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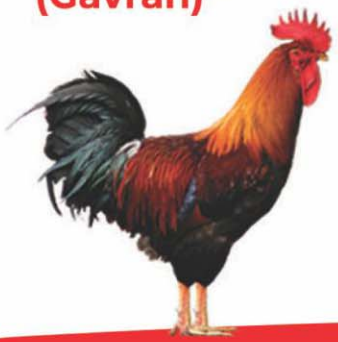

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INDEX OF ADVERTISEMENTS

Backyard Poultry: Regulation, Zoonoses and Prevention

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Introduction

In our country, broilers and laying hens becomes popular in backyard farming. There are many common zoonotic diseases of backyard poultry which are also described in several books and review. However, concerning the regulatory, zoonotic and disease prevention aspects of backyard poultry little has been published. It is known that that many owners of backyard chickens are poorly aware about the relevant regulations. Even some of the veterinarians are not fully aware about such matters.

Regulation

Regulations define certain species, including the poultry species, as food-producing birds. Backyard poultry are focus to legal requirements that relate to husbandry, feeding bans, disposal of carcases, notifiable diseases and its surveillance, the supply of eggs and food security, removal of waste and environmental protection. Under regulation, for food-producing animals or birds only those medicines can be used whose ingredients have been satisfactorily assessed for residues safety. These regulations split all medicinal substances into three categories; permitted, banned and unlisted. Any medicinal stuff that is not permitted cannot legally be used in any food-producing animal or bird. The use of such prohibited medicine is also illegal in poultry. The meat and other products from an illegally treated animal are harmful and should not enter the food chain. Fipronil, a topical parasiticide is prohibited medicine. However, many people use fipronil to treat poultry ectoparasites, in spite of this being illegal and the potential for eggs to be unsafe to eat. Regulations do not bound what veterinarian may do in the course of treatment of sick animals, but do limit what they can do for management purposes, i.e. for the ease of the owner.

The notifiable viral diseases of birds are Avian Influenza (AI) and Newcastle disease (ND) and both diseases are threat to backyard flocks as well as commercial poultry. There is a very less awareness among owners of what the regulations concerning to notifiable diseases may require them to do immediately in the occurrence of an outbreak. In case of AI or ND outbreak, the default position is that all birds on the infected premises would be culled and the premises will be cleaned and disinfected. Birds on high-risk in- contact premises may also be slaughtered. Birds can be vaccinated against ND, although it is a potentially zoonotic, but in humans the signs are usually restricted to conjunctivitis.

Agents	
Viruses	Avian influenza
	Viruses Newcastle disease
Bacteria (primarily food-borne)	*Campylobacter*
	Salmonella
	Escherichia coli (colibacillosis)
	Clostridium perfringens
	Listeria monocytogenes
	Staphylococci
Bacteria (other)	*Chlamydia psittaci* (ornithosis, psittacosis)
	Erysipelothrix rhusiopathiae
	Mycobacterium avium (avian TB)
	Pasteurella multocida (respiratory pasteurellosis)
Fungi	Aspergillus species
	Microsporum gallinae (favus, ringworm)

Zoonosis

Campylobacteriosis and salmonellosis causes gastrointestinal infections and are most commonly reported zoonotic diseases. The best safety against these diseases is good hygiene and meticulous cooking of poultry meat and eggs. The zoonotic agnets associated with poultry is listed in table 1.

Disease prevention and health safety

Little has been known about backyard poultry safety and welfare**.** Welfare depends on numerous factors including disease prevention, husbandry, biosecurity, hygiene, preventive medicine and disease treatment. Disease prevention and treatment for backyard poultry are usually poor as compared to pet and livestock. The following factors contribute to sub-optimal disease prevention and treatment in case of backyard poultry:

- Many owners are reluctant to look for veterinary care of backyard poultry.
- There is a little level of awareness among owners of the common diseases of poultry and their clinical signs.
- Poor biosecurity and hygiene in backyard flocks has been noticed and these factors promote the entry and establishment of infectious disease. Common biosecurity deficit include: mixing birds from different sources, not quarantining new birds, not restricting entry of visitors to birds, no footwear precautions, not washing hands before or after handling the birds, poor rodent control and no control of access of wild birds to the poultry permisies.
- Veterinarian should give emphasis to the farmer about benefits of preventive control of ecto- and endoparasites as they do for livestock and pets.
- Poultry vaccines are developed for commercial flocks with much shorter life expectancy than backyard poultry, and are approved for administration to young birds. Most vaccines need to be given when the birds are young and so must be given by breeders or suppliers. Several of the inactivated poultry vaccines are not very effective in adults unless the birds were primed as chicks.

Summary: The health of backyard poultry may be enhanced by implementing necessary biosecurity measures, improving hygiene, educating owners about the most common diseases and their clinical signs, control and prevention, regular scrutiny and handling of the birds by the owner, increased use of endo- and ectoparasiticides and use of vaccination. Many of these measures can be incorporated into a simple flock-health plan.

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Rearing of Poultry to Double the Income of Jammu & Kashmir Farmers

Suraj Amrutkar[1], Suhas Amrutkar[2], Bharti Deshmukh[3], Vinod Gupta[4] and S. K. Gupta[5]

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Introduction: Poultry includes all that birds which are domesticated for commercial purpose i.e. chicken, duck, quails, turkey, geese, pigeon, emu, ostrich and other domestic birds. Indians represent a major success story of poultry industry. While agriculture production has been rising at the rate around 2 percent per annum over the past 2 to 3 decades but at the same time poultry industry has been rising at the rate of around 8 percent. There is no religious issue regarding consumption of eggs and chicken and are accepted by all communities and are available at the most reasonable price. In last two decades, the egg production has gone to 70 billion from few millions and the broiler production has gone to 3.8 million tones.

In Jammu and Kashmir, 84% off the population is mostly non-vegetarian. The peoples of J & K, consumed 121 crore eggs and 7.4 crore kg poultry meat per annum. From the last decade, poultry sector has tremendous growth in Jammu & Kashmir. Poultry farming has come up in a immense way in Jammu, Kathua, Udhampur, Pulwama, Srinagar and Budgam districts with large number of educated unemployed youth taking poultry farming as a sustainable means of earning their livelihood. More than 8000 youths in J & K have been engage poultry farming for self employment till date. It is high time to take several measures to increase local production so as to achieve independency in J &K youths. Most of the imports of poultry meat and eggs come from the Punjab and Haryana state. Nearly 90% of the poultry farmers of the borders belt of the Punjab are dependent on the supply to J & K, as there is huge demand of poultry products throughout the year in the J & K. Indian Nutritional Academy; Hyderabad has suggested consumption of 182 eggs per head per annum as standard. The national availability is 63 eggs while in J & K, it is only 38 eggs.

Commercial poultry farming in India has creating profitable business opportunity for entrepreneurs. Poultry farming business can provide a great employment source for the job seeking people. This is such as business in India that can never dry up. All types of poultry product have a great demand inside the Indian market. Highly productive local and foreign breeds are available for commercial production. Requirement of initial investment for poultry farming is not too high. You can start small scale production and elaborate it gradually. Bank loans are available throughout the country. Numerous farms are available and can easily learn about poultry farming from those established farmers, KVKs, Universities.

Present status of poultry in India:

- Per capita recommended Egg: 180 eggs per year
- Per capita recommended Meat : 11 kg per year
- Per capita availability of Egg: 63 eggs per year
- Per capita availability of Meat: 2.96 kg per year
- Total poultry population in India: 851.81 million (2019 census)
- Total egg production in India: 88.03 billion
- Rank of India in poultry population: 5th
- Rank of India in poultry meat production: 4th
- Rank of India in egg production: 3rd

Need of Mix farming with Poultry:

Per capita availability of land is getting reduced progressively, so horizontal growth in agriculture has very limited scope in future. Further, crop

production is subjected to a high degree of uncertainty in income. Poultry farming activities require much lesser space in comparison to Crop farming. Poultry farming generate more income per unit of comparison to traditional agriculture and thus when taken as an supplementary activities also fulfils the goal of per drop more crop.

Commercial poultry farming is an important subsector of the agriculture of Indian economy. It forms an important livelihood activity for most of the farmers, supporting agriculture in the form of critical inputs, contributing to the health and nutrition of the household, supplementing incomes, offering employment opportunities, and finally being a dependable "bank on hooves" in times of need. It acts as a supplementary and complementary enterprise. Poultry birds also serve as an insurance substitute, especially for poor rural households. It can easily be sold during time of distress. Poultry farming promotes gender equity. The agricultural sector engages about 57% of the total working population and about 73% of the rural labour force. Livestock employed 8.8% of the agricultural work force although it varied widely from 3% in North-Eastern states to 40- 48% in Punjab and Haryana.

Poultry Population in India:

Category	Population (Million) 2012	Population (Million) 2019	% Growth
Total poultry	729.21	851.81	16.81
Backyard poultry	217.49	317.07	45.78
Commercial poultry	511.72	534.74	4.50

Poultry population 2012 & 2019 of major cities:

Sr. No.	States	Population (Million) 2012	Population (Million) 2019	% Change
1	Tamilnadu	117.3	120.8	2.92
2	Andhra Pradesh	80.6	107.9	33.85
3	Telangana	80.8	80.0	-0.93
4	West Bengal	52.8	77.3	46.34
5	Maharashtra	77.8	74.3	-4.49
6	Karnataka	53.4	59.5	11.33
7	Assam	27.2	46.7	71.63
8	Haryana	42.8	46.3	8.11
9	Kerala	24.3	29.8	22.61
10	Odisha	19.9	27.4	37.95

Poultry sector is important subsector of the agriculture of the Indian economy. Animal husbandry including poultry provide livelihood support to 2/3 of rural household specially the landless and marginal farmers.

Present Livestock Population in India:

The total poultry in the country is 851.81 million in 2019, registered an increase of 16.8 % of the total poultry. The total birds in the backyard poultry in the country is 317.07 million. The backyard poultry has increased by around 46% as compared to previous census. The total commercial poultry in the country is 534.74 million in 2019, increased by 4.5% over the previous census.

Present status of Jammu & Kashmir:

Per capita availability of eggs in Jammu & Kashmir is only 38 eggs per person per year while the same on a national level is 63 eggs. The Poultry Industry in the J & K state is estimating to be touching Rs. 2000 crore. In Jammu & Kashmir, import of egg is 87.75 crore, broiler chick is 96 lakh number and day old chick is 5.84 crore.

Need for a Poultry development policy:

High production cost of eggs and meat and uncontrolled disease problems have resulted in negative growth in layer and broiler industries in the recent past. Several poultry farmers are in deep financial crisis and trying to close their farms. Hence, it has become necessary to safeguard the interest of poultry industry for future economic prosperity and nutritional support through comprehensive Poultry development policy.

Constraint and challenges in front of J & K:

- Availability of hygienic poultry meat for consumer is a concern since there are inadequate modern processing facilities available in J & K.

Details of duck, turkey, other and all birds in poultry farms at Jammu & Kashmir:

Type of birds	Number of birds
Female Duck	33
Drake	5
Duckling	6
Total Ducks	44
Male Turkey	13
Female Turkey	50
Total Turkey	63
Quail	24964
Other poultry birds	10549
Fowl	5026828
Turkey and other	35576
Grand Total	**5062448**

- Teaching and Research faculty of SKUAST-J should undertake some field oriented research activities such as use of alternative feed for backyard poultry farming, production performance and economics of production of dual purpose breed. *There is need to establish at least demonstration poultry egg hatchery at the University level in SKUAST-J.*
- Poultry manure posses a major environmental concern in that relation poultry manure can use as a source of bio-fuel and organic fertilizer in the crop field.
- Poultry farming being a high cost intensive project coupled with high risk, Bird flu etc., and some policy decisions are needed for providing economic incentive to the poultry entrepreneurs.
- There are few broiler parent hatcheries and poultry feed mills in the Union territory of Jammu and Kashmir, especially in Jammu province; but the total production of day old chicks / feed does not fulfill the demand which result in heavy import.
- Due to lack of awareness of poultry sector in J & K, there have been couples of failure of enterprises as they take it as this may not be so profitable and successful.
- Lack of diagnostic and health cover facilities to the poultry farmers
- Lack of providing marketing support to the poultry farmers for eggs and birds
- The linkage between research-extension-farmers is not adequate. Strong extension efforts need to be taken up to reduce the gap between research and extension.
- The strengthening of the existing infrastructure is also a major challenge for the development of poultry sector in J & K. There is need import of high quality, high producing germplasm.
- Most of the poultry farms are simple open sheds while only a few large poultry integrators have controlled environment housing with automatic feeding and drinking systems. High capital costs and unreliable power supplies restrict large scale adoption of the controlled environment poultry barn model in India.
- Feed price constitute around 80% of the total production cost and therefore it is the major component in challenging production and marketing scenario of poultry and poultry products. At lesser feed prices, more farmers are willing to enter into the business and most of them would want to place more birds. In absence of any suitable market information, it becomes hard to assess the demand much well in advance every year emphasizing the importance of availability of suitable market information.
- Unsanitary conditions at a chicken center and improper disposal of dressing waste may favor spread of diseases in poultry which is a major challenge to the poultry Industry. Due to lack of trained man power, required managemental practices are not being followed by the farmers.
- Electric power is one of the main components which increase the production cost that requires consideration for reduction of power consumption charges to reduce cost of production from poultry.

Health and house management

Sufficient space requirement of individual bird, avoid over crowd of birds, proper ventilation, water management, feeding management, proper hygiene in poultry shed should be provide. Farmers

should contribute for the welfare and comfort of the birds and also need good management.

Contract farming in J & K:

In contract farming, company providing chicks, feeds, medicine and medical facilities to the farmers with a contract that farmer has to rear the birds up to marketing stage with 6-7 Rs. profit per birds. Cost of labour, electric bills and depreciation cost of poultry shed has bear by poultry farmers. In this contract farming, farmers do not have any tension regarding daily fluctuation of broiler rates. They are getting incentives on per kg of live birds. If there is mortality of birds, in that case dead bird cost deducting from incentives.

Name of the Scheme currently functioning in Jammu and Kashmir:

Poultry Venture Capital Fund Scheme:

Under this scheme, subsidy oriented loan will be provided for establishment of poultry (broiler and commercial layer) unit. Subsidy will be provided on first come first serve basis. Scale of subsidy: 25% for General and 33% for SC/ ST.

Rural Backyard Poultry Development:

Any individual farmer between the ages of 18-55 years from BPL category can avail the scheme under which district is going to select maximum of 3 beneficiaries per panchayat and total number of beneficiaries for year will be 250. Each beneficiary will be given 400 birds of 28 days of age along with cost of construction of night shelter for the birds. Birds will be distributed in two installments of 200 birds after a gap of year. All panchayats of the districts are to be covered.

Kissan Credit Card for Poultry:

Under this scheme, loan will be provided to the farmers for maintenance and repairing of poultry. Scale of finance: Rs.70000/ 1000 birds with upper limit not exceeding Rs. 2 Lakhs.

Jammu & Kashmir Poultry policy 2020:

1. **Schemes under J & K industrial policy:** Parent stock hatcheries/ feed mills/ poultry processing units are eligible for schemes under JK MSME Policy 2020 and industrial policy (Large and Mega Units)
2. **Industry development scheme** (administered by centre) Benefits under IDS are also applicable to parents stock hatcheries / feed mills/ poultry processing units.

Strategy for improvement of poultry production:

Proper feeding management is the major way to make business profitable, because feed cost constitutes approximate 80% of the total expenditure of the chicken or egg production.

Value addition:

Value addition is a process of changing and transforming a product from its original state to a more valuable state. Product development is a way that enhances the value of egg and meat. Local farmers also get the benefit if they engage in value addition activities which enhance the value of poultry sector.

Objective:

- To increase the production of eggs/ annum
- To increase the production of chicken meat/ annum
- To satisfy the need for food of the growing human population
- To do proper management of the Poultry
- To sustain commercial and broiler production in J & K
- To promote backyard poultry farming to improve rural livelihood
- Documentation, conservation and improvement of indigenous poultry germplasm
- Development of a dual purpose breed for rural poultry farming
- Poultry diversification by rearing other species of poultry like duck, geese, turkey, quail, guinea fowl at University farm and their propagation to provide multiple avenues to earn livelihood and engage unemployed educated youth in the fast growing industry.
- To increase the standard of living of farmers

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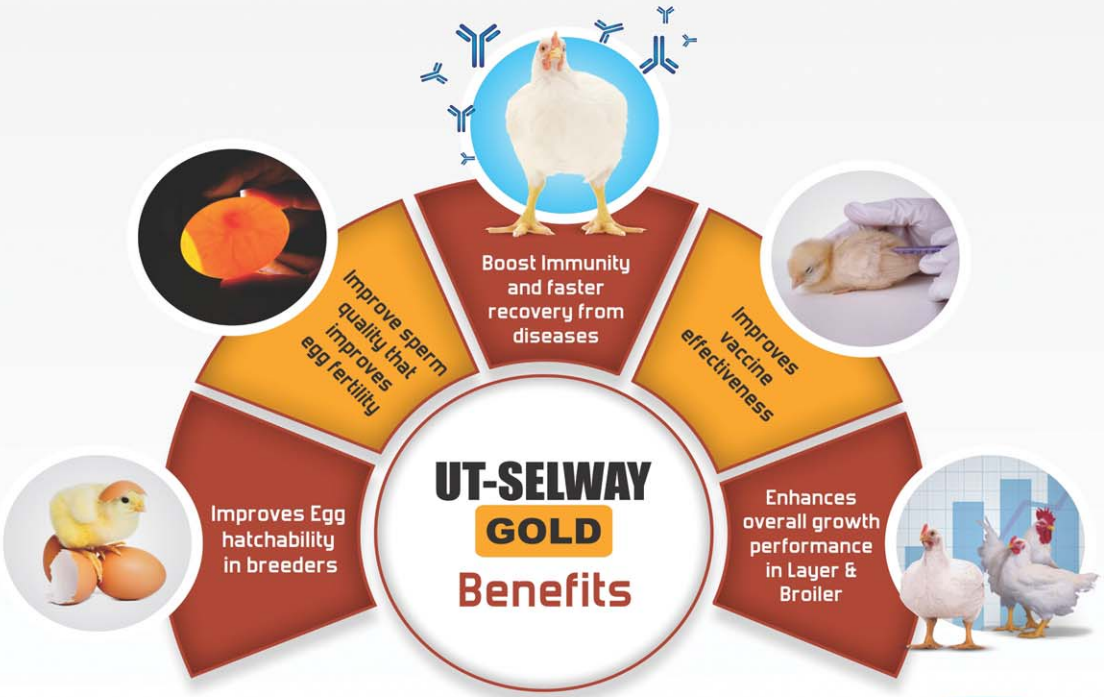

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PRESS RELEASE

Biomin®

World Mycotoxin Survey: Impact 2021

Everything you need to know about upcoming mycotoxin threats to poultry, swine, ruminants and aquaculture worldwide.

The BIOMIN Mycotoxin Survey constitutes the longest running and most comprehensive data set on mycotoxin occurrence. The survey results provide insights on the incidence of the six major mycotoxins in the agricultural commodities used for livestock feed in order to identify the potential risk posed to livestock animal production.

Highlights:

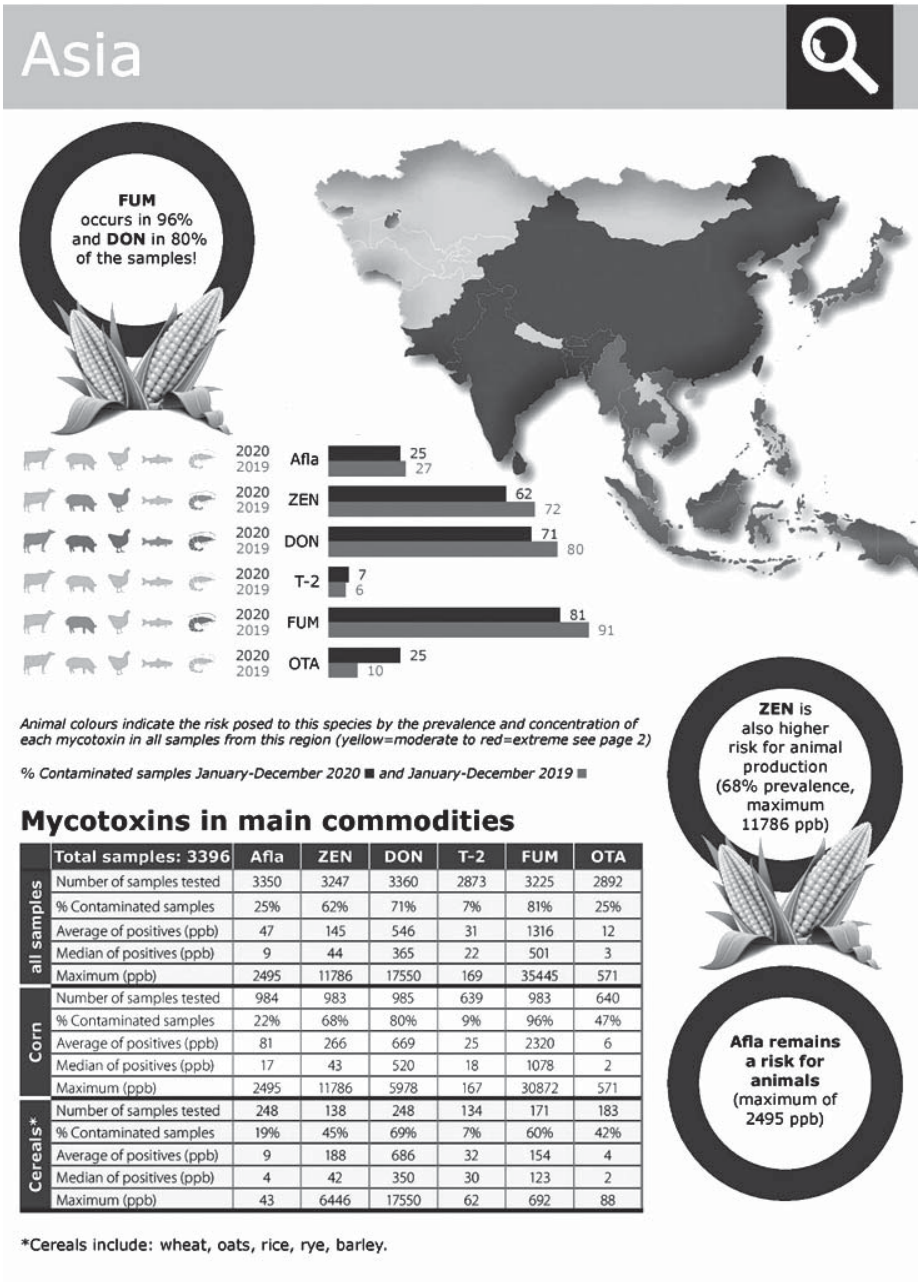
1. BIOMIN is a leading company in mycotoxin deactivation and analysis. With the help of cooperation partners we are able to present to you results from: **96,684 analysis**, done for **21,709 finished feed and raw commodity samples from 79 countries** between January and December 2020!
2. The **globally most prevalent mycotoxins** are still DON (65%) and FUM (64%).
3. **ZEN** is also highly prevalent (48%) with an average of 139 ppb globally.
4. In **North America** the risk stays extreme. DON was present in 72% of corn samples and in 89% of cereal samples. Average of positives for DON in corn (maize) was quite high with 808 ppb and even higher in cereals (1,721 ppb). Corn was also affected by FUM and ZEN with averages of 2,405 ppb and 323 ppb, respectively.
5. **South America** is at severe risk. Corn is highly contaminated with FUM at 83% and an average of positives of 2,280 ppb. In wheat, DON is the main threat (83% of the samples; average of 1,584 ppb). In Soybeans ZEN was most abundant (73%), followed by T-2 (51%) and DON (46%).

Figure 1. Global map of mycotoxin prevalence and risk in different regions.

6. **Europe**: Risk is high to severe. The most prevalent mycotoxin is still DON, followed by ZEN and FUM. DON is the main threat for livestock, with 70% of corn samples positive, but cereals were also affected: DON reached a maximum concentration as high as 11,875 ppb. ZEN increased its average contamination in corn to 171 ppb.

7. **Asia**: Risks are extreme in South Asia, China and Taiwan and severe in Southeast Asia and East Asia. FUM occurs in 96% of corn, followed by DON (80%). ZEN is also a risk: It was present in 68% of the samples analyzed (maximum 11,786 ppb). In this region, Aflatoxin remains a main threat for animals.

8. **Africa**: In Sub-Saharan Africa, risk is severe mainly due to DON and FUM. In cereals, 92% of the samples were contaminated by DON (maximum 917 ppb). South African corn was highly contaminated with *Fusarium* toxins. In South Africa, high levels of ZEN were found in straw samples (average of 1,664 ppb; maximum around 2,900 ppb.)



Mycotoxins in main commodities

	Total samples: 3396	Afla	ZEN	DON	T-2	FUM	OTA
all samples	Number of samples tested	3350	3247	3360	2873	3225	2892
	% Contaminated samples	25%	62%	71%	7%	81%	25%
	Average of positives (ppb)	47	145	546	31	1316	12
	Median of positives (ppb)	9	44	365	22	501	3
	Maximum (ppb)	2495	11786	17550	169	35445	571
Corn	Number of samples tested	984	983	985	639	983	640
	% Contaminated samples	22%	68%	80%	9%	96%	47%
	Average of positives (ppb)	81	266	669	25	2320	6
	Median of positives (ppb)	17	43	520	18	1078	2
	Maximum (ppb)	2495	11786	5978	167	30872	571
Cereals*	Number of samples tested	248	138	248	134	171	183
	% Contaminated samples	19%	45%	69%	7%	60%	42%
	Average of positives (ppb)	9	188	686	32	154	4
	Median of positives (ppb)	4	42	350	30	123	2
	Maximum (ppb)	43	6446	17550	62	692	88

*Cereals include: wheat, oats, rice, rye, barley.

Asia Pacific

Risks are extreme in South Asia, China and Taiwan. In Southeast Asia and East Asia, risk is severe. FUM occurs in 96% of corn, followed by DON in 80% of the samples tested. ZEN is also a risk for animal production: It was present in 68% of the samples analyzed and a maximum of 11,786 ppb was found.

In this region, Aflatoxin remains a threat for animals. In corn, Aflatoxin was found as high as 2,495 ppb.

In Oceania, risk of mycotoxin contamination is moderate.

Reproductive system of Birds

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The avian **reproductive system** is heterosexual and requires both a male and a female, each to contribute half of the genetic constitution of the offspring. The male contributes his half by way of the sperm produced by the testes and carried in the semen. The female contributes hers in the ovum carried by the egg yolk produced by the ovary. The ovum is often referred to as the **blastodisc**, **blastoderm** or **germ disc**. After release from the follicle on the ovary, the yolk moves into the oviduct where it is fertilised and has added to it the albumen, shell membranes and shell.

Male reproductive system

In the domestic fowl the male reproductive organs consist of two testes, each with a deferent duct that leads from the testes to the cloaca. Fowls do not have a penis unlike other animals. The testes are bean shaped bodies located against the backbone at the front of the kidney. Their size is not constant and they become larger when the birds are actively mating. The left testis is often larger than the right, inside of each is a small, flattened area that is believed to correspond to the epididymis of mammals. The deferent duct starts at this flattened area.

Deferent duct: The sperm transported from the testes where they are formed to the cloaca via deferent duct which enters a small pimple-like structure in the cloaca from where they enter the oviduct of the female while mating. This structure equates to the mammalian penis and is much larger in ducks to form a penis like organ. The deferent duct is quite narrow at first but widens as it approaches the cloaca.

Testes and sperm

In the testes very twisted tubes called seminiferous tubules where sperms are produced. The sperm carry half of the total chromosomes required to produce an embryo. The mother provides the other half. One cubic millimeter of the fluid called semen produced by the male contains on average 3-5 million sperm. Under a microscope the sperm of the fowl will be seen to have a long pointed head with a long tail. The testes produce testosterones and progesterone. The testes also produce hormones called **androgens** that influence the development of secondary sex characteristics such as comb growth and condition, male behavior and mating

Female reproductive system

The female reproductive system in the domestic fowl consists of the ovary and the accompanying oviduct. While the female embryo in chicken has two sets of reproductive organs, only one of these, the left survives and reaches maturity to produce eggs. The single surviving ovary is located in the laying hen just in front of the kidneys in the abdominal cavity and is firmly attached to the wall of the cavity. The ovary is well endowed with blood vessels to ensure there is no hindrance to the transport of nutrients to the developing yolk.

Ovary: The ovary consists of a mass of yellowish, rounded objects called follicles, each containing an ovum or yolk. There are many such follicles but only a small number in comparison, will ever reach maturity to produce an egg. When the hen is in lay the ovary will be active. The size of the follicles will vary from very small to those approaching the normal yolk size in the egg which can be up to 40 millimeters in diameter, and will contain a fully matured yolk ready for release into the oviduct.

Five stages of development in the active ovary:

1. Primary follicles – follicles that have not yet commenced to grow
2. Growing follicles
3. Mature follicles – follicles ready or nearly so for release
4. Discharged follicles – where the yolk has just been released

5. Atretic follicles – those from which the yolk has been released some time ago

Yolk: It takes approximately 10 days for a yolk to develop from the very small to the normal size found in eggs and during this time it is contained in the follicle. The follicle acts as a sack during this period of development supplying it with the nutrients required for its growth. When a mature follicle is examined an elongated area virtually free of blood vessels will be found on the distal surface of it. This area, called the **stigma**, is where the follicle normally splits to release the yolk into the oviduct. If, for some reason, the follicle splits at other than the stigma, the numerous blood vessels that rupture will result in free blood being found in the egg i.e. a blood spot will form.

Oviduct

The function of the oviduct is to produce the albumen, shell membranes and the shell around the yolk to complete the egg. It is a long tube well supplied with blood via numerous blood vessels. There are many glands found in its walls that produce the albumen, the shell membranes and the shell. In the non-layer the oviduct is quite short and small in diameter. However, once the reproductive system becomes active, it grows to a length of 70-80 centimeters with a variable diameter depending on the function of the section being examined.

The oviduct consists of five distinct parts or sections, each having different functions:

1 Infundibulum (or funnel): Fertilization of the ovum by the male sperm occurs here. This segment is funnel-shaped and lies adjacent to the ovary has very thin walls and is 6-9 centimeters long and has the function of searching for and engulfing the yolk that has just been released from the follicle into the adjacent ovarian pocket or body cavity and directs it into the oviduct. The yolk remains in the infundibulum for about 15 minutes. If the infundibulum malfunction and does not engulf the yolk, the yolk will remain in the ovarian pocket from where normally they will be absorbed within three days. If the number of such occurrences reaches a high level, the yolks will accumulate in the ovarian pocket faster than they can be absorbed. Such birds' are called internal layers as the abdomen becomes distended and the hens adopt a very upright stance

2 Ampulla or magnum: magnum. The magnum is the longest segment up to 40 centimeters long as its name implies (*magnum* being the Latin word for "large"). Its function is to add approximately 40% of the albumen to the developing egg that takes about three hours to move through. These percentages vary considerably depending on quite a few factors including the genetics of the hen, age of the bird, the egg's age and/or storage conditions.

Albumen in a normal egg consists of four different layers as follows:

Albumen layer	%
Chalazae and the chalaziferous layer	2.7
Liquid inner layer	17.3
Dense layer	57.0
Outer liquid layer	23.0

The **chalazae** are two twisted chords of albumen extending from the opposite sides of the yolk into the remaining albumen in the broken out egg. These two cords extend into the ends of the egg along the longitudinal axis and are parts of a very thin envelope of special albumen that surrounds the yolk and holds it in its position. The yolk has to remain centrally located for the survival of the embryo. The yolk turning or rotating as it passes along the oviduct causes the twisted effect of the chalazae.

While the bird produces only dense albumen, as the egg moves along the oviduct, water is added thus making **liquid albumen**. The rotation of the developing egg causes the albumen to separate into the inner liquid and the **dense layers**. The outer liquid layer is caused by the addition of more water when in the uterus. The dense layer contains significant amounts of mucin that binds it together in a jelly like form. As an egg stales, the amount of dense albumen decreases as it changes to the liquid form. The liquid form increases in volume and becomes even more fluid.

3 Isthmus: is slightly constricted (the term *isthmus* referring to a narrow strip of land joining two large tracts of land). The isthmus is where the inner and outer shell membranes form ,the inner shell membrane – laid down first, the outer shell

membrane – laid down last and about three times the thickness of the inner membrane. The isthmus takes approximately 75 minutes to carry out its tasks; it secretes some albumen and the shell membranes. In the oviduct the shell membranes in egg appear as one over the total surface of the egg, so close, they are associated with each other. Once egg has been laid, the membranes separate, usually at the larger end to form the air cell. The air cell in the new laid egg is approximately 1.5 centimeters in diameter and approximately 0.5 centimeters deep. As the egg ages, air cell increases in size due to loss of water from interior contents. This change in size is an indicator of egg quality as related to the age of the egg and the holding conditions. The shell membranes consist of a fibrous protein material and act as a barrier to bacteria and fungi penetration into the egg and also help reduce the rate of evaporation of water from the egg thus slowing the rate of deterioration of the egg. The isthmus also lays down the foundation for the shell by forming the first **crystals of calcium** carbonate on the outer shell membrane.

4 Uterus or shell gland: Shell gland (or uterus), which is 4 to 5 inches long. The shell forms on the egg in this section. The shell largely is made of calcium carbonate. The hen's body mobilizes 8 to 10 percent of body calcium from its bones to make the egg's shell. Bone calcium provides 47 percent of the calcium required to make a shell, and the hen's diet provides the remainder. Pigment deposition, if there is any, occurs in the shell gland. The egg remains here for 20 or more hours while approximately 40% of the albumen and all of the shell is added. It is for this reason that the organ is often called the shell gland. Shell formation really begins by the deposition of small clusters of calcium carbonate crystals onto the outer shell membrane

The shell of an egg is formed in two layers, Mammillary layer a sponge like layer composed of soft calcite crystals ($CaCO_3$). This layer is the inner layer. Palisade layer formed of columns of hard calcite crystals; the longer the columns the stronger the shell. This layer is the outer layer of the egg.

The calcium for the eggshell comes from the diet, a special bone called medullary bone (found in the cavity of long bones) and the skeleton. The hen uses approximately 2.5 grams of calcium in the formation of one normal egg. She cannot absorb sufficient calcium from her diet each day (approximately 2.0 grams per day) to supply this need and hence, it becomes necessary for her to utilize skeletal calcium to make up the shortfall. This is particularly so at night when most of the shell is being formed but the hen in unlikely to be eating. In addition to the calcite, the shell also contains small quantities of **sodium**, **potassium** and **magnesium**.

The carbonate ions which go with the calcium to form the calcium carbonate of the egg's shell come from the blood and the shell gland. If anything should interrupt the supply of carbonate, thin-shelled eggs will result. This occurs in hot weather when hens pant to remove excess heat energy. The increased respiratory rate removes carbon dioxide from the blood thus reducing the carbonate ions available for eggshell formation. Carbonic anhydrase is the enzyme which catalyses the conversion of carbon dioxide and water into carbonate ions. Zinc is the co-enzyme of carbonic anhydrase and any conditions resulting in Zn deficiency can lead to problems associated with egg shell formation.

5 Vagina: Is important in the laying of the egg, at approximately 12 centimeters in length, it secretes the egg's outer cuticle and possibly the shell pigment. The vagina is made of muscle that helps push the egg out of the hen's body. Prior to **oviposition** (the laying of the fully formed egg) th**e bloom**, or **cuticle**, forms on the egg in the vagina. The egg travels through the oviduct small end first but turns in the vagina and comes out large end first.

Ovarian hormones: The ovary produces estrogens, progestogens, and androgenic compounds. The thyroid glands produce two hormones, T4 and T3. The avian adrenal glands produce corticosterone and aldosterone

Androgen, oestrogen and progesterone

In addition to the production of eggs, the female reproductive system also produces hormones that aid in the control of body functions. These include androgen, oestrogen and progesterone. Androgen causes comb growth and condition, and has a

function in the formation of albumen. Oestrogen causes the growth of the female plumage, mating and nesting behaviour, oviduct development together with the nutrient supply to the ovary/oviduct for egg formation. Progesterone, with androgen, is involved in the production of albumen and the carriage of the message to the pituitary gland to release luteinising hormone.

The female reproductive system remains dormant in the young chicken and growing pullet until she reaches the age when these organs start to prepare for the normal production of eggs. One of the first signs of her developing maturity is the change in the comb development. This organ starts to grow and to take on a vivid red hue as the hormones produced by the now awakening ovary start to have an effect.

The formation of the hen's egg

The normal egg consists of the following major parts:

1. Yolk carrying the ovum – produced by the ovary
2. Albumen or white – produced mainly in the magnum
3. Shell membranes – produced in the isthmus
4. Shell – produced in the uterus or shell gland

The ovary and yolk formation

The ovary is attached to the abdominal cavity wall by the meso-ovarian ligament. It carries anything from 2,000 to 12,000 small ova in miniature follicles on its surface, plus hormone producing cells in its body. Not all of the ova found on the immature ovary develop and only approximately 200 to 350 reach maturity under normal modern commercial practice. Each yolk or ova takes about 10 days to grow and reach maturity when it is approximately 31% of the weight of the egg.

The composition of the yolk material is as follows:

Component	**%**
Water	48.0
Protein	17.5
Fat	32.5
Carbohydrate	1.0
Other compounds	1.0

The yolk is laid down in concentric rings of darker and lighter coloured material, the colour being produced by xanthophylls that are yellow/orange/red pigments occurring in many plants, plant products and other naturally occurring materials. The bulk of the yolk material provides a source of food for the developing embryo that originates by the fertilizing of the germ disc or blastoderm usually located on the upper surface of the yolk of the broken out egg. It lies in the surface segment of the latebra which is a vase-shaped segment of different yolk with its base in the centre of the yolk, the lips on the surface and the stem joining the base to the lips.

Yolk development in the **maturing pullet** is initiated by follicle stimulating hormone **(FSH)** produced by the anterior lobe of the pituitary gland. The compounds in the yolk material are formed in the liver and, on the appropriate signal, are transported by the blood stream to the target follicle and into the yolk. The appropriate signal for this development comes from the hormones oestrogen, progesterone and testosterone which are produced by the ovary after receiving the signal of the FSH. These ovarian hormones also provide the stimulus for the formation of the development of the oviduct.

The yolk is contained in a very thin, transparent membrane called the vitelline membrane. As an egg becomes stale, the vitelline membrane becomes significantly weakened and often breaks to release the yolk contents when the stale egg is broken out. On ovulation the yolk is released and enters the oviduct where, as it passes along that organ, fertilization occurs and the remaining parts of the egg are added around it. The yolk is located in a sack called the follicle, held on the ovary. The follicle, which although quite thin-walled, is extremely well supplied with blood vessels. These are necessary to carry the yolk constituting materials that have been formed in the liver

Ovulation: The release of the yolk (the process of ovulation), is the major controlling factor influencing the subsequent steps in the formation and laying of the egg. As a consequence, factors that influence ovulation are of critical importance to the various aspects associated with egg production. The presence of a mature yolk in a follicle causes

hormones from the ovary to stimulate the release of **luteinising** hormone (LH) by the pituitary gland. The presence of LH in the blood stream causes the follicle that contains the mature yolk to split along the stigma thus releasing it into the oviduct abdominal cavity adjacent to the oviduct.

Sexual maturity

Sexual maturity is reached when the hen lays the first egg in her life. Generally sexual maturity is genetically controlled, however, environmental factors play a very significant role. It will be in the age range of 18-24 weeks depending on fowl genotype, but it can be manipulated by controlled feeding practices, light intensity and day length management and other management practices.

Initiation of ovulation

The controlling mechanism setting the time of the day for the first ovulation is not fully understood. However, nervous and hormonal factors are important. Subsequent ovulations are, however, controlled largely by the time of the previous egg passing through the vent (being laid). Subsequent yolk release, if at all, occurs approximately 40-60 minutes after the previous egg has been laid.

Clutches: Eggs laid on successive days are called a clutch. Clutches are separated by days when no eggs are laid. Clutch size is an individual characteristic and may vary in a flock from 2 up to 100 eggs. However, the normal clutch size is significantly less than that and ranges from 3-8 eggs. The larger the clutch size the better will be the total production. Small clutch size indicates an inferior laying performance and is usually associated with long breaks in between.

Egg formation time

The time taken from ovulation until when the egg passes through the vent varies with individuals within the range of 23 to 26 hours. If the time is longer than 24 hours then the time of laying will be progressively later in the day for each successive egg in the clutch. When eggs are laid at a late hour, an ovulation is missed and the start of a new clutch will be earlier in the next laying day.

Ovulation time

Hens that produce long clutches release the yolk very shortly after first light (whether natural or artificial light). Successive ovulations occur very shortly after the laying of the previous egg. Those that produce short clutches usually release the yolk later in the day and often have longer periods between laying time and the next ovulation.

Laying pattern

When pullets first commence to lay, their hormonal and other controlling systems have not yet reached a state of balance. As a consequence, the first eggs are laid in a somewhat haphazard sequence. However, once these systems have reached a state of balance (usually after 7-10 days), egg production becomes more regular. Peak ovulation is reached 3-5 weeks after first egg. This will be held for a period and then will decline steadily thereafter until the bird moults or some other factor causes a cessation of production for a period.

There are many factors that influence eggshell quality:

1. **Length of time in lay:** The longer the bird is in lay, the weaker the shells will become because of her inability to obtain enough daily calcium from her diet to supply all of her needs for one egg. As a consequence, better layers will deplete their skeleton calcium supply.
2. **Increased environmental temperature:** These results in reduced food consumption (and calcium) and the reduction of carbonate ions because of panting.
3. **Egg laying time:** Eggs laid early in the morning are more likely to have thinner shells than those laid by the same bird later in the day. This is because in the case of those eggs laid early the shells have been deposited during the hours of darkness when the bird does not eat, and therefore no dietary calcium for the shell formation.
4. **Stress:** Stressed birds lay thinner shelled eggs.
5. **Body checked and misshapen eggs:** Most of these defects are caused by the birds being startled shortly after the egg has entered the

uterus and the first layers of calcium carbonate have been deposited. At this stage the shell is very fragile and weak and when startled the hen's muscles contract (including those in the wall of the uterus) and thus crack the newly forming shell. These are covered by subsequent depositions of shell but the damage remains in the form of body checks and/or misshapen eggs.

6. **Disease:** Certain diseases can cause weak shell and misshapen eggs.

7. **Drugs:** Certain drugs influence eggshell formation and deposition.

The shell of an egg contains openings or pores. There are approximately 8,000 such pores in the shell of a normal hen's egg. The function of these pores is to provide for the gaseous exchange during incubation and embryonic development. The developing embryo requires oxygen and gives off carbon dioxide. When the egg is first laid most of the pores are closed. However, as the egg ages more and more pores open up. The cuticle deposited on the outer shell is composed of organic material and water and blocks the pores. During the laying process the cuticle acts as a lubricant, but once laid, the egg's surface soon dries and the residue, which is mainly protein, closes off most of the pores as a barrier to the invasion of bacteria and fungi.

Further information

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PRESS RELEASE

Dietary sodium diformate (Acidomix DF +) improves growth performance and nutrient digestibility in broilers against negative and positive controls

Christian Lückstädt and Stevan Petrovic

Broiler growth rate and feed efficiency are key to economic performance through to market. Dietary formic acid and its salts act against pathogens, helping to decrease pressure on the immune system and improving nutrient digestibility. Previous studies on the antimicrobial impact of organic acids and their salts, including sodium diformate (**Acidomix DF +**, Venkys), placed less emphasis on the impact in the GI-tract of birds. This formed the impetus for this study, which assessed the impact of the additive on pH-levels at different locations of the GI-tract and digestibility parameters. In a trial conducted at a research farm in Iran, 0.1% NDF was tested in a typical corn-soy diet, against both a negative (NC) and positive control (PC) containing an antibiotic growth promoter (500 mg Trimethoprim Sulfadiazine per kg). 216 day-old broiler chicks (male Ross 308) were randomly selected into 3 treatment groups with 6 replicates of 12 birds each. Feed, in mash form, and water were available *ad libitum* throughout the 42-day trial period. The effects of dietary NDF on performance (body weight gain BWG, FCR, broiler index EBI), pH in the gizzard and ileum, Protein Efficiency Ratio (PER) and apparent ileal digestibility of protein and minerals were examined at the end of the trial. Data were analysed using the t-test and a confidence level of 95% defined for these analyses.

Performance was boosted in the birds fed 0.1% NDF. Treated birds had a significantly increased BWG against NC and PC respectively (2126 g vs. 2007 and 2006 g; $P<0.05$), while the FCR tended ($P<0.1$) to be improved (1.78 vs. 1.87 and 1.86). EBI was enhanced by almost 11% against both NC and PC. Utilization of nutrients was also significantly improved in the NDF-fed broilers, especially for crude protein, crude ash, calcium and phosphorus. Calculated as PER, the usage of NDF led to an increase of protein utilization against both controls by more than 5%.

This study demonstrates that including NDF in broiler diets is a sustainable tool for improved performance and nutrient utilization, thereby saving nutrient resources, even compared to an antibiotic growth promoter.

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Sinhagad Road, Pune, Maharashtra 411030

BROILER LIFTING RATES FOR THE MONTH OF FEBRUARY 2021

place	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28
Hyderabad	84	84	84	79	71	63	63	66	66	66	66	68	73	80	80	80	80	75	75	75	80	80	85	87	89	89	89	89
Karimnagar	84	84	84	75	67	63	63	66	66	66	66	68	73	80	80	80	80	75	75	75	80	80	85	87	89	89	89	89
Warangal	84	84	84	79	71	63	63	66	66	66	66	68	73	80	80	80	80	75	75	75	80	80	85	87	89	89	89	89
Mahaboobnagar	84	84	84	79	71	63	63	66	66	66	66	68	73	80	80	80	80	75	75	75	80	80	85	87	89	89	89	89
Kurnool	84	84	84	79	71	63	63	66	66	66	66	68	73	80	80	80	80	75	75	75	80	80	85	87	89	89	89	89
Vizag	89	89	89	86	80	77	77	80	80	80	80	82	84	89	89	89	89	86	86	86	86	86	90	92	94	94	94	94
Godavari	89	89	89	85	79	73	73	76	76	76	76	78	80	85	85	85	85	80	80	80	85	85	90	92	94	94	94	94
Vijayawada	91	91	91	84	77	70	70	73	73	73	73	75	80	85	85	85	85	80	80	80	85	85	90	92	94	94	94	94
Guntur	91	91	91	84	77	70	70	73	73	73	73	75	80	85	85	85	85	80	80	80	85	85	90	92	94	94	94	94
Ongole	91	91	91	84	77	70	70	73	73	73	73	75	80	85	85	85	85	80	80	80	85	85	90	92	94	94	94	94
Chittor	92	95	97	97	97	84	84	78	80	84	84	84	87	89	91	93	93	93	85	85	85							

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PRESS RELEASE

First Anniversary of Mr. Deepak Shah Managing Director of Nutridian Animal Health

KCPL has establihsed in 1971 and since then has been constantly working on better and innovative product development, expanding the portfolio in all types of Animal Health Segments dealing in Poultry, Aqua and companion animal feed additives and injectables. We further established ourselves as a reputed manufacturer and exporter of Halquinol and other allied products.

Mr. Deepak Shah had worked as Managing Director at Nutridian Animal Health which is a Subsidiary & Marketing Division of Kanad Chemical Pvt Ltd.

It has been one year since the sad demise of Mr. Deepak U Shah who took his last breath at the age of 38 years on 10th March 2020 at his residence.

Team Nutridian and KCPL on this occasion has offered tributes by distributing free eggs and school bags at various orphanages all over India. This function is just an act of extension of the kindness of our late Mr. Deepak U. Shah.

"Dear Deepak Sir, you will always stay in our heart with your unforgettable memories that remind us of the precious moments we had spent with you. We are sure that you will continue to shower your blessings and give us strength in fulfilling your dreams."

- Family members and team of Nutridian Animal Health


MONDAY
TUESDAY
WEDNESDA
THURSDAY
FRIDAY
SATURDAY
SUNDAY


In Loving Memory


In Loving Memory of

PRESS RELEASE

HIPRA presents
EVALON® with HIPRAMUNE T:

The new live vaccine against Coccidiosis for breeders and layers in India

On 1st February, 2021, **HIPRA** presented its virtual product launch of **EVALON®with HIPRAMUNE T**:The new live vaccine against Coccidiosis for breeders and layers in India. The launch successfully brought together over 350 HIPRA partners from 150 poultry companies/entreprenuersacross India who watched the event virtually or in person at 4 different venues: Pune, Hyderabad, Bangalore and Coimbatore with the live event been staged at Pune.

The event was divided into three sessions. The first session was the inaugural of the occasion with lamp lighting by the eminent stalwarts of the poultry industry- **Dr. K. Jayaraman, Dr. Madhukar Pawar, Dr. Vinod Chaudhari, Dr. Sudheer Rukadikar, Dr. BabanPawar, Dr. Duddbale and Dr. Irshad Alam**. This was followed by a beautiful cultural performance by Inspiration Dance school celebrating the colours of India and spreading the essence of equality and peace among us.

Later that evening, **Dr. Shyam Vane, Business Unit Manager**- HIPRA India, took charge of the stage with his welcome speech and the corporate presentation of HIPRA. The video shows how HIPRA stands different as an animal health company. HIPRA believes strongly that the future lies in prevention and hence care to invest on only highly innovative biological products/vaccinesfor animal health and differential services.

After this, **Ms. Panicha Thanahiranchai, Regional Manager** (Asia Pacific), HIPRA Thailand on the virtual platform presented on the vision of HIPRA to be the world reference in prevention, with differentiated products for animal health. She explained how HIPRA focusses not only on vaccine but also on diagnostic kits, medical devices and continued technical services with traceability of the vaccines.

Post her presentation, the technical session was flagged off by one of the reknowned poultry breeder expert **Dr. K. Jayaraman** with his outstanding presentation on Coccidiosis who reviewed the current situation of Coccidiosis worldwide and in India. The disease was very well described bringing forth the practical issues occurring in the birds after the disease sets in. One could understand that it is not only coccidiosis but also necrotic enteritis that causes high economical loss to the farmer specially sub clinical coccidiosis which most of the time goes unnoticed in the caged breeders. It is important to note that Dr. K. Jayaraman even stressed upon that this enteric disease has become an emergent issue in layer flocks housed in conventional cages which were earlier believed unlikely to suffer from coccidiosis. Hence at the end he emphasized the use of vaccines for both coccidiosis and subclinical coccidiosis in breeders be it on deep litter or in cages.

At the peak of the event, Dr. Shyam Vane triggered the theatrical ceremonial launch of **EVALON® with HIPRAMUNE T**. It was the most awaited Grand launch of **EVALON® with HIPRAMUNE T**picturized on screen with an audio visual act. The first of its kind in India for the launch of a live attenuated vaccine for breeders and layers against Eimeria and webcasted across different cities in India and abroad. The act picturized beautifully the problems faced by poultry farmers like mortality, reduced body weight, poor performance leading to enteritis and necrotic enteritis due to coccidiosis outbreak in birds and how it involves high treatment cost causing a huge economical loss to the farmers. All these led to the development of a new innovative vaccine that is **EVALON® with HIPRAMUNE T**. This precocious vaccine which is fully attenuated gives a lifetime of immunity to the birds which is amazing. The vaccine contains five species of Eimeria – *Eimeria acervulina,*

*E. brunetti, E. maxima, E. necatrix*and *E. tenela*which are the most important species affecting the long living birds. The vaccine improved the gut health for a better performance in breeders which gave way for uniform flocks, production of more eggs and thereby uniform chicks. The use of vaccine also eliminated the use of coccidiostats in the farm thereby leading to a higher Return on investment at the end.

In the next presentation, **Dr. Marc Pages**(R&D Senior Manager, Biologicals) HIPRA Spain, the man behind the innovative coccidiosis vaccine shared the designing of **EVALON® with HIPRAMUNE T**, its components besides the mode of action through immunomodulation with the use of Hipramune T. The vaccine has two components – first its antigen having the five important Eimeria species and the second part is the adjuvanated solvent Hipramune T which contains 3 components – a colouring agent, the aroma and the immunomodulator. Hipraimmune T switches **EVALON® with HIPRAMUNE T** immunity towards a stronger Th1 response causing the increase of IL-2 and IFN Y production. A stronger Th1 response boosts the performance of **EVALON® with HIPRAMUNE T** vaccine and thus increases the immunity upto 60 weeks and more proving to be extremely beneficial for the farmers.

Dr.Joan MolistBadiola (Corporate Product Manager, Poultry) HIPRA Spain later in his presentation described about the differences between the coccidiostats, non attenuated coccidiosis vaccine and attenuated vaccine. The failure to prevent the infection with all the existing type of coccidiosis vaccines led to the new strategyof developing the first fully attenuated vaccine **EVALON® with HIPRAMUNE T** with all the important Eimeria species by precociousness. Due to precocious nature, the prepatency period is reduced and the immunity is achieved within 21 days.

Next **Dr. Martina Dardi,** (Senior Brand Manager Poultry) HIPRA Spain explained on how efficacy of **EVALON® with HIPRAMUNE T** mainly depends on the correct administration and post vaccinal management at farm and its follow up. She even defined the **HIPRAlink®** Vaccination, the **SMART VACCINATION** concept element, to record all the vaccination data generated by Hipraspray®, providing traceability and control for the entire vaccination process.

Soon after **Dr. Luis Augusto Pantoja Millas** (Corporate Brand Manager, Poultry) HIPRA Spain presented on the comparative studies conducted on different coccidiosis vaccines across the world. He emphasized on the importance of attenuation which is of paramount importance in terms of efficacy and even safety. Attenuation by precociousness improve gut health, reduces the lesions and decreases bacterial enteritis issues. Ultimately this leads to improved technical performances in the birds.

Finally with Dr. Shyam Vane as the moderator, the third session focussed on the question and answer round in which the queries from the participants from all the locations – Pune, Hyderabad, Bangalore and Coimbatore were answered by the panel of experts from HIPRA Spain including Peter Saey (Zone Director, Asia Oceania).

To summarize, HIPRA launched the new wave of innovative smart vaccine to help poultry producers meet the performance challenges driven by the need for No coccidiostats mission and more sustainable production performances in breeders

About HIPRA

HIPRA is a veterinary pharmaceutical company dedicated to the research, production and marketing of products for Animal Health with our HQ at Girona, Spain. We currently occupy one of the top positions amongst pharmaceutical companies producing Biologicals for the veterinary industry worldwide. HIPRA has more than 38 subsidiaries across the world and spread over 100 countries. In India, we have started our operations with Poultry vaccines in 2019.

For further information, you may please contact:

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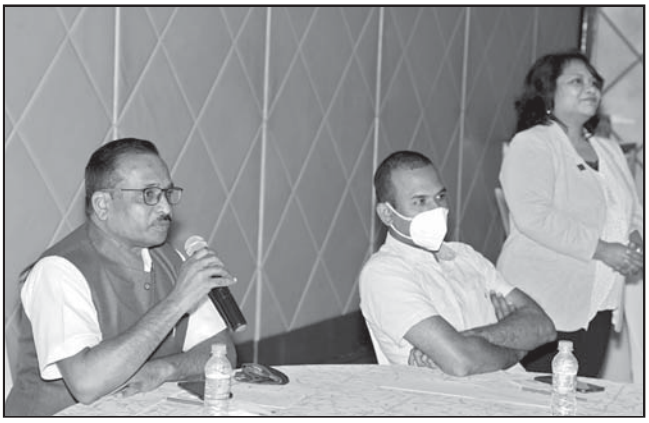
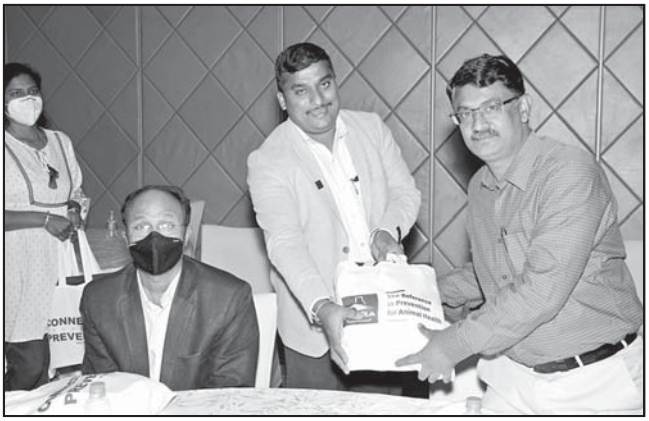
Photographs at Pune

Photographs at Hyderabad

Photographs at Bangalore





Photographs at Coimbatore

PRESS RELEASE

Peter Fisher Named New President, Aviagen Asia

Fisher will strengthen customer success with experience, knowledge and commitment

Mar. 24, 2021 – HUNTSVILLE, Ala. – Aviagen® Asia has appointed Peter Fisher as its new President, which will become effective on April 1. In this role, he will provide visionary and strategic leadership for the Asia region, while continuing to enhance service to poultry producers. They will benefit from his industry insight, knowledge of animal nutrition and health and passion for innovating to create greater customer value.

Peter Fisher

During his prior work with DSM Nutritional Products, Fisher fulfilled various international roles, including Vice President of Global Technical Services, Animal Nutrition and Health; Vice President of Animal Nutrition and Health for both Europe and Eastern Europe (including Middle East and Africa); Director, Animal Nutrition and Health for South and Sub-Saharan Africa; and Senior Account Manager. DSM is a company with a tradition of leveraging bright science to improve animal health and welfare through nutrition. Fisher earned a Bachelor of Science, Master of Science and PhD in Agriculture from the University of Stellenbosch in South Africa, where he also acted as manager of the Pig Research Unit and Part-Time Lecturer.

Fisher will report directly to Aviagen CEO Jan Henriksen, who commented, "We welcome Peter to the Aviagen Asia team. He was chosen to lead our team in this highly important region due to his in-depth industry expertise and business development experience, which will help to strengthen our distributor network and alliances, and expand our Asia business. Moreover, Peter's optimism and strong leadership abilities, coupled with a firm focus on our customers and our birds, will help lead our company and our customers forward in the growing and opportunityrich Asia market."

About Aviagen

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

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

For more information, please visit Aviagen.com, or follow Aviagen on LinkedIn.

COMPARATIVE EFFICACY OF VARIOUS GROWTH PROMOTERS ON PERFORMANCE OF BROILER CHICKEN

Dr. Ajay Chalikwar
Head - Technical Services,
Provet Pharma Private Limited,
Chennai, India

Modern chicken face tremendous performance pressure which sometimes leads to mortality due to metabolic, locomotor, gut related disorders due to faster growth rate & higher breast meat yield consequent to improvements in genetics, nutrition, management, disease prevention, etc. Substantial reduction in mean age of liquidation makes the challenge of maintaining gut health paramount among all.

The digestive, absorptive and secretory ability of the gut is solely dependent on its integrity and microbiome. Several stressors like coccidiosis, litter management, clostridium, other pathogenic bacteria & viruses, mycotoxin, nutritional and managemental errors affect gut functionality.

Necrotic Enteritis (NE)

Clinical NE is associated with severe losses due to heavy mortality and concerns the farmer more, whereas the subclinical form is responsible for substantial losses on FCR and is being ignored generally which was very much evident during intestinal lesion scoring in broilers performed by our team, pan India.

Losses due to NE are estimated to cost the poultry industry $2 billion annually worldwide. Causative organism of NE is *Clostridium perfringens* Type A & C which is a gram positive, spore forming, anaerobic bacteria.

This bacterium produces different toxins like α, β & ξ but the most important culprit is NetB toxin, an exotoxin, which may lead to systemic circulation of this bacterium to end up with cholangiohepatitis.

NetB toxin damages intestinal cells and causes leakage of plasma from enterocytes; further they produce perfrin, inhibit the proliferation of harmless Clostridia and increase the proliferation of pathogenic bacteria leading to dysbacteriosis resulting in heavy mortality, mostly during 2 - 5 weeks of age.

The clinical infection is characterized by sudden onset, high mortality, and necrosis of the mucous membrane of the small intestine and mortality may reach up to ~ 1% per day.

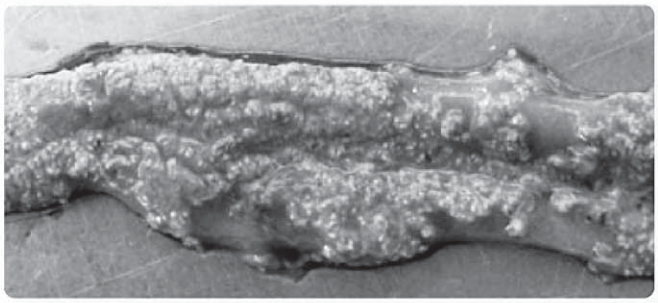


Fig: 1 Turkish Towel appearance in Necrotic Enteritis

Birds with NE are depressed, reluctant to move and have ruffled feathers. They are usually diarrhoeic, may be anorexic and dehydrated. The course is often per-acute, with death in 1–2 hours. Mortality rates may be as high as 50%, but virulence varies with the infecting strains.

Some strains cause cholangiohepatitis in broilers, as *Clostridium spp.*, a strictly gut pathogen, gets into the circulation due to breach in the gut barrier function.

Modern broilers are genetically selected for continuous eating and they continue eating during clinical & subclinical NE challenges, thus leading to a shift in the microbiota and subsequently dysbacteriosis. Deep seated intestinal damage destroys the lamina propria leading to destruction of immune cells in the Peyer's patches and makes the bird incompetent immunologically.

Solution

Different solutions exist for the control of clinical as well as subclinical NE like antibiotics, synbiotics, probiotics, essential oils, bacteriophages, antimicrobial peptides, etc.

Solutions like synbiotics, antimicrobial peptides, probiotics, essential oils show excellent promise as they provide efficient control of clinical & subclinical NE with additional benefits like replenishment of microflora and better immunocompetence.

In this study we have compared the efficacy of 3 different growth promoters on the performance parameters in commercial broilers.

BAMBERCIN PLUS - Novel & Potent Tribiotic

A unique and novel combination of Bambermycin / Flavophospholipol (exclusively for veterinary use) and adequate CFUs of *Bacillus subtilis* and *B. licheniformis*, fortified with Curcumin in a compatible base for improving performance and productivity in poultry.

Bambermycin / Flavophospholipol

Class: Phosphoglycolipids
Spectrum: Primarily acts against gram positive pathogens like Clostridium and Staphylococci, but spares beneficial microflora, like Lactobacillus & Bifidobacterium and hence improves microflora balance.

Probiotics

B. subtilis & *B. licheniformis* are generally regarded as safe (GRAS) and inhibit pathogenic bacteria, regulate gut microbiota, help in immuno-modulation are highly stable during feed processing.

Curcumin

Curcumin is well known for its safe & natural phytobiotic action. It has a wide range of biological properties such as anti-oxidant, anti-bacterial, anti-viral, anti-fungal and anti-inflammatory activities. It helps in the stimulation of bile secretion and bile flow, thereby maintaining liver health.

NAGRONEX ESF - Phytobiotic Growth Promoter

It is a synergistic combination of essential oils (oregano, clove, cinnamon & eucalyptus) with short chain fatty acids (SCFA). It has anti-bacterial, anti-viral, anti-fungal, anti-coccidial and anti-oxidant properties that promote performance and productivity.

Growth Promotion Effect

NAGRONEX ESF improves intestinal histomorphometry parameters like villus height / crypt depth ratio, which leads to a wider surface area for better absorption of nutrients, electrolytes and thus combats villus atrophy & promotes intestinal integrity.

Antimicrobial Effect

It has both direct and indirect anti-microbial effects due to the synergistic interactions of its various active components. Phenols directly act by altering the cell wall of some bacteria and fungi resulting in water imbalance and cell death. It indirectly helps by ensuring quicker renewal of enterocytes, which creates a hostile environment to bacterial and coccidial development.

Objective of the Study

To evaluate the effects of dietary supplementation of different gut acting growth promoters (Nagronex ESF and Bambercin Plus) on performance of male broiler chickens against Bacitracin Methylene Disalicylate.

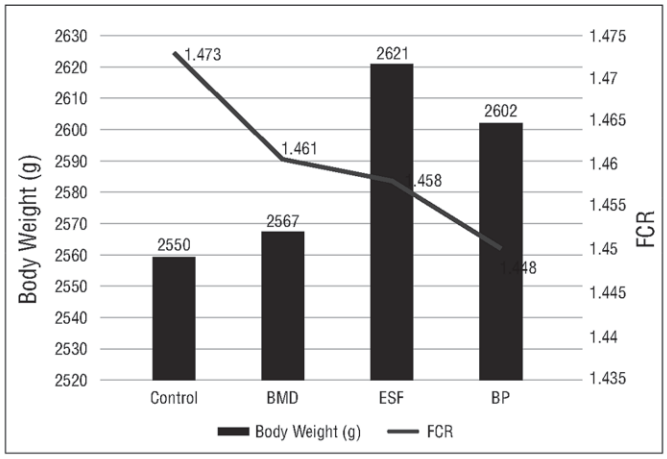
Materials and Methods

Dietary treatments and experimental diets

Group	Trial
Control	No Antibiotic / Probiotic
BMD	Control + 500 g Avibac MD (BMD 10%)
ESF	Control + 100 g Nagronex ESF
BP	Control + 250 g Bambercin Plus

General Bird Husbandry

Flock	:	410 one-day old male broiler chicks
Period	:	1 to 35 days
Diet Form		
Days 1 to 21	:	Crumbles
Day 22 onwards	:	Pellets
Diet Type		
Starter	:	Days 1-14
Grower	:	Days 15-28
Finisher	:	Days 29 to 35
Drinking Water	:	Ad libitum
Litter Material	:	Wood shavings and paddy straw
Vaccination	:	As per recommended schedule.
Placement	:	10 replicates & 10 chicks in a pen measuring (1.2 m x 1.2 m)



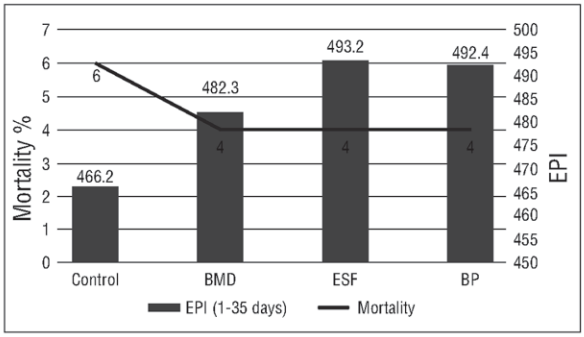
Graph 1: Body Weight & FCR

Results

BW: At the time of harvest at 35 d of age, birds supplemented with Nagronex ESF had almost 55 g more BW as compared with that in the BMD supplemented group. Similarly, the birds supplemented with Bambercin Plus had 35 g more BW than that of the BMD supplemented group.

ADG: During 29 - 35 d of age, ADG in the Nagronex ESF & Bambercin Plus supplemented groups was comparatively higher than that in the NC & BMD supplemented groups, resulting in marginally better ADG in the Nagronex ESF & Bambercin Plus supplemented groups as compared to the NC & BMD supplemented groups during 1-35 d.

FCR: FCR during 1-14 d was found to be higher in the BMD supplemented group (P = 0.032) as compared with the other dietary treatments. However, this ought to be an artefact since such difference was not followed during the subsequent periods of measurements during which FCR was found to be similar across the groups. The birds supplemented with Bambercin Plus had marginally (by 2.5 points) better FCR as compared with the Control group.



Graph 2: EPI & Mortality %

EPI: Numerically EPI was marginally better in the Nagronex ESF and Bambercin Plus supplemented groups as compared with the Control group.

Discussion and Conclusion

It was concluded from the present investigation that supplementation of **Nagronex ESF** and **Bambercin Plus** numerically improved body weight, FCR and performance of the birds.

The reason behind better performance of **Bambercin Plus** against BMD may be better control of Clostridium, sparing effect on the microbiome and additional replenishment of microflora in the gut.

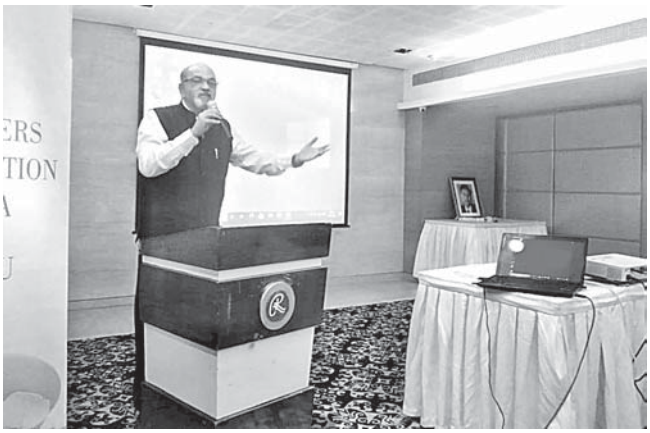
Nagronex ESF performance is an outcome of different modes of action of the phytogenics like anti-microbial, anti-inflammatory, endogenous enzyme secretion, immunomdulatory, anti-oxidant, proliferation of microbiome and maintaining gut pH at optimum level.

The data had a trend which suggested that with these supplements, it may be possible to get better FCR and productivity index as compared with the conventional antibiotic growth promoters like BMD.

References are available on request.

PRESS RELEASE

Poultry Farmers & Breeders Association (MH)



To mark the 25th death anniversary of Padmashri Dr BV Rao, Poultry Farmers & Breeders Association (MH) has decided to start a 'Chicken and Eggs Promotional Campaign'. This year long campaign consists of various Chicken Awarness Programmes, Chicken Festivals,expert talks and many more which kickstarted on February 12.

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

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

PF&BA President C Vasanthkumar told that,because of rumors during pandemic there were drop in chicken and eggs consumption and now again because of bird flu there is drop in consumption.Hence to aware consumer we have decided to organise programme like this with the help of poultry experts.''

PF&BA had also facilitated some media representatives as they had supported poultry farmers during pandemic. We are indeed grateful for all of your willingness to include us in your coverage in a positive during pandemic.Please extend our thanks to everyone involved.

Warm Regards
C Vasanthkumar
President PF&BA (MH)

Role of Chicken Gut Microbiota in Health and Disease

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Aviculture is the most efficient and economic animal production system that can cope up the protein demand of growing global human population. Chickens work like a biological machine, which can convert vegetable form of protein in to meat or egg protein. The growth of poultry industry is only feasible with proper strategies for disease control and prevention to minimize the impact of infectious diseases and simultaneously reduce associated ecological damage (Borda-Molina *et al.,* 2018).

Until recently, the view of the microbiome was restricted to those microorganisms that could be recovered on growth media but less than 20% of total chicken microbiota have been recovered by cultivation (Gaskins *et al.,* 2002). This lead researchers to adopt new culture-independent approaches and metagenomics to predict nutritional and ecological roles of gut microbes (Choi *et al.,* 2015). Though the diverse and complex structure of gut microbiota hindered the understanding of its roles in growth and health of chickens, recently it has attracted attention due to its importance in modifying gut environment (Brisbin *et al.,* 2008).

The chicken microbiota play a pivotal role in nutrient exchange, modulating the regulation and activation of innate and acquired immune responses, morphology and physiology of the digestive system and competitive exclusion of pathogens. The commensal bacteria of the digestive system contribute nutrients that are both directly and indirectly important to production and metabolism of short chain fatty acids (SCFAs), ammonium, amino acids, and vitamins (Tellez *et al.,* 2006). The innate immune response modulated by production of mucus and antimicrobial peptides like â-defensins (Derache *et al.,* 2009). Gut microbiome can also affect villus height, villus area, crypt depth and villus height to crypt depth ratio (Golder *et al.,* 2011).

Certain bacteria like *Lactobacillus* and *Bifidobacterium* can increase digestive enzyme activity, while suppressing some enteric pathogen like *Escherichia coli* (Xu *et al.,* 2003). Moreover, intestinal microbiota competes with the colonizing pathogenic bacteria that may reduce adhesion and colonization of intestinal pathogens. This reduction might be due to different mechanisms, perhaps the physical occupation of space, competition for resources in a given niche or direct physical or chemical confrontation with the potential colonizer (Chaucheyras-Durand and Durand, 2010).

Microbiota studies have to deal with many host and environment related hidden variables, which are responsible for diversity and concentration of chicken gut microbial population. Age, sex, breed and species are the host related factors while biosecurity level, temperature, housing, litter material, feed access/additives, hygiene and location are environmental factors (Jannigje *et al.,* 2018).

The diversity of chicken intestinal microbiota tends to increase most during the first weeks of life and corresponding colonization patterns seem to differ between layer-type and meat-type chickens. However, emergence of multi drug resistant bacteria has provided a new focus on bacteriophages as a natural, non-toxic alternative treatment of bacterial infections. (Nilsson, 2014).

Research aimed at identifying biologically relevant characteristics of a healthy poultry microbiota to replace antimicrobial drugs, is both promising and challenging. Bacteriophage therapy can be effectively applied against sensitive bacteria as well as strains that are resistant to antibiotics. In addition, metagenomic analyses in combination

with other approaches will allow the identification of the microorganisms and real players among gut that help in host metabolism and maintaining its health.

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PRESS RELEASE

NOVUS

Novus Animal Nutrition India Hires Dr. Krishnamurthy D as Sales Director for South, East India & Sri Lanka

Chennai, Tamil Nadu - March 1st, 2021- Novus Animal Nutrition (India) Pvt. Ltd. hired Dr. Krishnamurthy D as Sales Director South, East India & Sri Lanka. Dr. Krishnamurthy will be responsible for sales function for South, East India & Sri Lanka region reporting to Neeraj Kumar Srivastava, Managing Director – South Central Asia.

Dr. Krishnamurthy D

Neeraj Kumar Srivastava, MD of Novus Animal Nutrition (India) Pvt. Ltd., said we are very excited to have Dr. Krishnamurthy on board, his depth of experience, technical knowledge and management capabilities will complement our growing team.

###

Dr. Krishnamurthy brings with him 19 years of experience working across the sales& technical function with Provimi Animal Nutrition, India. He holds Masters in Veterinary Science and Animal Health from University of Agriculture Sciences, Bangalore. Dr. Krishnamurthy, said I am excited to join Novus International, a global leader in animal nutrition & health, which believes in adding value to customers' business through unique, innovative & sustainable solutions in animal agriculture. I look forward to driving the business in the region to even greater levels of success through honoring & patronizing the Novus's core values of "Maximize long-term customer satisfaction" and "Provide products & services with demonstrable value" to our customers.

Novus International, Inc. is a leader in scientifically developing, manufacturing and commercializing animal health and nutrition 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.

For more information, contact Reena Rani L C at reena.rani@novusint.com

PRESS RELEASE

NOVUS

Investigation finds Foreign Methionine has been illegally dumped in the U.S.

SAINT CHARLES, MO (26 February 2021) – The U.S. Department of Commerce (Commerce) this week announced its preliminary determination that methionine imports from France, Spain and Japan have been illegally dumped in the U.S.

This follows a unanimous decision on 11 September 2020 by the U.S. International Trade Commission (ITC) that there is reasonable indication that the U.S. methionine industry has been materially injured by imports sold by the three countries at less than fair value.

Novus International, Inc. filed antidumping petitions on 29 July 2020 requesting that the ITC and Commerce formally investigate methionine imports from the countries of France, Spain and Japan consistent with the World Trade Organization Antidumping Agreement. The petitions include information regarding the increase in methionine imports from 2017-2019 that led to substantial price depression and harm to the domestic methionine industry. Dumping, as an illegal activity, is taken seriously by the international trade community and governments have processes in place to ensure proper investigations occur.

"This preliminary decision confirms what we believed – that our industry has been harmed by unfair trade practices," said Ed Galo, Novus vice president and chief commercial officer – Americas. "Fair and competitive trade is critical to the health of our industry and all industries. Novus is grateful that the ITC and Commerce exists to ensure fair trade for all."

The final phase of this investigation is expected to begin next month and will conclude with the final determination regarding the injury or threat of injury to the U.S. methionine industry from unfairly traded methionine imports. If the ITC reaches a final determination that low-priced methionine imports have caused injury to the domestic industry and Commerce issues a final determination that France, Spain and Japan illegally dumped foreign products, importers from those countries may have to pay a duty on methionine imports, which would be collected by the government as a tax.

Novus is a global leader in developing, manufacturing and commercializing nutrition solutions to the animal agriculture industry. Visit www.novusint.com for more information.

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PRESS RELEASE

WELTEC BIOPOWER Builds Energy-Efficient Wastewater Treatment Unit for 33,000-PE Sewage Treatment Plant

Eco-Friendly Cost Reduction Through Anaerobic Sludge Stabilisation in Bückeburg

Following a public tender procedure, WELTEC BIOPOWER was awarded the contract for an anaerobic stage for the municipal sewage treatment plant in Bückeburg, North Germany. Apart from the earthworks and the electrical installations, the German biogas plant manufacturer will supervise the construction of the new sludge thickener, the engine room for the cogeneration power plant and the digester with its gas storage roof. Henceforth, the sludge will undergo anaerobic digestion in the stainless-steel digester. The budget for the various modernisation measures on the premises total •4.14 million. The anaerobic stage will be ready to go live in October 2021.

Until now, the sewage treatment plant with a capacity of 33,000 PE (population equivalents) has applied aerobic wastewater treatment. The conversion to anaerobic sludge stabilisation will put the entire plant on track towards economic and ecological success. The new wastewater treatment solution is set to optimise operating processes and deliver significantly higher energy efficiency. Moreover, the new process is expected to reduce the sewage treatment plant's greenhouse gas emissions by 664 t/year. Within the framework of the European Regional Development Fund (ERDF), the investment and development bank of Lower Saxony (NBank) rewards the carbon savings with a subsidy of •1 million.

Besides the ecological improvement, WELTEC's anaerobic wastewater treatment will result in a significant cost reduction. For instance, the amount of sludge that accumulates every year will go down from 2,800 t to 1,800 t. Additionally, some 5 percent of the power consumption will be saved. The greatest savings potential, however, lies in the sludge gas: „With the 465,000 kWh of power that we will gain from the sewage gas every year, we will be able to cover 40 percent of our own power demand", says Rainer Klenke. The technical manager of the wastewater operations of the municipality of Bückeburg calculates that the yearly power bill will drop by two thirds from •195,000 to •65,000.

The expertise for this optimisation concept originates from biogas technology. WELTEC BIOPOWER will implement the digester as a stainless-steel tank in the tried-and-

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tested segmental design with a double-paddle mixer. The digester will have a height of 6.3 m, a diameter of about 19 m, and a capacity of 1,823 m³. The sewage gas will be stored in the flexible double-membrane roof with a volume of approx. 600 m³. This design stands out with much lower investment costs than a conventional digester and is therefore an optimum solution for smaller wastewater treatment plants. The new static sludge thickener, which is equipped with a submersible mixer and boasts a capacity of 342 m³, is also made of stainless steel. A 226-kW CHP unit will ensure efficient utilisation of the gas. Both the generated power and the heat will be used on the plant premises. Additionally, a gas boiler with an output of 170 kW will be installed in the engine room in order to ensure the heat supply of the digester even during maintenance work on the cogeneration power plant.

The municipal sewage treatment plant will thus experience an efficiency boost thanks to technological and process-related improvements. Apart from the anaerobic stage, a primary clarifier will be newly integrated in the process. In this way, primary sludge will be extracted from the wastewater, reducing the chemical oxygen demand (COD) by a third. The lower this value, the easier the water can be treated. This reduces the aeration period in the aeration tank and thus the energy costs. Thomas Sextro, Sales Manager at WELTEC BIOPOWER, explains: „Aerobically stabilised sludge contains a higher organics load and is more difficult to dewater. With the anaerobic process, the dewatered sludge has about 35 percent less volume, which saves sludge transportation and disposal costs."

Such smart combinations of wastewater treatment, energy generation, and climate protection make existing sewa-ge treatment plants future-proof. The cost-efficient technologies and proven concepts from the field of biogas are suitable to counteract fluctuating energy prices and increasing sludge utilisation costs. In Bückeburg, for example, this enables the municipality to keep its wastewater and surface water drainage costs steady without burdening the citizens with extra fees.

Company Portrait

The **WELTEC** Group from Vechta, Germany, has developed into a globally leading specialist for the construction and operation of biogas and biomethane plants since it was founded back in 2001. The Group designs, plans and sets up energy plants, operates them on a permanent or temporary basis, provides 24/7 service and delivers sustainable usage concepts for output flows, thereby covering the entire biogas value chain.

The establishment of individual, technically mature solutions up to a plant size of 10 MW is one of the strengths of **WELTEC BIOPOWER**. The high proportion of custom-developed components is a key success factor. Moreover, the use of stainless-steel technologies ensures flexible substrate input, quick and inexpensive assembly and a consistently high quality standard, regardless of the location. Following the commissioning, **WELTEC's** mechanical and biological service plays a significant role in ensuring the plant efficiency.

The company also boasts a wealth of experience in the field of biogas generation and utilisation. The company's nine decentralised plants generate 96 million standard m³ of biogas a year. Most of it is processed to biomethane and made available to energy suppliers and petrol station operators via the public gas network. Additionally, at 16 locations in Germany– e.g. in the field of horticulture, housing construction and healthcare as well as communities – the biomethane is used for generating heat within the framework of **WELTEC** energy contracting.

The biogas specialist is well aware of the importance of customer and investor proximity. Accordingly, the Group's sales and service network spans the entire globe. The range of customers includes businesses from industries such as agriculture, food, waste and wastewater. So far, the 120 employees of the **WELTEC** Group have implemented more than 300 energy plants in 25 countries on five continents. These plants save about 485.000 tons of CO_{2eq} a year.

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NATIONAL EGG CO-ORDINATION COMMITTEE

DAILY / MONTHLY EGG PRICES DECLARED BY NECC AND PREVAILING PRICES AT VARIOUS PRODUCTION CENTRES (PC) AND CONSUMPTION CENTERS (CC) MARCH 2021

Name Of Zone / Day	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	Average
NECC Prices																																
Ahmedabad	430	430	430	433	436	438	438	438	438	438	438	410	410	400	400	400	402	405	408	410	417	412	412	412	412	412	412	412	412	-	-	418.79
Ajmer	375	381	385	386	386	376	380	380	380	381	381	381	381	374	372	367	371	380	380	374	370	370	373	375	370	370	370	372	372	-	-	376.31
Barwala	373	376	382	386	386	386	386	386	378	380	382	382	382	375	375	370	374	378	378	378	372	372	375	377	372	372	372	372	-	-	-	377.75
Bengaluru (CC)	430	430	415	415	415	415	415	415	415	400	400	400	400	400	400	380	380	385	385	385	385	385	385	385	385	385	385	390	395	-	-	398.62
Brahmapur (OD)	394	394	394	396	398	400	400	402	402	402	402	395	395	395	385	385	385	385	385	388	391	393	393	383	383	383	383	388	391	-	-	392.07
Chennai (CC)	455	430	430	430	430	430	430	430	420	420	420	400	400	400	400	385	385	385	385	385	385	385	385	385	385	385	385	385	385	-	-	403.97
Chittoor	448	423	423	423	423	423	423	423	413	413	413	393	393	393	393	378	378	378	378	378	378	378	378	378	378	378	378	378	378	-	-	396.97
Delhi (CC)	387	395	400	400	400	400	400	400	400	400	400	400	400	400	390	390	390	396	396	396	390	392	395	396	391	391	390	390	-	-	-	395.54
E.Godavari	385	385	385	387	389	391	391	391	391	391	391	381	381	381	370	370	370	370	370	372	374	376	376	365	365	365	365	368	371	-	-	378.17
Hyderabad	375	375	380	385	388	388	388	375	375	375	365	365	365	350	340	340	343	347	351	354	356	356	345	345	347	349	352	354	356	-	-	361.52
Ludhiana	380	372	376	382	384	384	384	384	384	384	384	382	382	382	376	372	369	375	378	378	375	372	372	374	374	374	371	366	-	-	-	377.5
Mumbai (CC)	455	440	425	430	435	435	435	435	425	425	425	415	415	400	400	390	390	395	400	405	405	410	410	400	400	407	410	412	415	-	-	415.31
Muzaffurpur (CC)	429	424	433	438	438	438	438	438	438	438	429	429	433	433	424	424	424	424	429	429	429	424	424	429	429	424	424	424	-	-	-	429.89
Mysuru	433	433	418	418	418	418	418	418	418	403	403	403	403	403	403	383	383	388	388	388	388	388	388	388	388	388	388	393	400	-	-	401.69
Nagpur	440	410	410	410	412	412	412	400	400	390	388	378	378	378	378	378	370	375	380	385	385	356	395	387	380	390	390	390	395	-	-	391.45
Namakkal	420	420	420	410	410	410	410	410	410	410	390	390	390	390	380	380	380	380	380	380	380	380	380	380	380	380	380	380	390	-	-	393.1
Patna	424	424	429	433	433	433	433	433	433	433	429	429	429	429	424	419	419	419	429	429	429	419	419	424	424	419	419	419	-	-	-	426.25
Pune	445	435	435	437	437	437	437	437	425	415	410	400	400	400	400	395	397	400	405	410	410	410	410	410	410	412	414	415	417	-	-	416.03
Ranchi (CC)	443	443	443	448	448	448	448	443	443	443	443	443	443	443	433	429	429	429	433	433	433	429	429	433	433	429	429	429	-	-	-	437.57
Vijayawada	395	395	395	397	399	401	401	401	401	401	401	391	391	391	380	380	380	380	380	382	384	386	386	375	375	375	375	378	381	-	-	388.17
Vizag	410	400	400	400	400	400	400	400	400	400	400	381	381	381	381	381	381	381	381	381	381	381	381	381	381	381	381	382	382	-	-	388.62
W.Godavari	385	385	385	387	389	391	391	391	391	391	391	381	381	381	370	370	370	370	370	372	374	376	376	365	365	365	365	368	371	-	-	378.17
Warangal	377	377	382	387	390	390	390	377	377	377	367	367	367	352	342	342	345	349	353	356	358	358	347	347	349	351	354	356	358	-	-	363.52
Prevailing Prices																																
Allahabad (CC)	414	410	414	419	419	414	410	410	410	414	414	414	410	405	405	395	390	395	405	405	395	395	390	390	390	395	395	395	-	-	-	404.18
Bhopal	400	400	400	400	400	400	390	390	390	390	380	380	380	382	382	375	375	375	385	385	385	385	385	385	385	385	385	-	-	-	-	387.19
Hospet	390	390	375	375	375	375	375	375	375	360	360	360	360	360	360	340	340	345	345	345	345	345	345	345	345	345	345	350	355	-	-	358.62
Indore (CC)	390	400	405	410	410	410	410	405	405	400	400	395	395	395	380	380	380	385	390	390	390	390	390	380	380	385	-	-	-	-	-	394.23
Jabalpur	410	395	400	405	405	405	405	395	395	395	390	385	387	387	387	370	370	372	374	378	379	380	380	370	373	377	381	-	-	-	-	387.04
Kanpur (CC)	400	410	410	410	410	410	410	410	410	400	400	400	400	400	390	381	381	390	395	395	395	395	395	400	400	400	400	400	-	-	-	399.89
Kolkata (WB)	424	424	424	427	430	435	442	453	453	453	453	453	440	440	430	430	430	430	433	433	435	435	435	435	435	435	435	435	438	-	-	436.38
Luknow (CC)	433	433	433	440	440	440	440	440	440	440	430	430	430	430	440	420	420	420	420	420	420	420	420	420	420	420	420	420	420	-	-	428.54
Raipur	405	395	400	410	410	410	400	400	390	385	380	380	380	380	380	365	365	365	370	375	375	375	375	375	375	375	380	-	-	-	-	384.26
Surat	455	445	445	450	455	455	455	455	455	455	455	425	425	410	415	415	417	420	423	425	427	427	427	427	427	427	427	427	427	-	-	434.41
Varanasi (CC)	427	433	440	443	443	433	433	433	433	437	440	440	440	433	433	433	433	433	433	433	423	423	423	430	430	430	430	430	-	-	-	433.04

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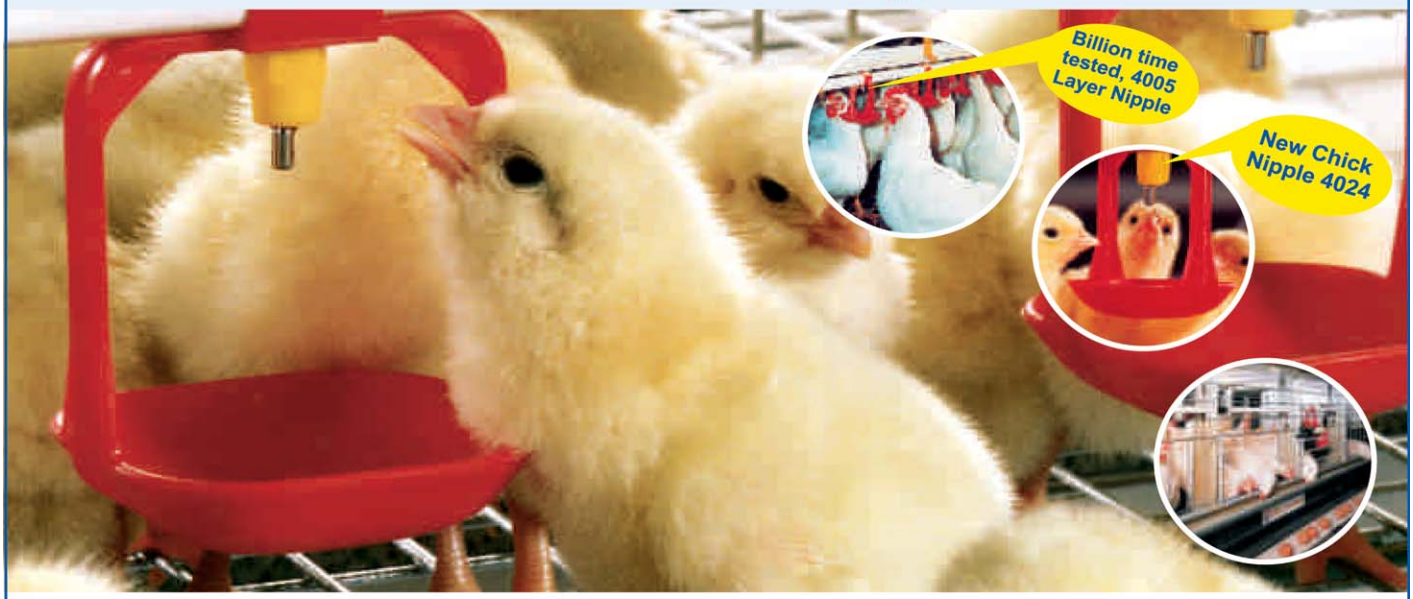

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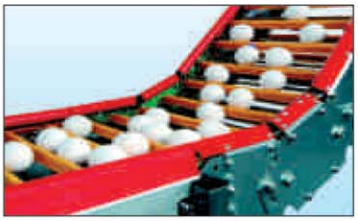

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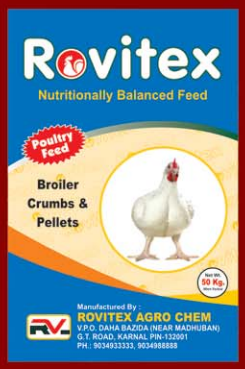

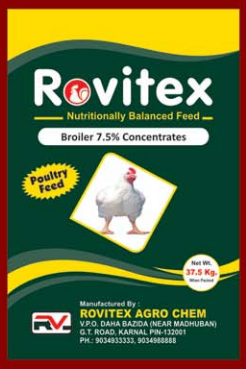

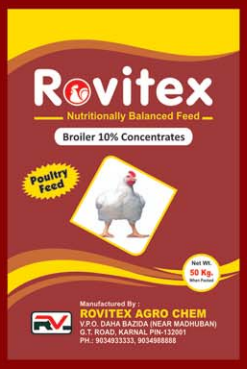

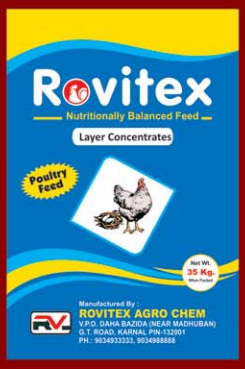

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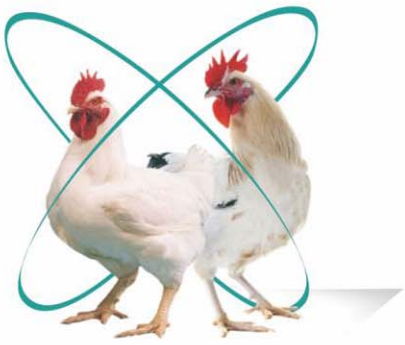

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