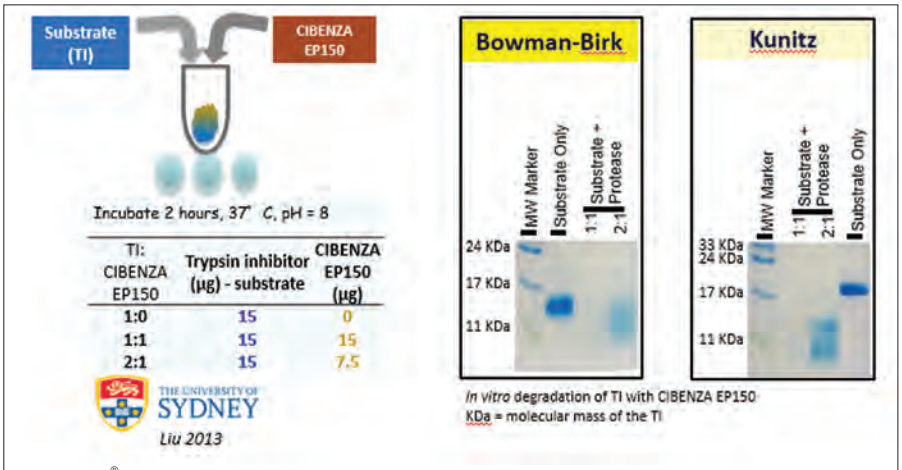


Araujo et al (2019) conducted similar study to determine the correlation of TI and KOH Protein Solubility.

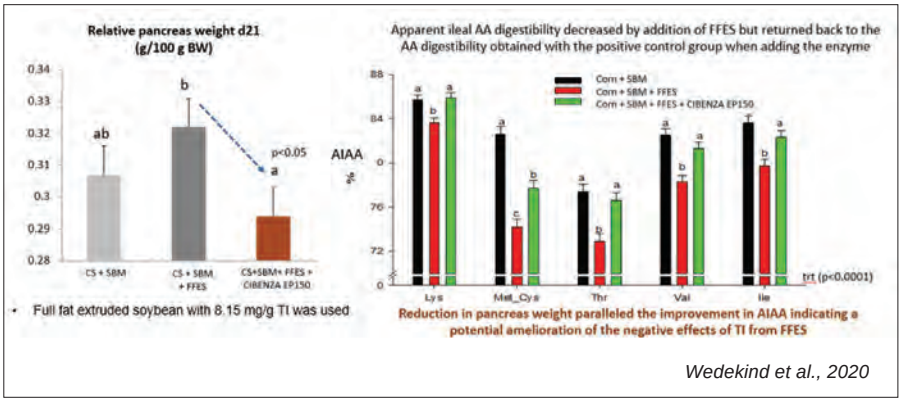
Analytical characteristics of common types of soy protein products

Product type	Unit	Soybean seeds	SBM	Enzyme treated SPC	Alcohol extracted SPC	SPI
Humidity	%	10 - 12	10 - 12	6 - 7	6 - 7	6 - 7
Crude protein	%	33 - 17	42 - 50	55 - 60	63 - 67	>85
Fat	%	17 - 20	0.9 - 3.5	2.5	0.5 - 3.0	0.1 - 1.5
Ash	%	4.5 -5.5	4.5 - 6.5	6.2 - 6.8	4.8 - 6.0	2 - 3.5
Oligosacharides	%	14	15	<1	<3.5	<0.4
Stachyose	%	4 - 4.5	4.5 - 5	<0.3	1 - 3	<0.2
Raffinose	%	0.8 - 1	1 - 1.2	<0.3	<0.2	<0.1
Trypsin inhibitor TIA	mg/g CP	45 - 60	4 - 8	1 - 2	2 - 3	<1
Glycinin	mg/g	150 - 200	40 - 70	<0.1	<0.1	<0.01
β-conglycin	mg/g	50 - 100	10 - 40	<0.1	<0.1	<0.005
Lectins	ppm	50 - 200	50 - 200	<1	<1	<1
Saponins	%	0.5	0.6	0	0	0
Phytic acid bound P	%	0.6	0.6	0.6	0.6	-

SBM = defatted soybean meal; SPC = soy protein concentrate; SPI = soy protein isolate.
Adapted from: Hansen (2003) and Peisker (2001)



CIBENZA® EP150 can destroyal most all tryps in inhibitors present in soyabeanmeal (at 1:1 ratio) and destroy substancially even in higher concentración (2:1) of TI as well



Wedekind et al., 2020

overheating has a negative impact on protein quality and amino acid digestibility. Exogenous Protease enzymes can improve digestibility of feedstuffs, lower feed costs and improve animal performance. Proteases improve animal performance and nutrient digestibility by decreasing digesta viscosity, improving endogenous enzyme activity and decreasing pancreas weight (Bedford and Classen, 1993; Bedford and Schulze, 1998; Erdaw et al., 2017a,b; Yan et al., 2017).

As mentioned earlier the determination in the laboratory of the TI content of SBM and its relationship with AA availability is tedious and time-consuming and provides inconsistent results. Also, the traditional processes of treating SBM can't remove the anti-nutritional factors to a safe level. Therefore, use of exogenous protease is very effective in reducing the deleterious effect of TI in SBM.Liu et al., in 2013 conducted a study wherein they used a protease enzyme (Cibenza EP150) with different levels of TI and found that protease enzyme was able to destroy almostalltrypsininhibitors(both Bowman-Birk&Kunitz TI) present in soyabeanmeal (at 1:1 ratio) and destroysubstanciallyeven in higher concentración (2:1) of TI as well.

Wedekind et al., in 2020 showed that addition of exogenous protease (Cibenza EP150)in a diet containing FFS(with TI8.15mg/g) improved the amino acid digestibility and at the same time reduce the pancreas weight also indicating a potential amelioration of the negative effect of TI from FFS.

Conclusion:

There are lot of scientific evidences on the negative effect of soybean trypsin inhibitors in chickens. They can not only adversely affect the productive performance of chickens but can also impair their intestinal health. The beneficial responses of protease are likely due to decreases in endogenous amino acid losses, but in vitro evidence also demonstrates the ability of protease to hydrolyze Bowman-Birk and Kunitz-trypsin inhibitor proteins. Thus, there might be both direct and indirect mechanisms whereby amino acid digestibility is improved with proteases and so is the bird's performances.

DSM launches Sustell™ an intelligent sustainability service for improvement in profitability

Royal DSM, a global science-based company active in Nutrition, Health and Sustainable Living, has launched Sustell™ – a first-of-its-kind intelligent sustainability service that delivers accurate, simple, and actionable farm-level solutions – to improve the environmental footprint and profitability of animal protein production. Through Sustell™, DSM is underlining its commitment to its strategic initiative We Make It Possible, which is driving a robust and achievable global transformation toward sustainable animal protein production. By leveraging digital and data-driven solutions such as Sustell™, DSM is advancing its precision animal farming journey towards a brighter future. DSM has developed Sustell™ together with Blonk, a recognized independent expert and leader in Life Cycle Analysis (LCA) and sustainability performance in the food and agriculture fields. The Sustell™service is built around a state-of-the-art Intelligence Platform that is connected to the Blonk APS-footprint tool, together with an 'Expert Center' made up of a team of DSM and Blonk experts in LCA, animal nutrition and sustainability. The Expert Center partners with animal protein producers, assessing the baseline environmental footprint of their animal production using their actual farm and feed data rather than industry averages and proxy data sets, and then developing case-specific intervention scenarios known as 'what-if' models to make measurable sustainability improvements. In this way, Sustell™ combines an advanced, powerful sustainability calculation tool that utilizes real farm data, with expert knowledge, tailor-made, practical solutions and business development projects to unlock the value of sustainability. Sustell™ is a global service, built on validated protocols, calculation methodologies and proven processes that meet international standards. It provides accurate, globally recognized, comparable analyses and results of environmental impact assessments, interventions and improvements throughout the animal protein value chain:

- Compliant with the internationally recognized FAO LEAP (Livestock Environmental Assessment and Performance) and Product Environmental Footprint Category Rules (PEFCR). Following calculation guidelines from IPCC, and in alignment with ISO 14040/44. Built on credible and sound food, feed and agriculture databases like the Agri-footprint database and GFLI (Global Feed LCA Institute).
- Covers the 17 largest agricultural producing countries in the world where the animal production systems can be defined in detail thanks to country-specific data.
- Analyses the environmental impact of 19 different categories including climate change, resource use, water scarcity, marine and freshwater eutrophication, ozone depletion, to name only a few, corresponding to impact assessment method Environmental Footprint 2.0. providing global recognition for the results.

By providing deep insights into farm-level emissions Sustell™ opens new possibilities for the wider value chain, including the ability to certify and incentivize sustainable farm practices. For example, retailers and financial institutions will be able to objectively manage the risks and opportunities relating to the environmental footprint of animal protein. In addition, Sustell™ enables farmers to accurately forecast the impact of sustainability measures on financial performance. Hans Blonk, CEO Blonk Consultants &Blonk Sustainability Tools: "We are excited to be launching Sustell™ today alongside DSM – a truly intelligent sustainability service that is front and center to our mission at Blonk – to support organizations in addressing the challenge of making the global production and consumption of food more sustainable." David Nickell, VP Sustainability & Business Solutions DSM Animal Nutrition & Health: "Sustell™ achieves the seemingly impossible – simplifying the complexity of measuring, validating and improving the environmental sustainability of animal protein transparently, scientifically, farm by farm, system by system. Animal farming companies and the associated value chain, have, for the first time, a powerful solution to measure, compare and improve the sustainability of animal protein." Ivo Lansbergen, President DSM Animal Nutrition & Health: "To sustainably feed almost 10 billion people by 2050 within our planetary boundaries, we must apply new thinking, technologies and business models. Together, we must shift away from criticizing animal farmers for their environmental impact and instead help and support them by providing the tools and systems to improve the sustainability footprint of animal farming. In line with this ambition,Sustell™ is a first-of-its-kind service that will enable positive change for business and the environment – and help deliver on our purpose of creating brighter lives for all."

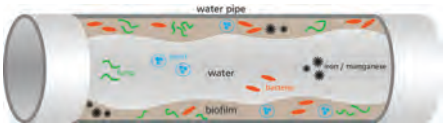


Figure 2 : Pipeline water biofilm

Water Quality Management for Healthy Gut in Chicken

Dr. Ashok Rajguru,
Programme Manager, Trouw Nutrition India

Water is the most important nutrient for poultry. Water plays a key role in thermoregulation, digestion and absorption of nutrients andacts as a carrier for administration of additives, such as medication, supplements, etc. Excellent water quality is important as chickens consume twice as much water as feed. Chick's body weight contains 70% of water but if water intakeis reduced or there is increased water loss, then it would have a significant effect on the bird's performance.Therefore, it is very important to ensure that adequate, clean and uncontaminated water supply is provided to the chicken.

When we analyze water samples for chemical parameters, we may observe higher level of inorganic elements such as sodium (Na), potassium (K), and chloride (Cl). This might lead to increased water consumption leading to wet droppings and poor litter conditions. Many a times, main source water and pipeline water could contain higher levels of calcium salt (hardness), high alkalinity and high level of nitrate, which need to be taken care of whilst addressing water quality. Also, the pipeline water samplesshould be regularly monitored for contamination with biofilms (Fig. 2) which would affect the quality and quantity of water intake. Biofilms will affect bird performance consequent to the reduced effectiveness of medication&vaccination, reduced nipple flow rate and increased bacterial disease mortality.

Sanitization of water can be carried out by Chlorination, Chlorine dioxide, Hydrogen peroxide etc. Sanitation of water should be coupled with acidification, for the sanitizers to act effectively and for synergistic effect with respect to microbial control. This can be accomplished by usage of apt combination of free and buffered organic acids.Selko pH from Trouw nutrition contains free and buffered organic acidswhich helps in maintaining good water quality along with optimal gut health conditions in birds.

Strategies to optimize water quality:

1. Acidification with Organic acid (Selko pH)

Addition of Selko®-pHin drinking water of poultry reducesand stabilizes the pH of the drinking water of animals. It supports the digestion of feed ingredients by reducing the pH in the crop and stomach. Primarily foryoung birds, a lower pH supports better protein digestion, as pepsin (a protease) is most active at a low pH. Lessundigested protein reaching the hindgut and microbialcontrol in the stomach results in improved performanceand a healthier gut (Fig. 3, 4 & 5)

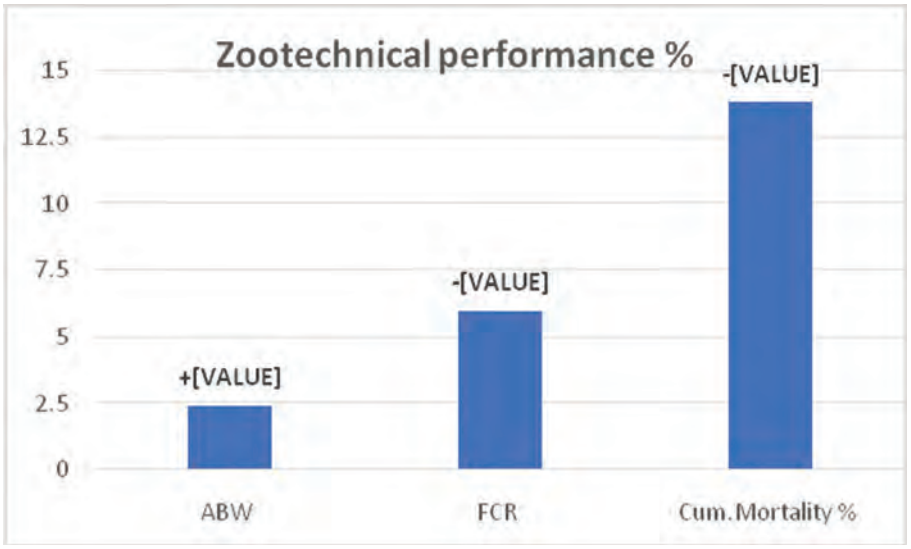


Figure 3: Improvement in performance with Selko pH over competing product

Fig. 4: Effect of Selko pH on gram negative bacteria

Water can be classifiedaccording to its alkalinity, or buffer capacity - ameasurement of water's capability to neutralize acids.Knowing the water's buffer capacity helps determinethe best blend (level of buffering) and the recommendedapplication rate.The goal of using water acidifiers is to achieve an end pH of approximately 3.8 to 4.0. In water with high buffer capacity (highalkalinity),a higher inclusion rate of acidifiers is required to reachthis target pH. Lessbuffered acidifiers can help reach thetarget pH at lower doses.A blend of organic acids may beworth considering when the objective is to combat biofilmand improve animal digestion, gastrointestinal microbialbalance, or animal performance.Dosage is especially important. Higher amounts ofa water acidifier will make more of the acid moleculesavailable to the animal to support desired effects.

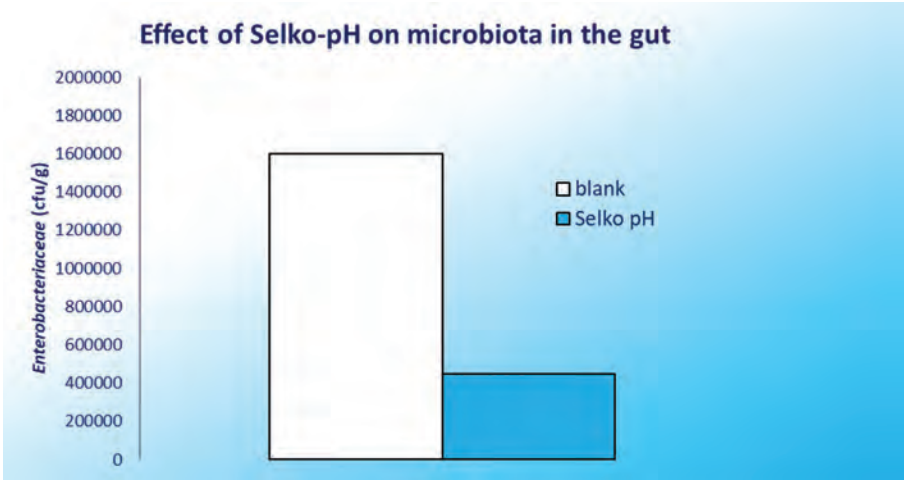


Fig. 5: Better feed digestion

2. Pipeline cleaning and disinfection with Hydrogen peroxide

A simple and effective disinfectant usage betweencycles like hydrogen peroxide will work very well inkilling many bacteria and removing biofilm buildup. Italso helps to prevent biofilm formation to some extent.Applying the proper concentration of hydrogenperoxide (35 % conc.) with 1-3 % water solution and allowing adequate treatment time is importantto achieve desired disinfection results. Hydrogen peroxide works best for disinfection purpose and not for regular practice or as a substitute to water acidification.

3. Chlorination asmaintenance during cycles

Generally, a concentration of sodium hypochlorite at15% (100 to 150 mL/1000 L water) or chlorine dioxideapplied at 0.2 to 0.4 mg/L water is recommended.The target level of residual free chlorine is importantand should be between 3-5 ppm or oxidative reductionpotential (ORP) in the range of 650 to 700 millivolts.Measuring the ORP in the water helps assess thebalance between the water's pH and free chlorine toassure water is effectively sanitized. ORP reflects theactivity of the water sanitizer as opposed to its concentration level (ppm). Chlorination becomes even more effective whencombined with a proper approach to acidification. Chlorine reaction (HOCl .OCl- + H+) is pH-dependent. At a pH of 5 to 6, the chlorine species is nearly 100%hypochlorous acid (HOCl) and

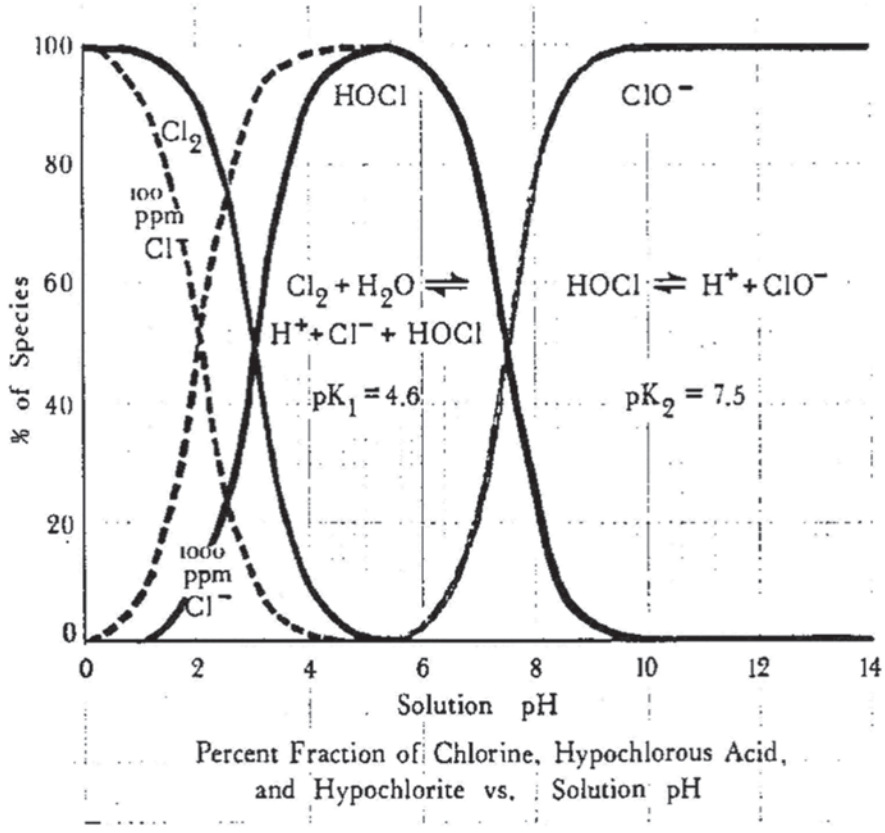


Fig. 6: pH dependent effectiveness offree chlorine

highly effective at killingbacteria (Fig. 6). Above pH 6, it starts to convert to thehypochlorite ion (OCl-) and acts mainly as an oxidizer.Water with a pH = 7 may need to be lowered for chlorineto achieve optimal bacteria-killing efficacy.

Conclusion

The microbial, chemicaland physical quality of water should be monitoredregularly. A good pipeline cleaning program should be in place for increasing the shelf life of pipelines and to prevent formation of biofilms. A water sanitation cum acidification protocol should be in place for improving quality of water that is been provided to birds and for optimizing their gut health conditions. Selko pH when applied in right dose in drinking water of poultry, improves the overall bird performance and can serve as an effective candidate in antibiotic free rearing practices as well.

VH Group's Webinar on "Breeding for Sustainable Growth of Poultry Industry"

Venkateshwara Hatcheries Group conducted a webinar on 28th June 2021 on "breeding for sustainable growth of poultry industry". Webinar was addressed by Dr. G. L. Jain, principal advisor VH Group. It was attended by large number of people of poultry fraternity from across the globe. The host for the webinar was Dr. Sunil Nadgauda. Question and answer session was also conducted after the webinar. The webinar's main focus was on requirements of successful breeding program, future of genetics and how can a good breeding program help the poultry industry to face the challenges. On account of taking up Poultry breeding in India by VH group as early as in 1980, productivity of BV300 & VENCOBB have improved so much. Over a period of last 40 years, input cost increased by more than 15 times but farm gate price of egg & chicken has increased by only 6 times. Still farmers are able to sustain poultry farming business because of improvement in productivity achieved through this indigenous breeding program of VH group.

Dr. G.L. Jain

Biomin

MYCOTOXIN Biomarkers

5 Challenges in Going from Lab to Farm

Veronika Nagl
Konstantinos Sarantis

Mycotoxins are well known to impair animal health and cause economic losses in livestock production. In the field, diagnosis of mycotoxin-induced disorders in animals is often challenging, as relevant feedlots are no longer available or feed analysis results are not conclusive. Driven by advances in analytical techniques, the application of mycotoxin biomarkers – assessing mycotoxin exposure directly in the animal by analyzing blood or other body fluids – is evolving at the farm level. Despite its potential, the on-field application of mycotoxin biomarkers still has major limitations. We discuss why it is currently tricky to interpret results and which aspects to keep an eye on.

- Great strides have been made in researching the applications of mycotoxin biomarkers at the farm level.
- Challenges to on-farm utilization of biomarkers include timing of sampling; species-dependent differences in mycotoxin metabolism; unknowns in the field; variability in laboratory experience; and current lack of biomarker reference values.

Mycotoxins - toxic secondary metabolites of fungi - are natural contaminants of foods and feeds. A plethora of mycotoxins has been identified that pose a risk for human and animal health. Due to their frequent occurrence worldwide and their toxic effects, mycotoxins require regular monitoring.

Feed analysis: well established, but still challenging

Analysis of mycotoxins in feed and food commodities represents the most traditional monitoring approach. Many different methods have been developed to detect mycotoxins in feed, ranging from time-efficient lateral flow devices to comparably more sophisticated, but also more expensive, spectrometry-based methods. For the analysis of mycotoxins addressed by regulations or recommendations, laboratories can verify the accuracy of their method via reference materials or participation in proficiency tests.

However, even the most accurate analysis method can only provide meaningful results if the sampling procedure has been performed correctly - a potential pitfall of mycotoxin analysis in feed. Mycotoxins are not distributed homogeneously within feedlots, but they occur in hotspots. Therefore, the sampling process is crucial to obtain a representative sample and thus meaningful information about the mycotoxin contamination. The multitude of scientific data and field reports on the relationship between mycotoxin levels in feed and negative health effects in animals facilitates

interpretation of data. Yet, under field conditions the time of sampling can be challenging the diagnosis of mycotoxicosis: feed lots might have been exchanged between the time of sampling and the onset of clinical signs and are therefore no longer available for analysis.

Mycotoxin biomarkers: challenges in going from lab to the farm

To circumvent the above challenges, the measurement of mycotoxins biomarkers in biological matrices of animals (e.g. blood, bile, urine, feces or tissue) has evolved. The underlying concept of assessing mycotoxin exposure directly in the animal is fascinating and would allow significant advances in the diagnosis of mycotoxicosis.

Mycotoxin biomarkers can be classified into two categories: mechanisms-based biomarkers and exposure-based biomarkers. Mechanism-based biomarkers refer to a biological response caused by mycotoxins, such as alterations in protein, enzyme or gene expression levels. This is exemplified by the effects of fumonisins on the sphinganine-to-sphingosine ratio, which is currently the best-known mechanism-based mycotoxin biomarker in livestock species. Exposure-based biomarkers describe the measurement of the mycotoxin itself and/or its metabolites in biological matrices, for example analysis of aflatoxin M1 in milk. Driven by the inherent specificity of exposure-based biomarkers (i.e. aflatoxin M1 presence in milk can only result from aflatoxin B1 ingestion) and significant advances in the field of mass-spectrometry, research on these biomarkers has intensified in the last years. New analytical techniques and instruments with high sensitivity has allowed scientists to unravel the fate of major mycotoxins in animals, i.e. how rapidly they are absorbed into the blood stream or to which metabolites they are transformed in the body. The next - and probably most eagerly anticipated - step is to transfer the knowledge gained under experimental settings to farms. However, the in-field application of mycotoxin biomarkers is currently not without major limitations. With an emphasis on exposure-based biomarkers in blood, the following aspects must be considered for the in-field application of mycotoxin biomarkers.

1. THE RIGHT TIME POINT OF SAMPLING

First, mycotoxins represent a heterologous group of contaminants. Therefore, mycotoxins show considerable differences in their kinetic profiles, e.g., to which extent they are absorbed, how quickly they appear in the circulation and how fast they are eliminated from the body via urine or feces. In other words, a given time point might be ideal to detect one mycotoxin in blood but might be too early or even too late to catch another one. Unfortunately, the situation is complicated by the fact that the same mycotoxin can show different characteristics in different animal species. For example, for deoxynivalenol the extent of absorption as well as the time point when it reaches maximum levels in blood varies between pigs and poultry. This implies that - depending on the mycotoxin and species of interest - biomarker analysis should be planned and /or interpreted in relation to last feed intake, which is often impractical on the farm. Otherwise, biomarker analysis in blood bears the risk of underestimating mycotoxin exposure.

2. THE RIGHT BIOMARKER AND MATRIX

Usually, the concentrations of exposure-based mycotoxin biomarkers are low in blood, i.e. in the low ng/mL range. For very poorly absorbed mycotoxins, such as fumonisins, it is practically impossible to detect them in blood. Here, analysis of feces would be more promising. In addition, mycotoxins are extensively metabolized after absorption, with the respective metabolite(s) often exceeding the levels of the parent toxin in biological matrices. Hence, it is essential to identify the right biomarker for each mycotoxin, taking into account species-dependent differences in metabolism. As such, the biomarker-matrix combination should be adapted to the mycotoxin of interest and target species. Unfortunately, the kinetics of many mycotoxins have not been fully elucidated in livestock species. This impedes, for example, the selection of suitable biomarkers for emerging mycotoxins.

3. KNOWING THE UNKNOWN

Even for major mycotoxins, such as deoxynivalenol, zearalenone or ochratoxin, factors influencing the levels of exposure-based biomarkers are

poorly explored. Obviously, the amount of ingested feed (and therefore ingested toxin) affects biomarker concentrations. Consequently, sick or weak animals with reduced feed intake might show comparably low biomarker levels. There are indications that other factors, such as sex or age of the animal as well as co-exposure to other mycotoxins or feed contaminants, impact biomarker levels. Further research in this field will help explain intra-individual differences in the mycotoxin biomarker response. For example, even when exposed to the same feed lot and sampled at the same time point, individual animals of a group can show marked variations in biomarker levels. These variations currently limit the comparison of biomarker results among groups, production cycles or farms.

4. THE RIGHT LAB

Any biological fluid or tissue represents a complex matrix, and that can interfere with the analytical measurement. In contrast to mycotoxin analysis in feed, no reference materials or proficiency tests exist for the evaluation of mycotoxin biomarker methods. Thus, the chosen analytical method and the experience of the laboratory is of utmost importance for reliable mycotoxin biomarker analysis.

5. THE RIGHT INTERPRETATION

As described, many factors need to be considered when analyzing mycotoxin biomarkers on farms. Perhaps the biggest hurdle to take is the establishment of reference values for mycotoxin biomarkers. Such reference or cut-off values are essential to interpret biomarker results adequately and to correctly deduce the health risk for animals. So far, research has failed to correlate levels of exposure-based biomarkers to clinical signs or the severity of mycotoxicosis. For example, the concentration of zearalenone and its metabolites in bile did not reflect the morphological changes in the reproductive organs of gilts.

Conclusion

As analytical methods for the assessment of mycotoxin biomarkers have become more time- and cost-effective, scientific progress in this field will hopefully accelerate. Filled knowledge gaps and availability of larger datasets might facilitate the application of mycotoxin biomarkers at the farm level in future. However, current limitations still impede the usefulness of this application.

Hester in talks with Bharat Biotech for Production of Covaxin

Hester Bio-sciences said it has tied up with the Gujarat government to explore production of COVID-19 vaccine through technology transfer from Bharat Biotech. The Ahmedabad-based firm said it has already initiated the discussions with Bharat Biotech in this regard. Hester Biosciences said it has tied up with the Gujarat government to explore production of COVID-19 vaccine through technology transfer from Bharat Biotech. The Ahmedabad-based firm said it has already initiated the discussions with Bharat Biotech in this regard. "A triparty consortium has been formed with the Government of Gujarat as the lead partner, to explore the prospects of manufacturing the Covid vaccine through technology from Bharat Biotech," Hester Biosciences CEO and MD Rajiv Gandhi said in a statement. The discussions are currently ongoing with Bharat Biotech towards reviewing the infrastructure at Hester, the technology adaption process and the regulatory compliances, he added. Based on the outcome of the review, the next course of action will be determined, Gandhi noted. Hester Biosciences is a leading player in the animal healthcare segment. It is the second largest poultry vaccine manufacturer in the country. Only three vaccines have so far been approved to be sold in India — Covaxin, Covishield and Sputnik V. Sputnik V has been approved to be imported from Russia by Dr Reddy's, but is yet to be widely available in the country. Last week the Delhi government urged the Centre to use its special power to allow more firms to manufacture vaccines. Delhi Chief Minister Arvind Kejriwal wrote to Prime Minister Narendra Modi, saying the Centre should share the vaccine formula of the two manufacturers with other capable pharmaceutical companies to scale up production in the country. He said the Centre can also terminate the monopoly on vaccine production through the patent law.

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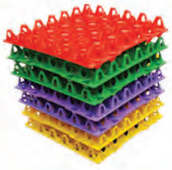

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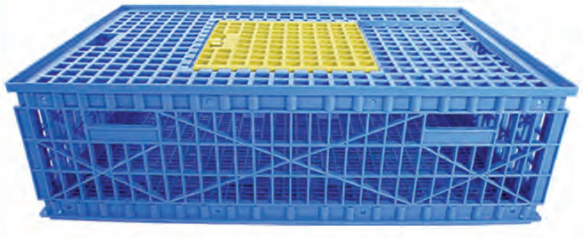

Bird Transportation Crate

Chick Transportation Crate

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Saving feed cost by reformulating broiler diets with the use of Nutrase BXP 200 TS

Jesse Stoops | Dr. Amit Patra | Geert Van de Mierop



Introduction

Nutrase BXP 200 TS is a blend of enzymes, containing endo-xylanase, â-glucanase, á-amylase and 6-phytase activities. This multi-enzyme complex is developed for production animals to guarantee an optimal digestibility of feed and supply of nutrients to the intestinal microbiota to improve gut health.

Endo-xylanase and â-glucanase. Arabinoxylans (AX) and â-glucans are important anti-nutritional factors in raw feed ingredients. Their most well know anti-nutritional effect is the increase of viscosity in the intestinal content, making digestion and absorption of nutrients extremely difficult. Also, unfavorable hindgut fermentation is stimulated. The presence of endo-xylanase and â-glucanase in Nutrase BXP 200 TS reduces these anti-nutritional effects of feed ingredients.

á-amylase. Starch is the main energy source in cereals for production animals. During starch digestion, á-amylase and gluco-amylase are produced by the animal and secreted into the small intestines. However, in young animals and during transition periods the endogenous production might be insufficient. In this case, the presence of á-amylase in Nutrase BXP 200 TS will support the animal to digest starch.

6-phytase. Phosphorous (P) is a key element in all known forms of life. In cereal grains, P is mainly stored in the form of phytic acid or phytate. Monogastric animals are unable to utilize P from phytic acid or phytate, as they lack endogenous phytase. Nutrase BXP 200 TS contains a bacterial 6-phytase that releases phosphate from phytic acid or phytate and increases the availability of a whole range of nutrients (e.g. P, Ca, Zn, Fe, Cu).

The aim of this trial is to investigate the effect of Nutrase BXP 200 TS to a corn-based diet with reduced energy, P and Ca matrix values on broiler performance.

Materials and Methods

A pen trial was conducted in which Cobb 430Y male broilers were reared in a poultry house (AgriVet, India) for 42 days. A three phase dietary program (starter d0-14, grower d15-28 and finisher d29-42) was used in which all diets were fed *ad libitum*. A total of 180 broilers were randomly allocated to 3 treatments (Table 1) with 6 replicates per treatment (11 birds/pen at the start of trial). The composition of the dietary diets is listed in Table 2. Body weight and feed intake were recorded at weekly intervals. Feed conversion was calculated from the measured weight gain and feed intake. Pen mortality was recorded to correct feed intake.

Results

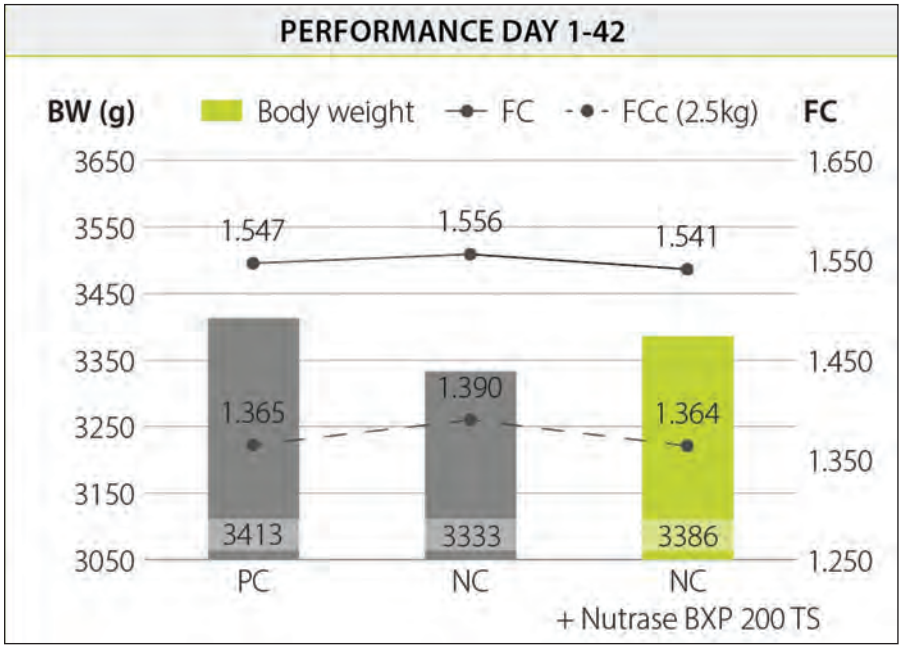
At the end of the trial period (day 42), the birds fed the negative control diet presented the worst

TABLE 1: DESCRIPTION OF DIETARY TREATMENTS

TREATMENT	DESCRIPTION
Positive control (PC)	Corn-soy-based broiler diet. The diet was formulated according to the nutrition specification of Cobb 430Y without enzyme supplementation
Negative control (NC)	The positive control diet was reformulated to contain approximately 100kcal/kg, 0.14% and 0.12% less apparent metabolizable energy (AME), phosphorous (P) and Calcium (Ca), respectively, without enzyme supplementation
Negative control + Nutrase BXP 200 TS	Negative control diet supplemented with 200 g/ton of feed Nutrase BXP 200 TS

TABLE 2: NUTRIENT COMPOSITION OF THE EXPERIMENTAL DIETS

	STARTER D0-14		GROWER D15-28		FINISHER D29-42	
	PC	NC	PC	NC	PC	NC
Ingredients (g/kg)						
Corn	541.3	566.6	568.5	595.2	583.8	622.9
Soybean meal	301.5	296.6	249.6	228.8	225.4	220.4
Full fat soybean	60.0	36.6	80.0	80.0	80.0	80.0
Meat-bone meal	25.0	25.0	25.0	25.0	25.0	25.0
Rape seed meal	-	25.0	-	24.5	-	-
Rice bran	20.0	20.0	25.0	20.0	25.0	20.0
Soybean oil	15.2	-	18.8	-	30.9	8.2
Dicalcium phosphate	18.4	8.8	16.7	7.3	13.7	4.3
Nutrients (%)						
Crude protein	23.00	23.00	21.00	21.00	20.00	20.00
Calcium	0.90	0.78	0.84	0.72	0.76	0.64
Available P	0.48	0.34	0.45	0.31	0.40	0.26
Lysine	1.28	1.28	1.15	1.15	1.08	1.08
Methionine	0.47	0.62	0.56	0.56	0.54	0.54
AME (kcal/kg)	2900	2800	3000	2900	3100	3000



results for body weight and feed conversion. The nutrient and energy reductions of the negative control diet effectively reduce broiler growth performance. The supplementation of Nutrase BXP 200 TS resulted in a higher body weight (+ 53g) and improved feed conversion (by 2.6 points) compared with the negative control group. Moreover, the feed conversion of the Nutrase BXP 200 TS group equaled the FC in birds fed the positive control diet.

Conclusion

The supplementation of Nutrase BXP 200 TS improved the performance of broilers fed diets with reduced nutrient and energy levels. Based on these trial results, Nutrase BXP 200 TS can be supplemented to a corn-based diet with matrix values of 100 kcal AME, 0.14% P and 0.12% Ca without any probable detrimental effect on broiler performance.

All India Poultry Breeders Association conducts Webinar on "Building Disease Free Indian Poultry Sector"

One of the major challenges in the poultry farming is the emerging and reemerging diseases in poultry. For over the year's poultry industry is suffering huge losses due to several diseases in poultry. So far poultry industry in India is mainly focusing on controlling diseases in poultry, but it was felt for a long time that not only veterinarian and poultry entrepreneurs but also the poultry scientists and policy makers must work together towards a disease-free poultry in India. Knowing the facts that it's a long process and need a close coordination between poultry entrepreneurs, Veterinarians, Poultry scientists and policy makers All India Poultry Breeders Association headed by its president Mr. Bahadur Ali took an initiative to conduct a webinar on "Building Disease Free Poultry Sector" on 22nd June 2021. The main objective of conducting this webinar was to bring the problem being faced by the poultry industry in India in to the notice of policy makers, and an attempt to develop disease free Indian poultry sector so that poultry farmers can get remunerative price for their product This webinar also attempted to discuss burning issues of poultry sector and to find the possible solutions. Ministry of Fisheries, Animal Husbandry and Dairying, Government of India, Indian Council of Agriculture Research, Members of All India Poultry Breeders Association and other stakeholders participated in the webinar. The webinar was attended by large number of people from poultry fraternity including poultry farmers, veterinarians, poultry scientists and representatives from Government of India which included Dr. Praveen Malik, Animal Husbandry Commissioner, Dr. 0. P. Choudhary, Joint Secretary(NLM/PC), Shri Upamanyu Basu, Joint Secretary (LH) and others. The webinar was moderated by Prof. P.K. Shukla, Dean and Registrar DUVASU Veterinary University, Mathura and former Joint Commissioner, Government of India, and Mr. Vijay Sardana, Techno-legal expert, and advisor, AIPBA. The webinar was hosted by Mr. Gulrez Alam, Secretary All India Poultry Breeders association and Director IB Group.

Mr. Suresh Rayudu

Mr. Bahadur Ali

Mr. Balram Singh Yadav

Mr. G. B. Sundararajan

Dr. N.K. Mahajan

Mr. Jagbir Singh Dhull

Dr. Praveen Malik

Dr. O.P. Choudhary

The webinar started with welcome address by Mr. Bahadur Ali, Chairman for All India Poultry Breeders Association and Managing Director of Indian Broiler (I.B) Group. He welcomed all the guests and attendees of the webinar and said that time has come when concerns of poultry industry should be discussed with policy makers so that the collective steps can be taken to overcome the problem. He said that since 2019 it has become very difficult to survive for poultry producers, but thanks to the decision of Ministry of Fisheries, Animal Husbandry and Dairying, Government of India for extending the best possible help during this crisis period. He further said that still poultry industry is facing many problems and the hardest one is emerging and reemerging of poultry diseases and its further spread. He said that today's webinar will help all of us to exchange our views and experience to understand this problem and hoped that the outcome of this webinar will definitely take us towards providing reasonable solution to make Indian Poultry Industry a disease free.

Mr. Suresh Rayudu, Vice President, All India Poultry Breeders Association, Chair-man - International Egg Commission and the Managing Direc-tor of Srinivasa Farms in his address greeted all the attendees and said that at present about 5million farmers are associated with the poultry sector and poultry industry in India provide direct and indirect employment to over 10 million people. He said that the purpose of our association is to become the voice of poultry farmers and to work as a bridge between poultry producers and policy makers to create more and more employment opportunities in poultry sector to contribute the economic develop-

ment of the country. Mr. Suresh Rayudu further said that this webinar has given a very good platform to poultry producers to put their problem directly before the Government to find a proper solution.

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As a special guest Dr. Praveen Malik, Animal Husbandry Commissioner, Govt. of India, while addressing Dr. Praveen Malik stated that few diseases like Influenza and Mycoplasma in Indian Poultry often put a negative effect of the economics of poultry farmers and it is our collective responsibility to make sure that the poultry diseases is eradicated instead of putting efforts to just control it. To that poultry producers must follow the biosecurity, hygiene, and proper waste management so that the farmers can be saved from unnecessary losses. The poultry sector also need to cooperate with the government, to make the Indian poultry industry a disease free industry

Dr. O.P. Choudhary, Joint Secretary (NLM/PC) Animal Husbandry while speaking in this webinar said that various steps have already been taken by the government to help poultry farmers and also said that it is now very important to develop vaccines which follows the OIE standards to avoid reemerging of diseases.

Shri Upamanyu Basu, Joint Secretary (LH), Department of Animal Husbandry said that vaccination is very important because it is the most effective way to control any viral disease from the root, but farmers should also take all the scientific steps to for better results


Dr. Suresh S Honappagol


Dr. S.K. Garg


Dr. Ashok Kumar


Mr. Upamanyu Basu


Dr. R.K. Jaiswal


Dr A.K. Tiwari

and remunerative prices for the farmers.

After the welcome address and presentation by industry leaders and government official panel discussion was started on few subjects.

First panel discussion was on, "Diseases in Poultry and its impact on Poultry Farming and Farmers' Income" Initiating the discussion Mr. G. B. Sundararajan. G. B. Sundararajan, MD, Suguna Foods Pvt. Limited said that there are many uncertainties in the poultry sector. The poultry farmer is never sure if he will get the right price or not for his birds the next morning. Due to the rumors about the poultry sector, small farmers suffer the most. The diseases in poultry add to the problems of our growth. The government need do something to end the uncertainty to create confidence among farming community.

Mr. Balram Singh Yadav, Managing Director - Godrej Agrovet

Limited said that the poultry sector while discussing the various subjects must think from the consumer's point of view so that the image of the poultry sector can be improved further. In the last few years, the poultry sector has suffered huge loss running in thousands of crores every year. He said that every viral outbreak has hit the poultry industry very hard may it be bird flu or the COVID - 19. Even because of rumors and lack of consumers education is also affecting the poultry consumption therefore we as an industry must work to educate the consumers; He said that poultry industry can help the rural economy if attention is given on infrastructure development. This is possible only when all the stakeholders work together to make this industry more remunerative.

Dr. R.K. Jaiswal, President, Indian Broiler Group while speaking in the webinar said that in the last few years, we have been witnessing rapid spread of viral diseases and it is not possible to control these through biosecurity protocol. We should not forget that these diseases specially LPAI has been proved very harmful and has affected the economics of poultry rearing. Due to this one disease, thousands of farmers have lost crores of rupees and it affects all types of poultry may it be broiler, layer, or even breeder. There have been huge mortality because of non availability of vaccine against this disease.

He demanded from the Government for the permission to import useful vaccines and even in India also correct antigen must be provided to vaccine manufacturers by NISHAD (National Institute of High-Security Animal Diseases). He also stressed upon massive nationwide vaccine program for poultry.

Mr. Paul Gittens, Advisor, Aviagen India, said that biosecurity and proper vaccines are the basic needs for a successful poultry farming. He also demanded that production and vaccination against the diseases so that the poultry sector can be protected from the deadly disease like Avian Influenza.

Mr. Gurminder Singh Bisla also stressed upon better vaccination program to control the deadly diseases in poultry. SECOND subject for the panel discussion was "Possible alternatives to reduce the adverse effects of Poultry Diseases"

Dr. S.K. Garg, former Vice-Chancellor, DUVASU Veterinary University, Mathura said that vaccine should be developed after studying the pattern of disease occurrence in the poultry sector in different parts of the country. Government should make such labs that can detect anddiagnose these diseases and be able to forecast easily. Talking about the feed used in poultry, the number of antibiotics used by some feed manufacturers should be avoided because they reduce the export quality of meat.

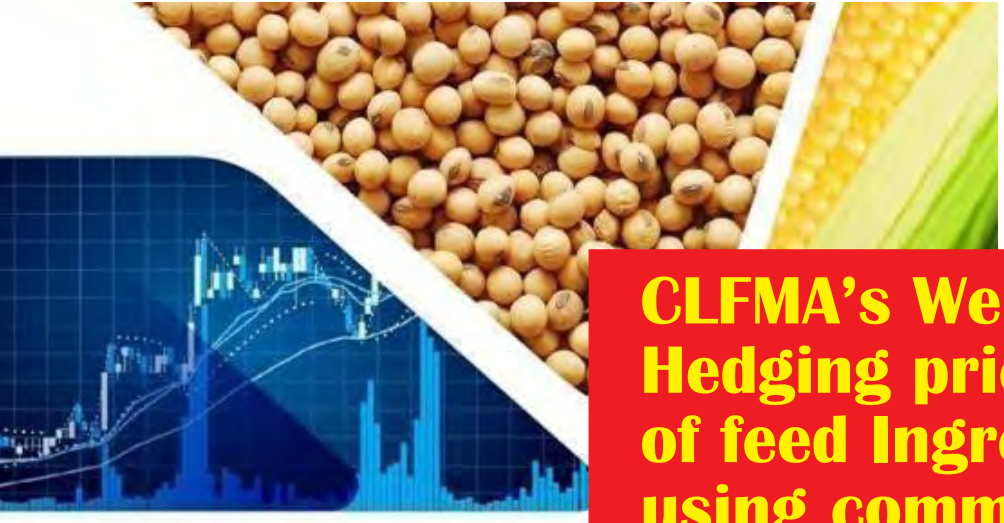
Dr. Suresh S Honappagol, former Vice-Chancellor of Karnataka Veterinary University, said that the poultry sector is well organized but the non-availability of any data in emergency hurts the planning process for the poultry sector and suggested a national poultry register go keep realistic data for better planning and implementation of programs. It can also help the proper relief plans for the poultry farmers whenever situation arises.

Dr. Ashok Kumar, ADG (AH), ICAR, New Delhi said that we can improve the poultry sector by using modern technology and creating more. Awareness among the farmers about biosecurity and good practices to solve the problems of poultry farming community.

Dr A.K. Tiwari, Director, Central Avian Research Institute, Izatnagar spoke on disease surveillance, disease diagnostics, and forecasting. He said that only migratory birds are not responsible for all diseases. With the right research and timely interventions, the diseases of poultry can be prevented. It is necessary to maintain biosecurity and hygiene.

Dr. N.K. Mahajan, Member of Empowe-red Committee to monitor Animal Health, Animal Husbandry Depart-ment, and Govt. of India said that there are three categories of birds i.e. broiler, breeder, and layer. These viral diseases cause a lot of damage, but to avoid it, giving a lot of antibiotics causes more damage. Vaccination is the only option to avoid this loss. Mr. Mahajan also said that as per OIE and WHO guidelines a proper certification of vaccination can be helpful.

Making a closing remark, Mr. Jagbir Singh Dhull, M.D – Skylark Hatcheries, thanked all the panelists, poultry experts, and farmers. Mr. Jagbir Singh Dhull expressed confidence that detailed discussion during the webinar will help not only the people of poultry fraternity to address the problems of disease management but also for the policy makers to frame the proper policy for the development of this industry. All the panelists were unanimous that The representative from government appreciated the efforts of All India Poultry Breeders Association in successfully conducting this unique webinar where all the stakeholders gathered and discussed very useful subjects to take India poultry industry to nest level and assured the attendees that Government will make all out efforts to address the key concerns raised by speakers so that the small poultry farmers can be saved from the economic losses and get the remunerative price for their products.



CLFMA's Webinar on Hedging price volatility of feed Ingredients using commodity derivatives

CLFMA OF INDIA, the apex organization and the voice of the Country's dynamic livestock industry in association with National Commodity and Derivatives Exchange **(NCDEX)** organized Webinar on hedging price volatility in feed ingredients using commodity derivatives. In the recent past, commodity prices have seen high volatility which has impacted the normal operations of business. It was thus imperative to understand how to manage this risk using the derivatives platform. The webinar was chaired by the Chairman of CLFMA OF INDIA Mr. Neeraj Srivastava. It included eminent panelists from the industry, Mr. Kapil Dev, CBO NCDEX, Mr Sumit Gupta, Business head, South Asia and South EA, McDonald Pelz, Mr Rajjib Saha, Agri derivatives Manager, ITC ABD Ltd, and Ms. Rajini Panicker from Phillip Capital. All the panelists have an average experience of more than 15 years in the industry. The event was moderated by Dr. Sujit Kulkarni, Managing Committee Member of CLFMA OF INDIA and finally the vote of Thanks was given by Mr. Suresh Deora, Hon Secretary of CLFMA OF INDIA.

Key objective of the Webinar was to discuss on anomalous rise in prices of Soybean seed and Soybean DOC and Corn which in turn enormous production cost leads to challenging circumstances for livelihood of livestock farmers of India. Webinar highlighted on the following topics:

- **Hedging Practices in Global & Domestic Markets**
- **Price risk management using commodity derivative tools**

- **Hedging mechanism – A Case Study**

The Webinar started with a welcome address by Dr. Sujit Kulkarni, who also moderated the sessions. Dr. Sujit Kulkarni said that since last almost 3 to 4 months our industries have seen the volatility and the unusual spike particularly in Soyabean which led to increase in the feed cost. Almost 80% price rise in Soyabean meal price was observed and there was a huge spike in soyabean seed also. So, CLFMA thought it prudent to support the Industry in this crucial time and hence arranged the webinar with NCDEX and invited the commodity market experts to deliberate the issue. CLFMA OF INDIA Chairman Mr. Neeraj Kumar Srivastava thanked Dr. Sujit Kulkarni for giving a very nice brief of the Webinar. He, on behalf of CLFMA and its MC Members, welcomed all. Mr Neeraj Srivastava, in his Welcome Note stated the objectives for the webinar, wherein he highlighted the importance of commodity price risk being a financial risk driven by commodity supply and demand fundamentals. The global commodity markets are facing high volatility due to the supply and demand gaps. It is important to manage this volatility using risk management tools like Futures and Options. The webinar is organized to understand the importance of these tools for effective price risk management and protecting the bottom lines of the business.

Mr Kapil Dev was the first panelist to speak on the subject. He highlighted the fact that risk is something that is unknown and uncertain. There is health risk, life risk and wealth risk. While we insure ourselves against the life and health, wealth is something that is not insured. Volatility and uncertainty is always there in business largely driven by unknown and uncertain factors. He cited some of the recent examples, droughts, Geopolitical events, biofuel push or logistical bumps like container shortages, Suez Canal blockage for recent volatility in the commodity prices. He explained that these can be effectively managed using the concept of Hedging.

Mr Sumit Gupta was the next panelist to talk on the subject. He further elaborated what Mr.Kapil Dev had explained in his presentation. He explained the weather patterns in terms of El Nino and La Nina periods and how these largely impact production of Agriculture commodities globally. Hi mainly focused on Corn and Soybean as these are largely used raw materials as feed ingredients. World corn production should increase to meet the rising demand. Corn prices almost doubled over last year for US farmer while the Indian Corn markets didn't see this kind of rally, this price gap has made Indian corn attractive for exports. He also highlighted the domestic scenario where demand is driven by poultry and starch industry. There has been sharp increase in production and consumption domestically. For Soybean, he stressed on the fact that while the demand was increasing the yield was constant. The demand for Soybean will continue to increase due to increasing awareness on food preferences and income growth. He mentioned that proper research and analysis of the commodity will help in taking informed price decisions.

Mr. Rajib Saha continued where Mr. Sumit Gupta left his presentation and stressed more upon from a business perspective how these price volatilities impact the revenues of business. Corporates must have risk management policy to ensure that planned targets of annual sales, purchases and profitability numbers are attained to satisfy management and shareholders. It is all the more important for corporates who are into commodities as they have a number of risks including risk of change in government policies on tariffs, overseas trade, weather, currency or even hedge funds' strategies. Procurement via futures gives two- way protections, one is fixing the price and another is immunity from counterparty default. Futures also give price signals as they are reflective of what is going on in the markets both globally and domestically. He urged the participants to at least keep following the prices of futures market to get an understanding of the market fundamentals.

Finally, Ms. Rajini Panicker explained the role of a member in the ecosystem of Futures market. She highlighted how they work with various value chain participants to device customized strategies for them based on their raw material requirement. She also explained in detail the opportunity loss in Soybean if the market participants had hedged Soybean this year. This year being highly volatile, she explained the same for the last year as well, where if hedged the corporate would have saved about 4-6% in their overall procurement costs. She summarized her presentation by saying Securing raw material purchases through far-month commodity futures contracts not only gives the protection from potential rise in prices at a later date but also raises the efficiency of capital through leveraged transactions.

Webinar participants actively participated in Question and Answer session and Panelists answered their Questions satisfactorily.

Mr. Suresh Deora, Hon. Secretary of CLFMA OF INDIA concluded the webinar by thanking the panelists for their valuable inputs and the audience for participating and making the event a success. CLFMA OF INDIA will associate for more such programs for the benefit of the feed industry at large.

The event was attended by 270 participants and total registrations received were 317.

Aviagen India Customer Muchim Foods Sees First Ross 308 AP Hatch

Aviagen® India customer Muchim Foods Ltd was proud to welcome the first hatch of Ross® 308 AP broiler chicks from their brand new hatchery in Kanpur, Uttar Pradesh, in early March. Mr. Ajay Tiwari, Managing Director of Muchim Foods, commented, "It's great to see the results of our hard work. This has been very much a collaborative effort by Muchim Foods, with guidance and advice from Aviagen India's breeder and hatchery experts. We look forward to a future of working and growing together. Our customers are going to be pleased with the chick quality and amazing performance of the Ross 308 AP broiler." Aviagen India cares about its customers throughout the country, and works alongside them to ensure the best performance, health and welfare of their chicks. The Aviagen India hatchery support team headed by Joe Maria, Hatchery Operations Manager, commented. "Our daily goal is to help our customers achieve optimal conditions for the best hatchery outcome. We are pleased to see that Muchim Foods has an excellent breeder flock with good-quality hatching eggs, high hatchability and super chick quality." Dr. Deepak, Aviagen India Technical Manager, added "The chicks got off to an excellent start and were carefully managed throughout the growing period by Muchim Breeder Farm Team headed by Mr. Kamath, Breeder Farm Manager. We are seeing the results now in both excellent peak and persistency. Production has been above 80% for the past five consecutive weeks and is expected to reach 86% peak or more." Since 1923, Aviagen® has been a preferred global poultry breeding company with a mission to help its customers — the world's chicken meat producers — supply sustainable, affordable and nutritious protein to their growing communities. Putting into practice its corporate value of "Breeding Sustainability," Aviagen implements efficiencies that make commercial chicken production environmentally and socially responsible and economically beneficial to producers, while at the same time promoting bird performance, health and welfare. To meet varied market demands, Aviagen offers a full portfolio of breeding stock under the Arbor Acres®, Indian River® and Ross® brand names. The Rowan Range® and Specialty Males® target slower-growing and other niche market needs. Aviagen is based in Huntsville, Alabama, US., with operations across the UK, Europe, Turkey, Latin America, India, Australia, New Zealand, Africa and the US, and joint ventures in Asia. The company employs close to 8,000 people, and serves customers in 100 countries.

PERSTORP's Technical Webinar on Global Animal Industry Outlook – The road to Recovery

Dr. Jim Ren,
Vice-President APAC, Perstorp Animal Nutrition

Mrs. Lina Anderson,
Perstorp Animal Nutrition

Mr. Nan-Dirk Mulder,
Senior Global Specialist - Rabobank

Perstorp Animal Nutrition organized a technical Webinar on "Global Animal Industry outlook and its recovery". The presenter was Mr. Nan –Drik Mulder, who is Senior Global Specialist in Animal protein from Rabobank and the webinar was moderated by Mrs. Lina Anderson, Perstorp Animal Nutrition.

After Hosekeeping Welcome introduction of the webinar, Mrs. Lina share the screen with Dr. Jim Ren, Vice- President APAC, from Perstorp Animal Nutrition for Group's Introduction.

Dr. Jim has more than 18 years of experience in different APAC countries in different roles. He started his carrier as a technical manager in China, later on relocated himself to Singapore and joined Perstorp in 2018. Dr. Jim than, welcome all the attendees and made them introduced to the Perstorp Animal Nutrition. He said that "One molecule can change everything" and this is the motto of perstorp. He added that Perstorp has 140 years of professional expertise with 7 sites of Production in which 5 are in U.S. He added that Perstorp made 9.2 Billion SEK (Swedish Currency ; Krona SEK) turnover in 2020 and Their animal nutrition unit is doing business in more than 50 countries. Dr. Jim explained that his company deals with Digestive Acids; i.e, Propionic Acid: Preserve Nutritional Value and reduce mycotoxin production, Formic Acid: Ensure Silage Quality, feed Acidification and hygiene, Butyric Acid: Improve Animal Gut Health and increase performance and Valeric Acid: Improve Animal Gut Health. He further added that Holistic solution by Perstorp towards Feed Hygiene (Propionic / Formic Acid), Gut Health (Butyric / Valeric) and Water Quality (Formic / Lactic Acid) made its approach very sound and clear.

As Dr. Jim stated previously about Perstorp's 140 years of history, he explained the genesis of the Company years by years, as illustrated in Figure 1.

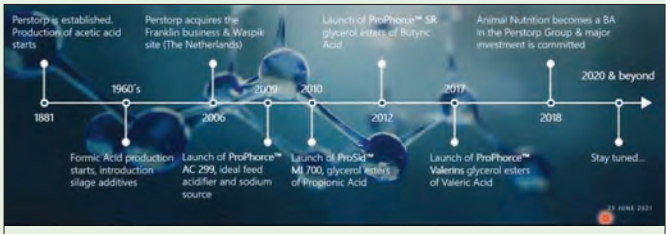


Figure 1: Genesis of Perstorp Group

He further said that Perstorp has targeted that in 2022, they: 1 Are going for expansion in their production capacity by 70%, 2. Geographical Expansion, as they are going to establish satellite production units in Asia and America and increase manpower. After this brief introduction, he handed over the digital stage to Mr. Nan-Dirk Mulder, Senior Global Specialist - Animal Nutrition, Rabobank. Mr. Mulder Started his presentation "Global Animal Protein Industry Outlook 2021" He said that we are recovering fast from the COVID-19, in last few months, as vaccination program all over the world is in full swing, but our animal protein industry has so many factor to affect other than COVID-19. He explained that if we look deeper into the market we could find that

1. ASF (African Swine Fever) has changed the prospect of the meat industry Globally from 2018.
2. COVID-19 has started affecting Global Food chain supply for March 2020.
3. Recently inflated Feed Prices has affected badly to the Global Animal Protein Industry.
4. Avian Influenza is always be there to inhibit the growth of Poultry Industry in many part of World.

The Graphical representation shows the effect of all these above given factors on Poek, Beef and Poultry Industry globally. He said that Global Market recovery has started but through the bumpy roads. He further explained that there are 3 stages of impact of COVID - 19 on the Global Animal Protein Industry:

i. Stage 1: DESRUPTION (2020): Where Food Channels have to shift from food service to retail and Online. There were closure of wet market in many Asian Countries and constrains on export has also been observed. He further said that Supply chain was badly affected due to absence of workers, Logistic or Distribution issue and Surge in pricing of inputs like feed additives, Animal Health Products and genetics.

ii. Stage 2: Road to Recovery (2021): He explained that gradually, market is recovering, as vaccination is in process with full swing and contamination measures have been taken care in each and every country. Food services recovery is also a good sign for the industry.

He further explained that due to COVID-19, ASF and AI, global supply is still low which the main matter of concern. Ongoing high feed price has also affecting supply chain. Trade is improving but slower than local production.

iii. Stage 3: (The Aftermath) (Post 2022); he said that changing view and aspects requires different strategies for food supply and supplies.

Mr. Mulder added that we are marching towards change and volatility of the market. He also said that reopening of the food service is key for market recovery. He stated that Food services has drastically increased in many countries and now share more % than retail market in E.U, Mexico, Thailand, Brazil, Malaysia, U.s, Philippines, Colombia and China. Mr. Mulder said that African Swine Fever in the Pork industry has affected many Asian Countries especially China. He said that China is victim of ASF from 2018 and has reported 42% drop since in the Hog Herd, are the main reason of its falling Prices.

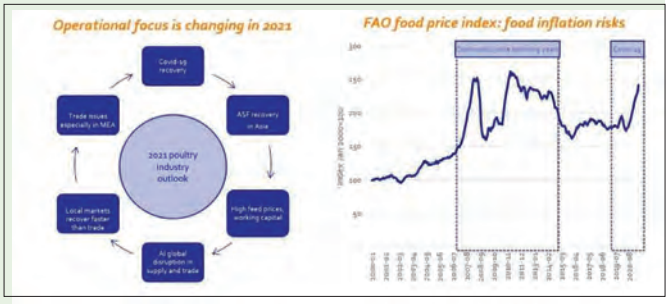
Due to these hefty drift in eating habits in densely populous country like China and its many pork eat neighboring, compassionated other Meat markets to Grow. China Reported 18% increase in White Broiler production after 2018, as well as now it is a booming market for many meat importers for last 2 years.

He further added that ASF in Eastern Europe like Russia and Germany has also affected the Export industry from last September. ASF in Germany has shaken up the trade flows as it is one of the biggest exporter of the meat to the china and from last September the trade has been close due to ASF. He said that now Spain, Denmark and Netherlands has replaced Germany as an exporter of the meat to the China. He further added that AI (Avian Influenza) has highly disrupting the global trends and it might stay endemic in Eurasia.

Mr. Mulder explained that Avian Influenza cases has sharply increased in Europe from November 2020 and has restricted the export trands. A.I has not only created disruption in the trends of the poultry but disrupted DOC and hatching eggs, as Europe is the biggest supplies of Hatching eggs around the globe. He added that A.I also affected local supply of Poultry.

Coming to the Feed and Grain prices rally in 2020, he said that feed prices expected to stay high in next year too. He explained many reason for it. Mr. Mulder said that Fast recovering Chinese Pork industry and Weather issue in Many African and European countries are main issues. Rabbobank reported 70-100% surge in the prices of Soybean and Corn and 40% increase in the Rates of Wheat.

He further added that New Biofuel ambitions are pushing up the global vegetable oil prices. He said that CPO Soy oil prices are up by 70% in last 5 months, and rising Biofuel demand are the main factors affecting Feed Prices. He said that according to the Rabobank, gradually recovering markets will cause increase in price inflation, as shown in the diagram.



Mr. Mulder explained that Global Meat Consumption is also recovering fast after the decline in the cases of ASF and COVID-19. He emphasis on the COVID-19 Vaccination and Controlled program will be key for the Market recovery. United States has reported strong market demand during COVID-19 recovery. He further added that if we talk about individual Meat, condition of Poultry has increased whereas Pork market will be driven by ASF; roads of recovery are bumpy after this surge in endemic.

He talked about the Asian Poultry Industry. He stated that Vietnam has got many new projects related

to poultry in last 2 years, made it an only Asian Country with Positive YOY growth in both 2019 & 2020. Further he said that Indian Poultry market has been a roller-coaster due to AI and COVID-19 related issues. Japan's Poultry industry has been affected from oversupply and trade related issues in 2021. Malaysia is facing low domestic supply and import issue as well as surged feed prices has inhibiting the growth of the industry.

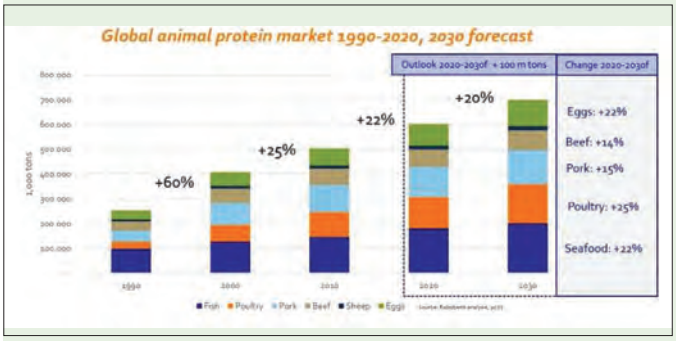
Figure: Asian Poultry Production & its Performance

For EU, Mr. Mulder said that Market is recovering for Pork and Poultry, but export will be Pork Farming driven. He added that EU's poultry industry has big impact of COVID-19 and prices are also rising very fast.

For Poultry, he explained that following will be key investment trends:

1. Growing Global Market Trends.
2. More focus on Value added and Concept
3. Change in Supply channels; more digital, Sustainable and smarter.
4. More Globalized industry

He stated that Global Animal Protein market will keep growing with Poultry in Lead, as data's are shown in the Diagram



He said that in Outlook 2021-2030, 85% of growth will be happen in the emerging markets. He also mentioned that alternative protein sources will also gained solid position, but having low base. He also shown the Poultry Value added Pyramid, given is the diagram.

Mr. Mulder also explained about the social concerns to push the differentiation in the standard of the Industry, i.e. In many Countries Animal Protein is a Food as a need. Developed countries need it Animal Welfare Friendly, so somewhere else it is to be grown as environmental Friendly. So there are many drivers for the change in the standards of the product. He added that Consumers are increasingly driving the changes in the Poultry Production Standards. From 2017 to 2020, it was "Antibiotic reduction in Poultry" Campaign ran in U.S. Cage free Poultry till 2025 is another Motto many companies has committed in U.S by 2025. Third is Better Chicken Commitment, Where some firms are cultivating slow growing Chicken with low density. So he said that everything depends on Countries Purchasing Power and Customers demands.

He also said that Asia has observed an exponential growth of Modern Grocery Retail sale from 2014-2019. Onlien Food distribution has also got breakthrough in 2020. He explained that Remote working and Work from Home Scenario has changed the Market Completely. He further said that i. To go to market, ii. Catering market, iii. Lunch restaurant, and iv. After work Restaurant has been decreased, whereas 1. Supermarket Retails, ii. Online food Supllies, and iii. More Freash, less time supply is focused.

By concluding his presentation mr. Mulder said that for short term outlook, we can say that 1. Global Meat consumption to return into the growth mode, as we are recovering from COVID-19 and ASF. 2. Global Pork prices will be strong but ASF pressure will be there. 3. Chicken prices will be in the recovery mode. 4. Ongoing Feed prices will be matter of concern.

About the long term Outlook he said that 1. Global Animal Nutrition Market will grow by 20% in next decade; Asia will capture 85% market. 2. Ongoing expansions in Asia and Eastern Europe to meet growing demand. 3. Shifting from global to local will occur. 4. Western market will move towards the concept poultry.

After the presentation, Webinar was concluded with Q & A Session.

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