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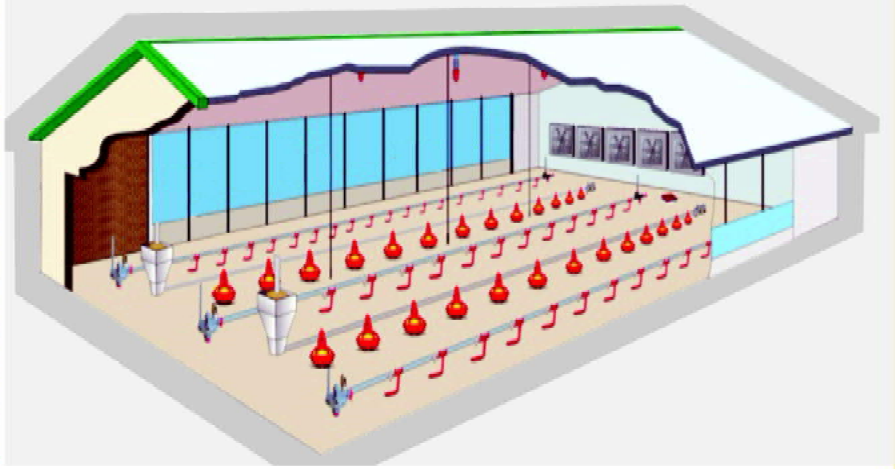

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INDEX OF ADVERTISEMENTS

Use of Azolla as feed substitute for profitable Poultry production

Rakesh Roy

Malda Krishi Vigyan Kendra, Uttar Banga Krishi Viswavidyalaya, Ratua, Malda-732205, West Bengal

Efforts are continuously made by the scientist as well as the farmers to substitute the conventional feed ingredients of poultry ration with cheap items to reduce the costs. Several studies had been done on the nutritive value of aquatic plant Azolla. At least eight species of Azolla are known all over the world, of which *Azolla pinnata* is the most common (Mathur *et al.*, 2013). Azolla is an abundantly available aquatic fern in the stagnant water of ponds, drains, rivers, canals, marshy fields and wetland paddy in tropical and subtropical countries of the world. This fern can be cultivated under natural and controlled environmental conditions (Senthilkumar and Manivannam, 2016). It is reported that the addition of Azolla in rations significantly reduces the feed cost (Sujatha *et al.*, 2013). The bio-composition of Azolla makes it one of the cheapest, economic, potential, efficient, and maintainable feed alternatives for livestock and poultry (Kathirvelan *et al.*, 2015). *Azolla pinnata* meal has long been used successfully for broiler and layer chickens (Naghshi *et al.*, 2014), ducks (Acharya *et al.*, 2015) and quails (Varadharajan *et al.*, 2019).

Composition of Azolla

Azolla is a rich and potential source of protein (25-35%), nitrogen (Lumpkin, 1984), almost all essential amino acids (7-10%) especially lysine (Van Hove, 1989), essential minerals such as iron, calcium, phosphorous, magnesium, manganese, potassium, iron and copper (10-15%), vitamins like vitamin A and vitamin B12, carotenoids, chlorophyll a and b, bio-polymers, probiotics, and growth promoting intermediates (Henry *et al.*, 2017). Thus, Azolla is considered a significant source of nutrients.

Effect on production performance by Azolla supplementation

Azolla supplementation to Broiler chickens

The supplementation of Azolla to the poultry diet reduces production cost. Azolla is inexpensive and unconventional plant protein source that improves FCR, energy efficiency, and performance with no adverse effects on livestock, poultry, and humans (Namra *et al.*, 2010). Although there are inconsistent results, the majority of the data show enhancement of production and reproduction of livestock and poultry fed with diet containing Azolla. Many studies have demonstrated the efficiency of using Azolla at different replacement concentrations in the ration of broiler chickens. However, Ali and Leeson (1995) found that feeding of broilers on Azolla resulted in similar body weight and growth like those kept on a maize-soybean meal. Sarria and Preston (1995) also found better broilers growth when soybean protein was replaced by Azolla up to 15% level. Sundararaju *et al.* (1995) found that the addition of Azolla, Sesbania, and Leucaena to broiler chicken diet at a level of 6% considerably enhanced the body weight at 4, 6 and 8 weeks of age. Seth *et al.* (2013) found an increase in efficiency at 5-15% Azolla level in the ration of broilers, while Naghshi *et al.* (2014) and many other researchers had found this improvement at 5% level. Incorporation of Azolla up to 5% as a feed ingredient to replace sesame meal in the ration of 2-6-week-old broilers improved growth rate, FCR, and energy efficiency without deleterious effect on palatability and mortalities (Basak *et al.*, 2002), along with promising economic returns (Parthasarathy *et al.*, 2002). It was found that *Azolla pinnata* meal can be safely included up to 15% (Samad *et al.*, 2020) and 10% level (Saikia *et al.*, 2014) in broiler diet by with no health issues. Incorporation of the concentrate feed with Azolla at 7.5% level resulted in an increase in the body weight up to 2.6% (1.99 kg) in comparison to control diet (1.93 kg). A significant difference in the feed intake was observed when Azolla increased up to 15% (Querubin *et al.*, 1986) up to 30% (Dhumal *et al.*, 2009) in the diet. However Ara *et al.* (2015) found a

linear reduction in feed intake with increasing Azolla levels in the diets of broiler chickens. Saikia *et al.* (2014) reported that the highest body weight gain in broiler when supplemented with 5% Azolla while lower when fed with 15% level and further they explained that with increasing fiber content in high concentrations of Azolla negatively affects the appetite of the birds and consequently reduces the growth rate. The decrease in the consumed feed may be due to reduced palatability (Bested and Morento, 1985) and increased bulkiness of Azolla (Bacerra *et al.*, 1995) which reduces its utilization. The addition of dried Azolla to Vencobb broilers ration can be used safely up to 5% without any adverse effects, however, 2.5% addition level of Azolla is effective in improving both growth and biochemical parameters (Rana *et al.*, 2017). It was revealed that inoculation of Azolla at levels of 5% or 7% is appropriate for safe and profitable production of broilers due to reduced FCR, mortalities, and production costs, as well as improved net profit (Islam and Nishibor, 2017). The addition of Azolla to the basal ration could enhance FCR without any unfavorable effects on blood biochemistry and immune parameters (Shukla *et al.*, 2018). However, there are some researchers who have found no or low effects of Azolla supplementation on poultry production performance. Higher dressing percentage of broiler chicken with giblet percentage at 15% was reported in the treatment group fed on 5% Azolla (Basak *et al.*, 2002) and this development was attributed to the higher body weight gains. Feeding on 5% Azolla powder considerably improved the carcass yield percentages of broiler chicks, while lowest yield percentage in case of 15% Azolla supplemented group (Naghshi *et al.*, 2014).

Azolla supplementation to improved dual purpose poultry

Seth *et al.* (2013) noticed better weight gain in Vanaraja chicken fed on 5% or 10% Azolla over control. Boitai *et al.* (2018) that Azolla meal can be included up to 10% in the diet of Vanaraja laying hens with no loss in production and quality of egg. Joshi *et al.* (2020) reported that supplementation of 200 g/bird/day of fresh Azolla along with foraging in backyard poultry like Vanaraja was helpful in improved weight gain, early achievement of market weight which improves the net profit and thereby the B: C ratio.

Azolla supplementation to ducks

Azolla as an unconventional nutrient source could be added by 10% to the basal diet of white Pekin broiler ducks (Acharya *et al.*, 2015). No variation in the production effectiveness was found among different groups after partial ration replacement of growing Muscovy ducks with Azolla at levels of 20, 30, and 40% (Escobin, 1987). In addition, 15% substitution of soybean meal with Azolla improved the daily weight gains of ducks (Bacerra *et al.*, 1995), however the growth rate was reduced at 20, 45, or 60% of Azolla (Sujatha *et al.*, 2013) and at levels of 75 or 250 g/bird/day decreased the FCR of Mallard ducks (Lawas *et al.*, 1998). Addition of 15 to 60% Azolla in diet providing 15.2-30.3% of the total protein, the FCR reduced with increasing Azolla intake (Bacerra *et al.*, 1995).

Azolla supplementation to quails

Lakshmi *et al.* (2019) reported that Azolla meal (up to 6%) could be incorporated in laying quail's ration without affecting the performance and egg quality parameters. Shamna *et al.* (2013) reported that feeding of quails on Azolla at 5% replacement level of the basal ration enhanced the growth and FCR, also it was more profitable than feeding on basal diet alone. Varadharajan *et al.* (2019) reported that Azolla meal up to 6% can be included in quails diet without affecting feed consumption and carcass traits. Rathod *et al.* (2013) reported non-significant effects of Azolla supplementation on feed consumption of Japanese quails.

Azolla supplementation to turkey

Henry *et al.* (2017) in their study concluded that supplementation of Azolla at 30 g per turkey per day along with concentrate feed from 7 to 16 week of age found to have better feed efficiency without any adverse effect on the production performance

and has positive impact on performance in terms of body weight, livability and net returns per bird. Therefore, fresh Azolla may be incorporated in the diets of turkey to make the turkey production more profitable.

Shukla *et al.* (2018) reported that choice feeding with Azolla and basal diet may improve FCR without any adverse effect on blood biochemical attributes and immune competence traits.

Azolla supplementation to layer chickens

Ali and Leeson (1995) found that adding Azolla powder to chicken feed significantly improved the carotene status of the chicken and increased egg production. Khatun *et al.* (1999) explored that substitution of sesame oil in the layers ration by Azolla 200 g/kg and reported good egg mass output and FCR. Similarly, higher egg production noticed after inclusion of Azolla @100 g/bird/day (Kannaiyan and Kumar, 2005). Lakshmanan *et al.* (2017) stated supplementation of Azolla in layers diets resulted in increasing egg production, improving the nutrient value as well as saving the concentrated feed. The positive effect of Azolla on eggshell strength was referred to the high calcium content of Azolla which consists of minerals especially calcium carbonate that deposits in the organic matrix (Austic and Nesheim, 1990).

Conclusion

Azolla species which is available cheaply can be used as a source of protein and other essential nutrient elements for poultry species by reducing feed cost and thereby making poultry production more profitable.

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DAILY / MONTHLY EGG PRICES DECLARED BY NECC AND PREVAILING PRICES AT VARIOUS PRODUCTION CENTRES (PC) AND CONSUMPTION CENTERS (CC) JANUARY 2022

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	534	534	534	534	520	510	510	510	510	510	510	510	510	500	500	500	500	500	500	475	465	465	465	465	465	465	465	465	465	468	471	494.68
Ajmer	503	503	500	480	480	474	474	477	480	480	480	472	472	465	465	470	470	470	465	460	460	462	467	470	470	460	460	456	456	452	452	471.13
Barwala	502	502	502	483	483	470	470	475	477	477	477	477	471	463	463	467	467	467	467	457	457	460	466	470	470	470	470	458	454	454	454	470.97
Bengaluru (CC)	515	515	515	515	515	500	480	480	465	470	470	470	470	470	470	470	470	470	455	455	440	440	440	440	440	440	440	440	440	455	455	468.06
Brahmapur (OD)	508	508	508	493	493	493	483	483	483	483	483	483	483	473	473	473	466	460	450	450	440	440	433	433	433	433	433	433	418	428	433	464.06
Chennai (CC)	520	520	520	520	520	505	490	490	475	475	475	475	475	475	475	475	475	475	465	465	445	445	445	445	445	445	445	445	445	460	460	473.87
Chittoor	513	513	513	513	513	498	483	483	468	468	468	468	468	468	468	468	468	468	458	458	438	438	438	438	438	438	438	438	438	453	453	466.87
Delhi (CC)	525	525	525	515	505	505	495	495	500	500	500	500	500	495	485	485	490	490	490	490	482	482	485	490	490	490	490	490	480	477	477	495.1
E.Godavari	480	480	480	470	470	470	460	460	460	460	460	460	460	452	452	452	445	445	437	437	427	427	420	420	420	420	420	420	405	410	415	444.97
Hyderabad	471	471	471	460	450	440	440	440	440	442	442	442	435	435	435	435	435	435	425	415	415	405	405	405	405	405	405	405	408	411	416	430.45
Ludhiana	501	501	501	491	481	481	475	475	476	476	476	476	470	470	465	465	467	467	459	459	459	459	461	469	469	469	461	461	454	454	454	471.03
Mumbai (CC)	535	535	535	535	525	515	505	505	505	505	505	505	505	500	500	500	500	500	500	490	480	480	470	470	470	470	470	470	470	473	476	496.9
Muzaffurpur (CC)	552	552	552	552	538	533	533	529	524	524	524	524	524	524	519	519	519	514	514	510	507	507	507	514	514	514	510	505	495	500	495	520.9
Mysuru	515	515	515	515	515	500	475	460	460	465	465	465	465	465	465	465	465	460	450	450	435	435	435	435	435	435	435	435	435	450	450	463.39
Nagpur	515	515	520	515	500	480	460	480	480	480	480	490	490	480	480	480	470	475	475	465	445	445	445	445	445	445	445	435	435	435	435	470.48
Namakkal	505	505	505	505	505	480	480	460	460	460	460	460	460	460	460	460	450	450	450	430	430	430	430	430	430	430	430	430	440	440	460	457.58
Patna	548	548	543	543	533	529	529	524	519	519	519	519	514	514	514	514	510	505	505	500	500	500	495	495	495	495	486	486	481	481	481	511.1
Pune	525	527	527	527	520	510	500	505	505	510	510	510	510	500	500	500	500	500	500	490	480	480	475	475	475	475	475	475	475	475	480	497.29
Ranchi (CC)	552	552	548	548	538	533	533	533	533	533	529	529	529	524	524	524	519	514	514	510	510	510	510	510	505	505	505	505	500	495	495	521.58
Vijayawada	490	490	490	480	480	480	470	470	470	470	470	470	470	462	462	462	455	455	447	447	437	437	430	430	430	430	430	430	415	420	425	454.97
Vizag	500	500	500	475	475	475	460	460	460	460	460	460	460	460	460	460	450	450	450	450	435	435	425	425	425	425	425	425	425	425	430	452.42
W.Godavari	480	480	480	470	470	470	460	460	460	460	460	460	460	452	452	452	445	445	437	437	427	427	420	420	420	420	420	420	405	410	415	444.97
Warangal	473	473	473	462	452	442	442	442	442	444	444	444	437	437	437	437	437	437	427	417	417	407	407	407	407	407	407	407	410	413	418	432.45
Prevailing Prices																																
Allahabad (CC)	538	538	533	524	519	519	509	509	514	514	509	505	500	490	486	486	486	486	486	486	475	471	467	467	467	467	467	467	457	472	476	493.58
Bhopal	510	510	510	510	500	495	490	480	490	495	495	495	495	495	480	480	480	480	480	460	445	445	445	445	445	445	445	445	450	450	455	475.65
Hospet	475	475	475	475	475	460	440	440	425	430	430	430	430	430	430	430	430	430	415	415	400	400	400	400	400	400	400	400	400	415	415	428.06
Indore (CC)	510	510	510	490	480	490	490	485	490	490	490	490	480	470	465	465	465	465	460	450	450	465	465	440	440	435	435	435	440	445	450	469.19
Jabalpur	511	511	500	500	492	482	477	477	482	483	483	483	483	473	473	473	473	473	455	455	445	445	445	445	446	446	435	435	437	441	453	468.13
Kanpur (CC)	529	529	538	519	519	519	519	505	505	505	505	505	505	495	495	495	495	495	495	495	495	476	476	476	476	476	476	476	476	476	476	497.48
Kolkata (WB)	540	550	550	550	550	540	540	540	530	530	525	525	525	520	520	515	505	505	505	495	490	490	480	480	475	475	475	475	478	488	495	511.65
Luknow (CC)	560	560	550	550	543	543	543	533	533	533	533	533	527	527	527	527	527	527	527	527	520	517	517	517	517	517	517	517	510	507	507	528.81
Raipur	520	520	520	520	500	500	500	490	490	495	495	495	495	485	485	480	480	480	465	465	455	440	440	443	443	443	443	443	443	443	447	476.23
Surat	535	535	535	535	525	515	515	515	515	515	515	515	515	510	510	510	510	510	500	485	470	470	470	470	470	470	470	470	470	473	476	499.97
Varanasi (CC)	567	567	567	557	547	547	547	547	533	533	533	533	533	523	517	517	517	517	517	517	507	500	500	500	500	500	500	500	490	500	500	523.65

Technical Bulletin 1

VAXXITEK HVT+IBD

VAXXITEK® HVT+IBD, Boehringer Ingelheim's first HVT vectored IBD vaccine: first steps after the 2006 launch

VAXXITEK HVT+IBD, Boehringer Ingelheim's live vector vaccine against MD and IBD is safe and protects effectively against two major immunosuppressive diseases that significantly impact the poultry industry, Marek's Disease (MD) and Infectious Bursal Disease (IBD). VAXXITEK HVT+IBD is effective in preventing infection by a wide range of IBD viruses, including classical, variant and very virulent strains. It can be administered in-ovo or to 1-day-old chicks by sub-cutaneous injection in the hatchery, regardless of maternal antibody status: it induces an active immune response against both IBD and MD even in the presence of high levels of maternal antibodies, and eliminates the immunity gap observed with all conventional modified live vaccines (MLVs). VAXXITEK HVT+IBD confers early and sustained protection against both diseases to broiler and layer chickens. By protecting immune system integrity, it protects from a variety of infectious diseases. Flocks vaccinated with VAXXITEK HVT+IBD have lower mortality, better growth performance and increased return on investment. Vaccinated and protected chickens can be distinguished serologically from infected birds.

1. VAXXITEK

Marek's Disease (MD) and Infectious Bursal Disease (IBD), also called Gumboro disease, are the two most common immunosuppressive viral diseases that affect the poultry industry. MD is a common lymphoproliferative disease caused by a herpesvirus (Marek's Disease virus or MDv). Control of Marek's disease has been achieved in the poultry industry since the 1970's with the large-scale use of turkey herpesvirus (HVT) vaccines. Infectious bursal disease is a highly contagious infection of chickens caused by a birnavirus (IBDv) that destroys lymphocytes in the bursa of Fabricius (BF). Although it was first recognized more than 40 years ago, IBD still causes significant economic losses in the poultry industry worldwide. In the late 1980's a very virulent strain of IBD (vvIBD) emerged in vaccinated flocks in Europe and rapidly spread across the globe.

IBD mainly affects young chicks up to 6 weeks old, depending on their level of maternal immunity against the disease. The clinical form of IBD usually occurs in chickens from 3 to 6 weeks of age with a sudden onset and rapid increase of mortality rate. The most frequent and economically important form of the disease is subclinical and occurs in chickens less than 3 weeks of age. They present no clinical signs of disease, but experience permanent and severe immunosuppression, reduced antibody response to vaccination and increased susceptibility to concurrent or secondary infections.

2. VAXXITEK HVT+IBD, the first HVT vectored vaccine

2.1. IBD vaccination, a challenging issue

A new vaccine, VAXXITEK HVT + IBD, combines the advantages of a live vaccine against IBDv without its safety problems and allows for early vaccination against both MD and IBD viruses (including classic, variant and very virulent IBD strains).

Early protection of chicks is key in preventing IBD; this can be achieved through passive protection which is obtained by vaccinating breeding hens with inactivated IBDv vaccines. Maternal antibodies (MDAs) are transmitted to the progeny through the egg yolk to provide protection to chicks for the first few weeks of life, and then titres decline. Protection against IBDv must then be maintained by administering modified live vaccines (MLVs).

However, MDA levels are highly variable and the delicate balance between efficacy and safety of MLVs remains an unsolved issue (Figure 1). Since high levels of MDAs at the time of vaccination neutralize the vaccine virus, chicks are generally vaccinated at 2-3 weeks of age, a time when MDAs reach sub-protective levels. Then, approximately 10 to 12 days after vaccination are required to develop minimal protective titres, leaving an immunity gap between approximately 15 and 28 days of age, during which chicks are susceptible to IBD.

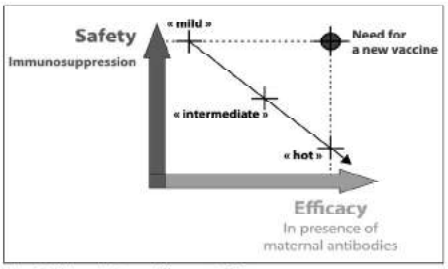

Figure 1 - Balance between efficacy and safety.

Various MLVs have been developed and classified as "mild", "intermediate" and "hot" IBD vaccines. Mild vaccines are safe in specific pathogen-free (SPF) chickens, but their efficacy in the presence of anti-IBDv MDAs is poor. Protection provided by "intermediate" and "hot" vaccines is much higher, but these vaccines retain some pathogenicity: they induce bursal lesions (2).

Co-administration of live MD and IBD vaccines as early as possible (ie. in day-old chicks or in-ovo) has been proposed in order to induce early protection against both immunosuppressive diseases, however this approach has been hindered by the safety/efficacy problem (7).

2.2. VAXXITEK HVT+IBD: The HVT vector concept

VAXXITEK HVT+IBD is a live vector vaccine in which turkey herpesvirus (HVT), the most widely used MD vaccine on the market, is used as a vector expressing an IBDv antigen (VP2) (3). The HVT vaccine is well-known to be safe and poorly sensitive to interference from MDAs. VP2 is one of the major structural proteins of the virus, and the major host-protective antigen to IBDv, containing at least three independent epitopes responsible for the induction of neutralizing antibodies.

The vector vaccine strain is obtained by insertion of the IBDv VP2 gene from the Faragher 52/70 strain into the HVT virus. Its expression during vector replication triggers an immune response that protects against all types of IBDv strains (classic, variant and very virulent strains) (8). Since no IBDv gene responsible for bursal lesions is present in the vector, VAXXITEK HVT+IBD is safe, and can be administered by subcutaneous injection in 1-day-old SPF chicks or by the in ovo route during transfer from setters to hatchers in the hatchery, between 18 and 19 days of embryonation. No visible gross pathological changes or significant microscopic lesions of the bursa have been observed up to 35 days after vaccination of 1-day-old chicks (2).

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3. VAXXITEK HVT+IBD: High efficacy demonstrated in experimental studies

3.1. Preventing the immunity gap

Delivered at 1 day of age, when MDA levels are at their highest, VAXXITEK HVT+IBD induces an efficient and early immune response both in broilers and pullets under experimental conditions as well as in the field. Studies show that no immunity gap occurs during the 3-5 weeks of age period, the most critical time for IBDv field challenge. On the contrary, an immunity gap has been observed in birds vaccinated with a registered MLV administered at the ages of 17 and 24 days (2,6,8,9) (Table 1).

Full protection against bursal lesions induced by challenge with classical IBD or IBD variant viruses have been observed as soon as one week after vaccination of broilers (2).

3.2. Period of susceptibility-lasting protection against experimental IBDv exposure

The immune response induced by VAXXITEK HVT+IBD provides early protection against IBDv that lasts during the whole period of susceptibility to the IBDv. Protection refers to the prevention of mortality and the reduction of clinical signs, as well as lesions due the IBD viruses depending upon the context of the clinical studies.

The immunity conferred by VAXXITEK HVT+IBD is long lasting, without need for booster vaccination (5). Massi *et al.* observed high antibody titres at 6 weeks of age in brown commercial pullets vaccinated with VAXXITEK HVT+IBD at one day of age, which was not the case for pullets vaccinated with conventional MLVs (8).

In a study by Goutebroze *et al.*, broilers vaccinated at 1 day of age with VAXXITEK HVT+IBD were fully protected against vvIBDv challenge either at 3 or 6 weeks of age, while 70% of the controls were severely affected (5) (Table 2a). Massi *et al.* found that pullets were also fully protected against vvIBDv challenge at 6 weeks of age; no clinical signs, no gross lesions and no mortality cases were observed in 15 pullets vaccinated with VAXXITEK HVT+IBD, while 1-2 mortality cases were observed in similar groups of chickens vaccinated with commercial MLVs (Table 2b). Parameters reflecting IBD induced immunodepression, like bursa weight and bursa-to-body weight ratios, were only slightly impacted in the VAXXITEK HVT+IBD group, while they were dramatically decreased in other groups (8).

3.3. Efficient protection against a large range of IBDv strains

VAXXITEK HVT+IBD protects chickens against a broad range of IBDv field strains, including vvIBD and classical IBD, and against IBD variant viruses. Laboratory tests showed that 95 to 100% of chickens vaccinated either in ovo or at one day of age were protected against challenge with various IBDv strains: the USDA (STC) isolate, the homologous Faragher 52/70 strain, the French vvIBDv strain (91168), a vvIBDv Italian field isolate and a US variant E strain. Protection was evaluated either by observing gross bursal lesions 4 days post-challenge (STC), by scoring microscopical lesions of the bursa (52/70 and 91-168), by measuring the bursa lesion score (Italian isolate) or by measuring the bursa-to-body weight ratio 10 days post-challenge (variant E) (2,5,8) (Table 3).

3.4. Bursal protection

Since VAXXITEK HVT+IBD only triggers the expression of the IBDv VP2 gene, it does not express any gene responsible for IBDv pathogenicity: it does not induce bursal lesions in contrast to conventional MLV vaccines, even those with intermediate strains.

Several experimental studies have shown that vaccination with VAXXITEK HVT+IBD protects the integrity of the bursa of Fabricius, the main target of IBDv. After challenge with various IBDv strains, bursal characteristics of vaccinated broilers and pullets (size, weight, presence of microscopic or gross lesions) have been shown to be unchanged or better than those of unvaccinated birds or birds vaccinated with MLV vaccines (2,5,8) (Table 3).

	Trial	Immunity	Reference
Broilers	Experimental conditions	Persisting plateau of high levels of seroneutralizing anti-IBDv antibodies reached at about 6 weeks of age	Bublot *et al*, 2007
	Field conditions	Active immune response at 3-4 weeks of age / immunity gap in control birds vaccinated with a registered attenuated intermediate IBD vaccine	Le Gros *et al*, 2009
Broilers & pullets	Field conditions	Active and strong anti-VP2 response observed from 15 days of age	Prandini *et al*. 2008

Table 1 - Onset and persistence of immunity after VAXXITEK HVT + IBD vaccination at 1 day of age.

Experimental conditions Broilers	Protection against challenge with the vvIBDV 91-168 strain	
	Challenge at 3 weeks of age 20 broilers	Challenge at 6 weeks of age 20 broilers
VAXXITEK HVT + IBD (at 1 day of age) Antibody titre (maternal) = 1:8910	Full protection	Full protection Antibody titre = 1:1890
Controls	30%	30% Antibody titre = 1:18

Table 2a – Protection provided by vaccination of broilers with VAXXITEK HVT + IBD against experimental challenge (adapted from Goutebroze *et al*, 2003).

Experimental conditions Pullets	Challenge with a vvIBDv field Italian strain at 6 weeks of age	Clinical signs of IBD	Mortality rate
VAXXITEK HVT + IBD	Yes	0/15	0/15
"Intermediate" vaccine A	Yes	2/15	2/15
"Intermediate" vaccine B	Yes	2/15	2/15
"Intermediate plus" vaccine C	Yes	2/15	1/15
Unvaccinated, challenged	Yes	15/15	2/15
Unvaccinated, unchallenged	No	0/15	0/15

Table 2b – Protection provided by vaccination of pullets with VAXXITEK HVT + IBD against experimental challenge (adapted from Massi *et al*, 2008).

	Challenge strain	Parameter evaluated	Results	Reference
Broilers	**vvIBD 91168 strain**	Size of bursa of Fabricius	Significantly bigger bursa at necropsy than unvaccinated controls	Goutebroze *et al*, 2003
SPF		Presence of microscopic lesions	No microscopical lesions (lesions in 70% of controls)	Bublot *et al*, 2007
SPF	**STC strain**	Presence of gross bursal lesions	No gross bursal lesions detected 4 days after challenge, no matter the time of challenge	Bublot *et al*, 2007
SPF	**variant E strain**	Bursa-to-body weight ratio	Higher bursa-to-body weight ratio 10 days after challenge when compared to unvaccinated challenged controls	Bublot *et al*, 2007
Pullets	**vvIBDv field Italian isolate**	Average bursa lesion score	Significantly lower bursa lesion score 11 days after challenge, compared to birds vaccinated with MLV strains	Massi *et al*, 2008

Table 3– Broad protection and preserved bursa integrity upon vaccination with VAXXITEK HVT+IBD.

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4. Improved performance with VAXXITEK HVT+IBD vaccination

4.1. Mortality and bursal protection

The field performance of VAXXITEK HVT+IBD has been demonstrated in various field trials in broiler flocks. A field trial in Asia found only low-grade bursal lesions post-vaccination, confirming that the VAXXITEK HVT+IBD vaccine is safer than conventional vaccines in the field. The same trial showed that flocks vaccinated with VAXXITEK HVT+IBD were better protected against naturally occurring infection after vaccination than flocks vaccinated with classical IBD vaccines: no clinical IBD was observed in these historically positive farms after vaccination with VAXXITEK HVT+IBD (1).

In field trials conducted in Asia and in South America, where classical, vvIBD and variant strains have been reported, mortality in broiler chickens vaccinated with VAXXITEK HVT+IBD was found to be much lower than in control birds vaccinated with MLVs (1,4). In the Asian trial, bursa size, bursa weight and bursa-to-body weight ratio were found to be higher, and bursal lesion scores lower, in flocks vaccinated with VAXXITEK HVT+IBD than in flocks vaccinated with classical IBD vaccines; mortality was higher in former flocks vaccinated with conventional IBD vaccines (1) (Figure 2).

4.2. Growth performance

VAXXITEK HVT+IBD contributes to the development of a strong immune system and a decreased risk of respiratory problems noticed during field trials. Immune integrity results in increased production performance of the flock, as energy from feed is utilized for growth rather than fighting off diseases. In broiler production, an improvement in production performance translates into a higher economic benefit.

Growth parameters of VAXXITEK HVT+IBD birds vaccinated in the field have consistently been found to be better than those of control groups with higher mean body weight, lower feed conversion ratio and lower mortality (4). In the Asian trial, both lifetime average live weight and feed conversion ratio were favourable for flocks vaccinated with VAXXITEK HVT+IBD (1) (Figure 3).

4.3. Return on investment

In field trials conducted in South America, the use of VAXXITEK HVT+IBD resulted in increased productivity and economic benefits (4). The Asian trial showed that, in practice, the use of VAXXITEK HVT+IBD in farms translates into an increased average daily gain, a higher European Performance Index (EPI) and decreased feed cost per bird, compared to the use of classical IBD vaccines. This data provides evidence that the use of VAXXITEK HVT+IBD is cost effective, as shown by a computed cost advantage per bird observed in all study farms. (1) (Table 4).

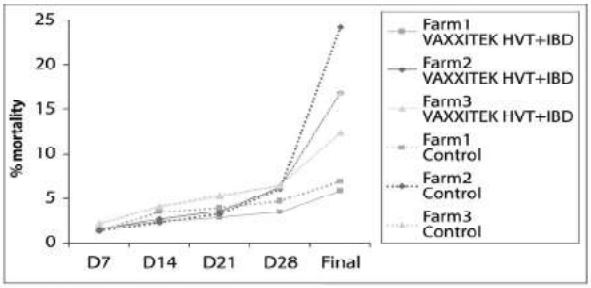

Figure 2 - Mortality monitoring - Asia trials

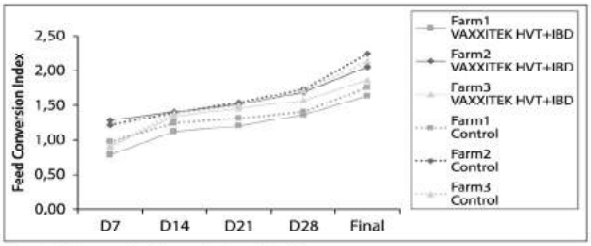

Figure 3 - Feed conversion index monitoring - Asia trials

	Farm 1		Farm 2		Farm 3	
	VAXXITEK HVT+IBD	Control	VAXXITEK HVT+IBD	Control	VAXXITEK HVT+IBD	Control
Average daily gain (g)	48.49	48.25	37.52	35.57	50.33	47.81
European Performance index	287.25	261.44	156.22	124.30	240.27	190.11
Feed cost per bird (US $)	$ 1.19	$ 1.31	$ 1.23	$ 1.28	$ 1.50	$ 1.69
Computed cost advantage per bird (US $)	$ 0.13		$ 0.19		$ 0.27	

Table 4 – Return on investment following vaccination with VAXXITEK HVT+IBD (adapted from Atienza *et al*, 2008)

5. Vaccination monitoring and diagnosis of field infection

Antibody profiling of flocks is critical for assessing vaccine efficacy and antibody persistence and diagnosing field infections that could have dramatic consequences. However, classical IBD ELISA tests do not easily allow for differentiation between infected chickens and chickens vaccinated with MLVs. This is a problem, particularly when bursal lesions are observed. A way to distinguish vaccinated from infected birds is to perform RT-PCR on IBDv strains responsible for the bursal lesions.

With the use of the VAXXITEK HVT+IBD vaccine, it is possible to differentiate susceptible, immunized and infected chickens on the basis of the anti-IBDv antibody response obtained by a test that uses two ELISA kits:
1) a classical full virus antibody detection kit and
2) a specific anti VP2 antibody detection kit. The classical full virus IBD Ab test kit detects antibodies mainly against the VP3 antigen, present in field viruses as well as modified live vaccine viruses, but not in the VAXXITEK HVT+IBD vaccine; the specific anti-VP2 IBD Ab kit detects more specifically antibodies raised against the VP2 antigen, which is expressed by all IBDv field and vaccine viruses. This test kit is very sensitive and highly correlates with the virus neutralization test that accurately reflects the protection against IBDv.

This test has been used in the field to monitor the appearance of protective antibodies after vaccination, with no risk of interference with infection-induced antibodies, and to show the absence of an immunity gap (6).

This approach has been successfully used in commercial broiler and pullet flocks in several countries (France, Italy, Hungary) and allowed for differentiation of chickens vaccinated with VAXXITEK HVT+IBD from IBD-infected chickens (9).

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NOVUS

Winter management in poultry farming

Dr Milind Rainchwar, Technical Service Manager – South Central Asia, Novus International

Dr Milind Rainchwar

Poultry rearing is an art as well as a science and management plays most crucial role in deciding profitability of this business. It has been observed in past several years that high market rates of broiler meat & eggs are observed only in those times when rearing is very difficult due to harsh climate and thus, demand is more than supply. Therefore, it is very important to understand and implement the best management practices in such harsh climate.

Every region in India has different climatic challenges and variable climate extremes and thus management practices differ between different parts of country. But almost all parts of India experience three to five distinct seasons across the year.

Winter is one of the seasons which presents very harsh temperature extremes and maintaining liveability and production becomes very difficult without taking extra measures.Management in winter is very difficult and often described as double edges sword, as a very perfect balance is required between climate management and ventilation management. Similarly, a very careful decision making is required to reduce cost of production and to provide healthy environment at the same time. It requires ample of experience to understand the economic feasibility of cost involving management practices.

Chickens are unable to maintain body temperature in young age and although they improve their tolerance to cold with age, they cannot perform well when ambient temperature drops below 20 degrees Celsius and start exhibiting stress and drop in productivity. Failure to provide optimum temperature very frequently results in high mortality, high disease incidence and drop in performance.

Although ways of practicing the management in harsh climate may differ slightly across region, the basic principles remain same. Below listed are few basic principles which may guide proper decision making.

- Proper temperature and humidity suitable for the age is always required
- Proper ventilation to provide fresh air and removing gases inside house is always required
- The rearing surface and bedding material should be always warm and dry
- The drinking water should be maintained at suitable temperature to promote water intake

- The feed & feeding practice should help bird to maintain their body temperature, metabolism, and osmo-regulation

To achieve these goals, following practices are implemented across country

- External heat source is provided to keep the poultry shed warm and dry
- False ceiling is often used to reduce the volume of shed
- Various types and layers of curtains and jute bags are used to insulate the farm
- Round brooding is often practiced when spot heating is done

As stopping the air flow becomes necessary to maintain temperature, it is very difficult to remove the gases like ammonia and to keep bedding material dry in winter. These challenges affect the respiratory, hepatic, and gut health directly.

The wet litter and humid conditions provide a very suitable environment for gut pathogens like Coccidiosis and Clostridium. The stressed and immunosuppressed birds become easy target for these gut pathogens and therefore, very high-performance losses are observed due to poor gut health. It is a well-known fact that body only gets that part of nutrition, which gut retains. An unhealthy gut loses a lot of nutrients which are necessary for weight gain and egg production. The major part of poultry immune system is also situated in gut. Thus, healthy gut is key to a developed immune system.

While managing good managemental practices, essential needs such as Proper feed and water is an utmost need to optimise performance during this difficult time. Gut health compromise always leads to poor performance and thus loss in business. Different fed additives play crucial role in maintaining and improving gut health such as Protease, NSPase Enzyme, Probiotics, Essential oils, Organic Acids, etc.

Serine Protease, A broad spectrum protease when added in the feed improves the digestibility and absorption of Amino acids which otherwise are the food for pathogens in the hind gut like Clostridium, Salmonella, etc. This Protease thus enables the improved digestion of Nutrients and reduces the pathogenic load and helps to improve litter condition.

Serine protease has other benefits as well. It has good impact on neutralisation of trypsin inhibitor, an Antinutritional factor in Soybean. Use of Serine Protease also helps to reduce the allergen proteins like Lectins, B Conglycinin by significant amount which otherwise causes the gut irritation. Hence, Proper use of Protease in winter leads to improved litter quality with better absorption of nutrients.

NSPase when added in the feed improves the absorption of nutrients and helps to reduce wet litter condition. Improvement in litter quality leads to the less damage by pathogens.

Organic Copper has the strong impact on litter quality in winter (copper is antifungal in nature). It helps to improve the Clostridium cluster IV & XIVA which are responsible to increase the Lactobacillus count in the gut and maintains or improve microflora through competitive expulsion. This, then enables to improve the litter quality.

Organic Acids such as Coated Benzoic acids helps not only to reduce pathogenic bacteria such Clostridium, Salmonella as well they help to improve Lactobacillus count in gut through increase in Clostridium clusters IV and XIVA which are responsible for Increase in Lactobacillus count.

Essential oils are considered primarily Digestive enhancers apart from their immune function. They help to digest the nutrients in early stages effectively where endogenous enzyme is not active fully. Also, they impede quorum sensing, thus acts as Antibacterial in nature too.

Addition of God organic Acids such as formic Acids, Propionic acids in water to keep water acidification at par is key to improve water quality. Water intake is always a concern in winter. Thus, Effective use of Organic acids along with water Sanitisers to improve water quality and intake should always be considered in winter season.

Below are some pics showing the brooding in Winter and Impact of Winter on gut Health if not managed well…

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PRESS RELEASE

NOVUS

Novus to Debut new Booth, Research at IPPE

SAINT CHARLES, MO (January 20, 2022) – Novus International, Inc., is bringing new research and a new look to the International Production and Processing Expo (IPPE), January 25-27, at the Georgia World Congress Center in Atlanta, Georgia.

As a global leader in health and nutrition solutions for the animal agriculture industry, Novus has been a long-time supporter of IPPE. The event in 2021 was held virtually due to the COVID-19 pandemic and Ed Galo, Novus vice president and chief commercial officer for Americas & EMEA said he and his colleagues are excited about this year's in-person show.

"This is an industry built on relationships. There's something about face-to-face conversation that fosters relationship-building in a way that a computer screen cannot match. We're very excited to be back in Atlanta for IPPE," Galo said.

IPPE attendees can meet with company representatives at the revamped Novus booth, #8139 in Hall B, during the Expo. Representatives will be on-hand to share how Novus trace mineral, eubiotics, enzyme, and methionine solutions can positively impact animal protein production.

Researchers will showcase Novus solutions during the International Poultry Scientific Forum (IPSF), held in conjunction with IPPE. These posters will be on display from 1:00 p.m. EST, January 24 to noon on January 25 in Room B313 Foyer at the Georgia World Congress Center.

- *Effect of Zn Methionine-Hydroxy-Analogue Chelate supplementation on performance and carcass quality of broiler chickens* from Dr. LirisKindlein of the Department of Preventive Veterinary Medicine at the Federal University of Rio Grande do Sul.
- *Effect of an essential oil blend on growth performance of broilers under different coccidiosis control programs* from Dr. Frances Yan, senior research scientist at Novus.

A carryover from the virtual IPPE in 2021, the TECHTalk session are short, informative live presentations where attendees can gain quick knowledge that can directly impact their business. Held at booth #8579 in Hall B, Novus is presenting a TECHTalk session titled *Understanding Mixer Coefficient of Variation and Troubleshooting* by Application Systems Manager Dr. Jonathan Wilson at 3:00 p.m. EST on Tuesday, January 25.

For more information on Novus at IPPE, visit https://www.novusint.com/Events/novusatippe2022

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Novus International, Inc. is a leader in scientifically developing, manufacturing and commercializing nutrition and health solutions for the animal agriculture industry. Novus's portfolio includes ALIMET® and MHA® feed supplements, MINTREX® bis-chelated trace minerals, CIBENZA® enzyme feed additives, NEXT ENHANCE® feed additive, ACTIVATE® nutritional feed acid, and other feed additives. 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

PRESS RELEASE

Stellapps wins 'National Startup Award 2021' in Animal Husbandry Sector

National, 20th January 2022: Stellapps Technologies won the 'National Startup Award 2021' by #StartupIndia in the **Animal Husbandry sector** for its effort in digitizing the dairy sector in India. The dairy tech startup was honored through a virtual ceremony in the presence of Union Minister of Commerce & Industry, Piyush Goyal. Stellapps is one among the 46 startups announced as winners of the National Startup Awards 2021 along with 1 incubator and 1 accelerator.

Ranjith

The awards seek to recognize and reward outstanding startups and ecosystem enablers that are contributing to economic dynamism by spurring innovation and injecting competition. As a part of the award, the founders of Stellapps were commended with a cash prize of INR 5 Lakh.

The Department for Promotion of Industry and Internal Trade (DPIIT) conceived the National Startup Awards appreciating the efforts of enablers that are building innovative products or solutions and scalable enterprises, with high potential of employment generation or wealth creation, demonstrating measurable social impact.

Stellapps has been recognized for their innovative tech solutions in digitizing and strengthening the dairy farming processes. With a prime focus on data acquisition and machine learning, the startup aims to digitize the dairy supply chain. The technology can be used where the yield per animal is low with inadequate traceability.

Stellapps was also a part of the working group that presented policy recommendations for the Indian agriculture sector to the Hon' Prime Minister, Shri. Narendra Modi under the theme 'Growing from Roots'.

Delighted with the achievement, **Mr. Ranjith Mukandan, CEO and Co-founder of Stellapps** said, *"We started in 2011 as the first of its kind startup, working towards the digitization of the dairy supply chain. We are honored to receive the 'National Startup Award 2021' organized by the Government of India. Milk is the largest crop on this planet and there is a strong need for technology interve-ntions, especially in the emerging markets where the yield per animal is low, traceabi-lity is inadequate and quality is not up to the mark. It is a proud moment for us to be able to contribute and be a part of this era of Indian startups."*

The 2021 awards invited applications across 15 sectors and 49 sub-sectors. The sectors included Agriculture, Animal Husbandry, Drinking Water, Education & Skill Development, Energy, Enterprise Technology, Environment, Fintech, Food Processing, Health & Wellness, Industry 4.0, Security, Space and Transport, and Travel. A total of 2177 applications were received from startups across the 49 sub-sectors along with applications from 53 incubators and 6 accelerators for the ecosystem enablers categories.

About Stellapps: Stellapps is a farm-to-consumer dairy digitization service provider, improving productivity, quality and ensuring end-to-end traceability across the dairy supply chain. It leverages advanced analytics and artificial intelligence through its full-stack IoT platform to enable dairy ecosystem partnerships with financial & insurance institutions, veterinary services, cattle nutrition providers, etc. to drive significant value for smallholder farmers and all stakeholders in the dairy value chain. Through its customer base which includes all major private & cooperative dairies, Stellapps currently digitizes over 13 million liters of milk worth USD 3.4 million each day and directly impacts 2.8 million dairy farmers in over 36,000 Indian villages.

NOBLE VETSCIENCE QUARTERLY SALES MEET

Dr. Subhash Vaidya

NOBLE VETSCIENCE LLP, a subsidiary of **NOBLE LIFESCIENCE SINGAPORE,** conducted its Quarterly Sales Review meeting in Lonavala. The event was cheered by the celebration of 75th birthday of Honorable Chairman **Dr Subhash V Vaidya.** This event was attended by the National Sales and Technical team.

Dr Vaidya, one of India's most regarded nutritionists in the poultry industry, established the Noble Group in the year 2003. Dr Vaidya holds a Ph.D. in Poultry Science and has worked as an editor for FAO –AGRIPA.
He has a long and illustrious career that spans over 45 years. He has also worked for major industry organization such as CLFMA India and the Planning Commission of India for Livestock Development. In 1993, for the first time in India, Dr Vaidya successfully applied the concept of poultry feed without any animal protein source, based on soyabean meal. This became the industry norm.

NOBLE LIFESCIENCE SINGAPORE

About NOBLE VETSCIENCE:

NOBLE VETSCIENCE was established in 2016 with the goal of manufacturing and distributing a comprehensive range of Organic, Phytogenic and Scientific Feed Supplements that support holistic health in poultry and livestock. This has been a pioneering work in India. The review meet commenced with the welcome note by Dr Jyoti Nandardhane, Product Manager who addressed the gathering.

Dr Chandrashekhar Saraf, Director Sales and Technical presented a Sales review. He revealed the sales figures as well as the organization's purpose and mission. Dr Saraf applauded the Sales and Technical team's tireless efforts, hard work, and dedication, without which the company's success would have not been possible. He informed the team that our products are being used by many integration companies and these companies have begun to make claims for non AGPs farming.

Dr Saraf further highlighted that the Company has a lot of potential for growth and currently working on expanding its international markets in Kenya, Ghana, Tanzania, Nigeria ,Malaysia and Brunei in addition to its current export markets in Bangladesh, Sri Lanka, Nepal and the Philippines. The company's development was discussed by Mr. Niket Vaidya, Director Marketing. During his discussion, he explained how the organization had grown to such an extent in just five years. He reviewed the Company's action plan for the coming year.

Mr Rohan Sovani, Director Operations gave a rapid overview of our plant operations. In the light of projected export market demand, the team was notified that production capacity has been doubled.

A technical session on "Alternative to Soyabean meal was conducted by Dr Arjun Madnurkar, National Manager. The speaker addressed rising feed prices and discussed soybean alternatives in order to reduce feed cost, with addition of "NUTRIBION". Dr Ankur Hazorika, Export Manager spoke about his thoughts on the export market. He gave the team an update on his recent visit to East Africa.

Product Launch:

On the occasion of this meeting, Dr Jyoti announced the launch of two products namely Phytogenic Feed Sanitizer and Mycotoxin deactivator. Noble is confident in helping the farmers to accomplish the performance goals of broilers, breeders and layers. Noble also provides technical support to it's customers in the form of feed formulation, farm and hatchery management guidance and laboratory services.

BROILER LIFTING RATES FOR THE MONTH OF DECEMBER 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	29	30	31
Hyderabad	95	100	102	103	110	110	112	112	103	97	92	97	97	88	91	94	97	100	105	105	105	95	85	85	88	93	93	95	97	97	100
Karimnagar	95	100	102	103	110	110	112	112	103	97	92	97	97	88	91	94	97	100	105	105	105	95	85	85	88	93	93	95	97	97	100
Warangal	95	100	102	103	110	110	112	112	103	97	92	97	97	88	91	94	97	100	105	105	105	95	85	85	88	93	93	95	97	97	100
Mahaboobnagar	95	100	102	103	110	110	112	112	103	97	92	97	97	88	91	94	97	100	105	105	105	95	85	85	88	93	93	95	95	95	98
Kurnool	95	100	102	103	110	110	112	112	103	97	92	97	97	88	91	94	97	100	105	105	105	95	85	85	88	93	93	95	95	95	98
Vizag	95	95	100	100	103	103	105	105	102	99	94	99	99	95	98	101	104	107	112	112	112	102	92	92	95	100	100	102	104	104	107
Godavari	95	95	100	100	103	103	105	105	100	97	92	97	97	91	94	97	100	103	108	108	108	98	88	88	91	96	96	98	98	98	101
Vijayawada	95	95	100	100	103	103	105	105	100	97	92	97	97	91	94	97	100	103	108	108	108	98	88	88	91	96	96	98	98	98	101
Guntur	97	97	102	102	105	105	107	107	102	99	94	99	99	93	96	99	102	105	110	110	110	100	90	90	93	98	98	100	100	100	103
Ongole	97	97	102	102	105	105	107	107	102	99	94	99	99	93	96	99	102	105	110	110	110										
Namakkal	93	95	95	95	99	102	102	102	90	83	88	93	95	95	95	93	93	95	99	99	99	93	93	82	88	96	96	96	96	96	96

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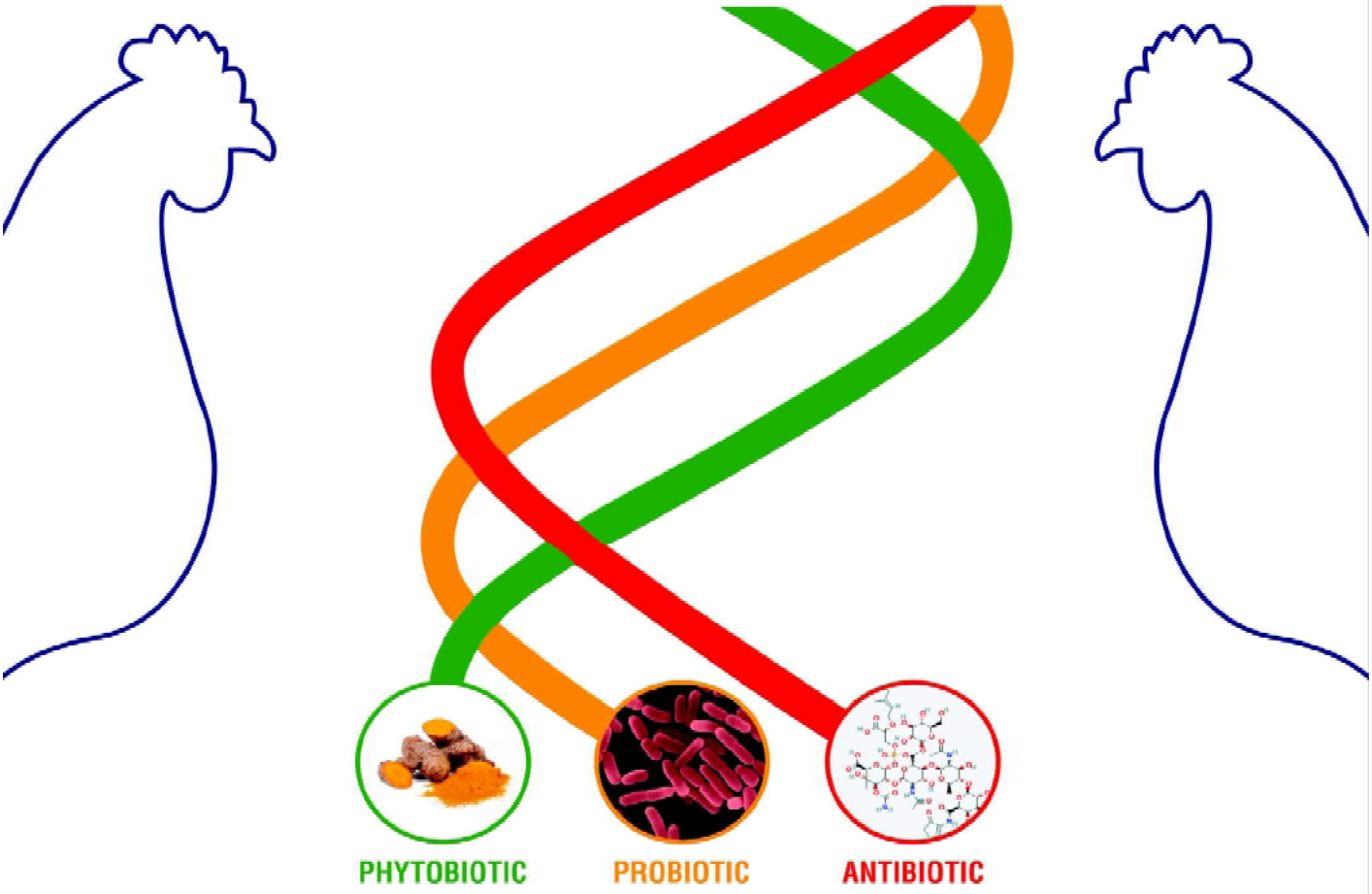

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PRESS RELEASE

Aviagen Applies Latest Technology to Give Customers and Internal Teams Best of Both Worlds for In-Person and Remote Support

New remote support high-technology solution is perfect complement to local personal support

Jan.4,2021 – HUNTSVILLE, Ala. –Aviagen®teams in Asia Pacific, Latin America and North America have combined their talents to create a new hybrid platform for heightened customer service and internal flock management. The new solution is made possible by a combined package of the latest in bonded cellular networking, mesh Wi-Fi, Augmented Reality (AR) headsets, specialist softwareand other technology. Thus, through live-streaming capabilities, for example, customers will be able to bring Aviagen experts virtually to the farm, hatchery, or any area of their facility where they need help on a pressing issue.

"Being there for our customers to ensure their continual success is our number one priority, and this new suite of tools is meant as a complement to the world-class support our customers get from their local teams. Thus, they could have immediate remote access to our array of specialists, both local and global, in addition to regular face-to-face personal support," explained Aviagen CEO Jan Henriksen.

The end goal — Strengthening customer service

As a result of the new virtual solution, no matter where they are located on the globe, poultry producers can have the opportunity to receive rapidadvice on performance improvements and solutions to their daily challenges, directly from Aviagen's team of globalspecialists in genetics, veterinary service, nutrition, flock management, incubation and hatching, and more. This solution

optimizes organizational efficiency by providing on-the-spot answers to pressing issues within a poultry operation.

"Aviagen is passionate about continually improving our service to customers," explained Aviagen President of North America Marc de Beer. "While AR and Virtual Reality (VR) headsets are largely associated with gaming and entertainment, we have found an ideal application in business, which will elevate our support efforts by providing the perfect complement to one-on-one care and collaboration from our local Aviagen customer teams."

"We are committed to leveraging the latest and most advanced technology to champion the success of our customers," added Rafael Monleon, Business Manager for Asia Pacific. "Our new solution will enable our Aviagen experts opportunities to collaborate with customers inremote locations, resulting in fastersolutions to challenges and best-practice advice to optimize their operations."

"We are happy to maximize the effectiveness of our customer service team by putting to use technology to further expand their abilities. These advanced tools demonstrate our innovation, not just as a breeding company, but also as a technology business," concluded Ivan Lauandos, President of Aviagen Latin America.

An added bonus – Increasing internal efficiency and collaboration

Aviagen will also use this technology to improve informationand idea sharing, as well as training for its internal teams located in Asia Pacific, Latin America and North America. In fact, the company has already started applying this innovation internally, and will introduce it to customers in early 2022 based on a structured region by region roll-out.

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.

PRESS RELEASE

Breeding Sustainability – Aviagen Illustrates CO_2 Reduction Contribution to Global Poultry Industry

January 24, 2022 – HUNTSVILLE, Ala. –. –How can the food production chain meet the needs of the world's ever-growing communities without overwhelming the planet? Aviagen® addresses this question through "Breeding Sustainability." Sustainable poultrybreeding contributes to a decrease in carbon emissions through a continuous improvement in biological efficiency, fitness and welfare traits. Feed Conversion Ratio (FCR) or the rate at which feed is converted to body weightis a key indicator of biological efficiency and hasthe greatest direct impact on the industry's carbon footprint.

Due to an FCR improvement of 1.5-2.0 points per year, Aviagen contributes to a 1% year-on-year carbon footprint reduction. Thisvideotells the story of the "FCR Advantage" through a balanced breeding approach, resulting in a yearly reduction in the poultry industry's greenhouse gas (GHG) emissions.

Feeding the world, preserving the planet – The FCR advantage

The global population is growing. The United Nations (UN) estimates just over 8.5 billion people by 2030, and the world will face the challenge of providing food for everyone. The OECD-FAO Agricultural Outlook 2021-2030 predicts that meat production will need to rise by 44million metric tonnesby 2030, with half of the increase supplied by poultry. The food industry currently contributes close to25% of the world's annual GHG emissions, and of this amount, poultry meat is responsible for about6%.

As a result of FCR improvements, the modern broiler generates 50% less carbon footprint than the bird in 1970, and fast forwarding to 2030, the bird of the future will create a 15% lower carbon footprint than the bird of today.

In 2020, 133.3 million metric tonnes of poultry meat were produced globally, at a carbon cost of 6 kilograms CO_2 for every kilogram of meat. That translates to 800 million tonnes of CO_2.

"To illustrate the impact with a hypothetical example, based on our FCR gains, if every bird were an Aviagen bird, this amount would be reduced by 8 million metric tonnes per year. To put it in perspective, this is the carbon equivalent of flying around the world on a Boeing 747-400 5,906 times," explained Aviagen's Director of Global Genetics Dr. Santiago Avendaño. "As a poultry breeder, we are at the beginning of the food production chain, and we take our responsibility of contributing to the sustainability of the entire industry seriously. We have worked for years to breed efficiencies that make poultry production more sustainable, while at the same time advancing bird health, welfare and performance. Because we care about the planet, our customers and the communities they serve, we are committed to continually breeding for sustainability for decades to come."

Breeding a greener future

Aviagen has made Balanced Breeding one of its top 5 corporate commitments. Balanced Breeding simultaneously promotes the Environmental, Economic and Social pillars of sustainability,helping farmers around the world feed their communities with a healthy, affordable and sustainable source of protein, while breeding efficiencies that help to preserve our planet for today and for generations to come.

Join in the conversation at IPPE

This year at the International Production and Processing Expo (IPPE), which takes place Jan. 25-27 in Atlanta, Ga., US, Santiago will delve into this topic in his presentation entitled, "Poultry

breeding's contribution to the environmental sustainability of the meat sector." You may join him in this discussion on Jan. 26 11:30 am in booth B3649. To talk "Breeding Sustainability" with the Aviagen team, IPPE visitors can stop by boothB4225.

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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.

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PRESS RELEASE

Aviagen Supports Industry as Super Platinum Sponsor of Poultry Federation of India Meeting

As a super platinum sponsor, the Aviagen India team is presented with a PFI meeting memento

Jan. 17, 2022 – Udumalpet, India. – On Dec. 23, Aviagen®India Sales and Customer Service team members took the opportunity to engage with customers and industry colleagues at the annual Poultry Federation of India (PFI) meeting, which is considered the voice of the Indian poultry industry. Addressing current hot topics important for Indian poultry producers, the meeting saw various speakers, including two Aviagen customers: Mr. Bahadur Ali from IB Group and Mr. Suresh Chitturi of Srinivasa Farms. Also present among the 375 meeting delegates were government officials who shared the latest support programs for the farmers of India.

Ferry Monné, Head of Sales and Marketing for Aviagen India, was present at the meeting and commented, "'Transparency, communication and engagement' is one of our top 5 corporate commitments, and we value the PFI as an important forum to collaborate with other members of the poultry value chain on ways to advance the industry in India. We all share a common goal of helping to feed families throughout our country with an affordable and healthy source of protein, while promoting animal welfare and sustaining our environment for our current and future generations."

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Optima founded on 11th January 2011 is today a leading and fast-growing Indian Multi-national company in the animal health and nutrition sector. Customers around the world trust Optima's products and services. **On 11th January 2022, Optima celebrated 11 Glorious years of Development, Trust and Growth.** Optima was established with a vision to become a leader in animal health and nutrition by providing high-quality innovative products and services. Among all products, OptiBetaine, one of Optima's Flagship products enjoys market leadership in branded Betaine segment.

Animal industry's demand to supply innovative and high-quality products at affordable prices compelled Optima to delve heavily into developing products and services for the demanding conditions. Journey of 11 years was exceptional, inspirational, and rewarding, and this could be possible due to the highest standards of hard-working and passionate People and Products produced in manufacturing facilities certified with FAMI QS, GMP, ISO and HACCP. With a mission of offering quality products as per market need, in 2020, Optima launched the hygiene brand Optisan (logo) which offers skin-friendly hand sanitizers and surface cleaners.

Optimians in Optima Life sciences are grateful to that one person, who holds a great treasure of knowledge, experience, learnings, and execution. He is none other than CEO of the company, **Dr.Dey.**

Dr. Dey has completed 37 years in poultry industry and still counting. He has successfully served various organisations, but he has also helped animal health industry to address and overcome various issues from time to time. May it be an import ban on vaccines and breeds to the recent incidence of LPAI vaccines.In this field, he has worked so hard with great devotion.

Dr.Dey has always been an inspiration to everyone at Optima, because of his dedication, guidance, and mentorship. His abilities and contributions are an important key to the success of future Optima and all Optimians. On the occasion of 11th Foundation Day, Director of the company, Mr. Vinay Kulkarni felicitated Dr. Dey for his overall contribution to poultry industry and to the company.

In the last 11 years of growth, we never forgot our duties towards society. Under the CSR activity, we organized blood donation camp, egg distribution camps, financial helps to Paani Foundation, Educational support to needy students, financial support to Orphanage run by Late Sindhutai Sapkal and also to flood victim for the reconstruction of his home.

On the occasion of the 11th foundation day, Optima continued its CSR activity by offering financial help second time to Dr. Sindhutai Sapkal Orphanage based in Pune.

We are thankful and grateful to all our customers, distributors, partners, suppliers and past and present employees for their continuous support and faith in our products and services.

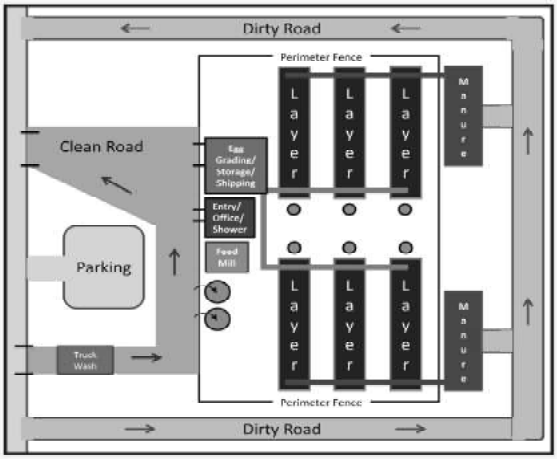
Conceptual

Location, Isolation

Poultry farm should be planned in isolated location away from existing poultry farms. Poultry sheds should be back from the road.

Growing and laying facilities should be segregated to avoid spreading of diseases.

Clean Road and **Dirty Road** should be established.**Clean Road** for eggs, feed and materials; **Dirty Road** for manure, cull birds and trash.



Cultural

Training, Education and Meetings

Educate workers and external crews on the importance of biosecurity. Have a **biosecurity plan** with written procedures for employees to follow.

Train (and periodically retrain) employees on biosecurity procedures.

Structural

Layout, Fences, Gates, Footbaths

Farm should have an **entry gate** which is locked and supervised.

Limit human and vehicle traffic onto the farm.

A **perimeter fence** should surround the poultry sheds to avoid unwanted entry of people and animals.

Vehicle washing station for all vehicles entering the farm.

Use dedicated farm vehicles to deliver feed.

Eggs, feed and materials should be delivered at the farm perimeter fence.

Bird exclusion fencing at bottom of the sheds.

poultrybiosecurity.org

hyline.com

Operational

Daily Routine Procedures

Sign boards and proper traffic flow – to avoid unwanted entry.

Limit visitor entry onto farm, use office meetings whenever possible. Avoid using external crews for vaccination/beak trimming/moving birds.

Biosecure entry point. Entry equipped with human spray, hand wash, farm dedicated footwear and foot bath. Vigilant receiving external crews and their equipment.

Use footbaths with clean disinfectant at each entry of the poultry house.

Limit number of workers inside the sheds for feeding and egg collection.

No outside vehicles allowed inside farm gate.

During depletion, take old hens outside farm gate for pick up.

Water. Use good quality water. Test water source twice annually. Water treatment as necessary.

Dead bird disposal should be by incineration, burial or compositing.

Risk Factors

Rodents can carry and transmit disease to poultry. Provide an effective rodent control program.

Wild birds are carriers of Raniket and avian influenza. Use bird-proof fencing on bird sheds.

Feed. Use good quality tested feed ingredients. Do not re-use feed bags or use bulk feed. Avoid animal source proteins. Routinely clean feed mill and mixer.

Manure is a source of infection. Keep manure dry to control flies. Replace leaking nipples and sprayers to keep manure dry. Do not spread manure near poultry farm. Drying and composting manure reduces contamination.

Egg trays. **Trays returned from outside the farm are dangerous sources of infection.** Effective disinfection of egg trays is required. Best practice is paper egg trays that do not return to the farm.

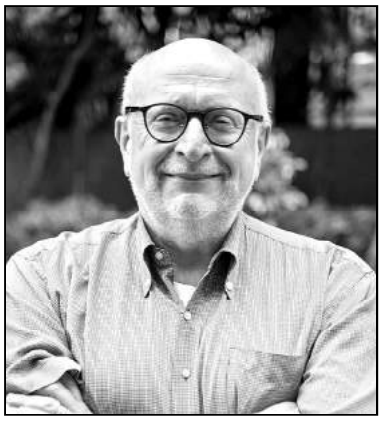
Equipment. Use farm-dedicated vehicles for moving eggs, feed and materials inside the farm. Maintain own beak trimming and vaccination equipment.

PRESS RELEASE

Proteon Pharmaceuticals

Proteon Pharmaceuticals appoints Paolo Doncecchi as Global Sales Director

Mumbai, 27 January 2022: Proteon Pharmaceuticals, a subsidiary of Proteon Pharmaceuticals SA Poland, today announced that it has appointed Paolo Doncecchi as its Global Sales Director as its expansion plans in India and other South-East Region.



Paolo Doncecchi

Proteon Pharmaceuticals focuses on precision biology for microbiome protection to improve animal and human health, increasing environmental sustainability and eliminating the unnecessary use of antibiotics.

With over 30 years of experience in marketing and sales, Paolo has led several sales and marketing positions at global biotechnology companies such as Pfizer, Zoetis, Biomin and Adisseo in the field of animal health and nutrition. Paolo, an Italian national, has completed his university degree in Veterinary Medicine. He recently became member of Insight Partners, an American venture capital and private equity firm based in New York City that invests in growth-stage technology, software and Internet businesses.

Elaborating on his new role at Proteon Pharmaceuti-cals Paolo Doncecchi said, “We will focus ongetting results through people empowerment. I believe that Proteon’s technology is on the edge of a modern and sustainable fight against AMR (Antimicrobial Resistance). Bacteriophages are effective and do not leave residuals in poultry meat, therefore, eventually, safe for us to consume.”

Meanwhile, Proteon Pharmaceut-icals is further streamlining its R&D investments, aiming to deliver phages solutions focused on controlling bacterial diseases to let their livestock customers achieve sustainable profit.

Commenting on Paolo’s joining, Nipun Gupta COO, Proteon Pharmaceuticals, said, “I am pleased to announce the appointment of Mr Paolo Doncecchi as the Global Head of Sales. Paolo started working as part of Proteon commercial organization from January, 2022. I am excited to welcome him.Paolo brings in wealth of experience from the animal healthcare organisations that will be of benefit for our company’s global expansion plans.”

About Proteon Pharmaceuticals

Proteon Pharmaceuticals uses precision biology for microbiome protection to improve animal and human health, increasing environmental sustainability and eliminating the unnecessary use of antibiotics. Proteon uses natural, safe and environmentally sustainable solutions developed from patented phage-platform technology. Proteon partners with farmers in the field of animal health, focusing on solutions that improve the economic efficiency of farms, while promoting environmentally sound, natural and sustainable solutions.

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Ostrich Farming: to Double the Income of Farmers

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

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4. Senior Scientist & Head, KVK Samba, SKUAST-J
5. Professor & Librarian, Medicine Division, SKUAST-J

Introduction:

The demand of diversified food has increasing due to health consciousness in the modern civilization. The Europian communities have gone in search of new foods which contributed mainly to the health diet of population. In this process, animal and avian species have contributed to a large extent in providing the required health foods like milk, meat and eggs. The tendency to go for low calories foods has resulted in increased demand for new species for meat purpose. At present, the ostrich meat ranks highest among health food in Europe. Ostrich meat in terms of health value is credited to less percentage of fat, low cholesterol, less calories, rich in protein and iron. The demand of ostrich meat has been increasing especially after the threat of mad cow diseases. The unique taste of ostrich meat has been added into different meat dishes. This meat has a great demand in restaurant in Eorope, Japan, Australia and China in a big way. The popularity of this bird can be judged from the fact that presently 65 countries, including our neighbor Pakistan and China are engaged in ratite farming. The increased demand of ostrich over the past few years has given way to rearing birds under controlled system. The intensive system become popular because of adoption of scientific technologies reduced risk of diseases, through improved bio-security measures, genetic selection and nutritional innovation, health regimes and extensive diseases surveillance. Scientifically proven management practices resulted in low cost production and improvement in quality of ostrich products.

Peculiarity of ostrich:

Ostrich is a recently domesticated bird. Ostrich is a largest known bird and some scientist believes that present birds develop from ancestors that are capable to flight. They belongs to running birds family. In ratite family, there are five birds; Ostrich, Emu, Cassowary, Rhea and Kiwi. Ratite is a Latin word which means raft and this is because of their flat bone. Because of this reason, ratite family birds do not fly. They do not muscle to support the wings. Ostrich can't fly but run well and they are capable to run with a speed of 70 km per hours. The normal body temperature of Ostrich is 39.4°C to 40°C. The ostrich have only two toes.

Ostrich is a well adaptable bird and can thrive in different environments. Ostrich is a large flightless hardy birds and having African origin can survive in temperature ranging from 2°C to 50°C. It can be reared on fallen land and mainly consumes Alfa-Alfa, Lucern fodder and water. It has a long neck and small head with large eyes and short broad beak. They spread their small wings while running. The large powerful legs are made of defense.

The male are polygamous and move with three or five female or in a group of four to five males accompanied by mates and young once. The female lays their white eggs together in a single large depression in sand. The weight of the ostrich egg is about 1.48 kg and has a volume of about 1.4 liter. The male sits on them at night and the female incubate them by day time. Ostrich life span is 60-70 years. Ostrich, Cassowary and Emu are biggest birds having 1st, 2nd and 3rd rank respectively. Mating ratio in ostrich is 1 male for 2 female. Ostrich

breeding periods are 30 years. Ostrich lay 40-70 eggs average per breeding. In brooding stage, mortality is negligible. Ostrich growth rate is about 1 cm per day during first 6 month. Fattening age of ostrich is 12 months. Incubation period of ostrich egg is 39 to 42 days. Fertility, Hatchability and Livability rate of ostrich eggs are 80% in all three economic traits. Ostrich egg production begins at 2 years of age.

Commercial feed absolutely essential. For one pair of ostrich birds require at least 1 acre fallen land. Adequate shelter with a confinement pen and 9 feet high chain link fence is necessary to protect from dogs and other predators. Floor at boundaries should be cemented to prevent entry of dogs by digging. Commercial ostrich farming begins in South Africa more than 150 years ago and is now practiced in Israel and United states.

Advantage of ostrich Farming:

- Plenty of infertile and barren lands throughout the country are suitable for these birds. All drought prone areas of the country are appropriate for this farming. The farmers who such land will be gainfully employed.
- The chick grows to slaughter weight in only 10-12 months. They lay around a hundred eggs per year and have a lifespan of 30 years. Besides, there is a ready market with a high price for such low fat, low cholesterol meat.
- These birds have a very high feed conversion ratio, *i.e.* they eat very little compared to animals which provide red meat such as sheep and goat.
- Ratite provide very valuable oil, which is used by the cosmetic industry.
- Ostrich skins are considered Exotic and sell at a very high price. The skins are currently being imported for making leathers.
- Ostrich egg shell is used by the handicraft sector for making decorative items.

Origin of birds:

Birds name	Place of Origin
Ostrich	Africa
Emu	Australia
Rhea	South Africa
Cassowary	New Guinea
Kiwi	New-zea-land

African Ostrich varieties:

i) Blue necks (large Ostrich)
ii) Hybrid blue (better egg layer)
iii) Red neck (small Ostrich)

Production cycles:

Particulars	Age
Starter	1 day to 3 month
Fattener	4 to 12 month
Selection for breeding	12 to 24 month
Breeder	Above 24 month

Floor space requirement:

Category	Floor space/sq.m./bird
Starter	0.3 to 1.5
Grower	2 to 1.5
Grower	3.5 to 4
Layer	5
Run as per age	50 to 400

Commercial Ostrich production:

Ostrich production in United States currently is considered a highly speculative venture. Successful large scale production depends on implementing scientifically proven practices in managements and husbandry, breeding and rearing, nutrition, health, maintenance and above all hatchery management and incubation.

General Identification of Ostrich:

Parameters	Male	Female
Colour	Black with white wings and tail	Grayish brown
Sexual maturity	30 month	24 month
Height	2.60 m	2.40 m
Weight	150 kg	130 kg
Speed	70 km/hours	70 km/hours

Advantage of Ostrich production:

- The birds can be reared in paddocks along with sheep, goat and cattle.
- The birds no need of dipping, drenching, milking and shearing as like other livestock

Ostrich Egg:

Egg Weight	1443.86 gm
Shape Index	82.86
Shell thickness	1.93 mm
Shell	19.86 %
Albumen	55.25 %
Yolk	24.28

Nutrient composition in ostrich eggs:

Egg parts	Nutrient components	Values in %
Shell	Moisture	1.06
	Ash	98.07
Albumen	Moisture	89.51
	Protein	9.56
	Ash	0.88
Yolk	Moisture	51.21
	Proteins	15.19
	Fat	31.37
	Ash	2.10

Ostrich Feed formula:

Ingredient	Share of ingredient
Oat	30
Alfa-alfa meal (7% protein)	30
Soyabean meal	10
Fish meal	5
Meat and bone meal (50% protein)	2.5
Soyabean oil	2.5
Oat hull	2
Salt	1.5
Calcium phosphate	0.5
Vitamin and mineral premix	0.5

Nutritional requirement:

Components	Starter (0-8 weeks)	Grower (9 – 17 month)	Layer (18 month)
Protein %	18	18	18
Crude fat %	3	3.5	3.5
Calcium %	1.35	1.35	2.40
Available Phosphorus %	0.70	0.70	0.70
Crude Fibre %	6	11	11
Salt %	0.90	0.90	0.90

Ostrich Products:

- **Leather**: It is useful for making boot and cloth. Adult ostrich produce 14 square feet of hide. One hide can made 3 pairs of boot.
- **Meat**: In ostrich meat is famous for low cholesterol. It is red meat because of their red colour, beef like texture and low fat content.
- **Feather:** Feather is use as a decorative purpose.

Getting start business:

An Ostrich business can be started in one of the following ways.

i) Buy the eggs and hatch: For this require large capital initially provided egg can be obtained at reasonable cost. However production is at 2 years away.

ii) Buy started, sexed chicks (8 week or older): Due to this reduce the problem involved in hatching process and early brooding but it is more expensive than eggs. Again production is at least 2 years away.

iii) Buy juveniles (1 year old birds): Due to this, you obtain opportunity to select quality birds within one year of sexual maturity.

iv) Buy proven breeders: This is expensive route but enable to begin production immediately.

Constraint of ostrich farming:

- Regardless of the ostrich farming providing a profitable business over the world, the same does not hold true in India. The government's attitude has not been very helpful in encouraging and developing the farming of these birds. In fact for the want of an import license to import ostrich.
- Some years ago in Bangalore, some farmers comes together and formed an association called the *Forum of Technology*

on Ostriches. But even after organizing themselves, they have been unable to import ostrich chicks because of requirement of an import license from the Director General of foreign trade. They refuse to issue one for import of ratites. It has ignored the fact that the latter will provide valuable employment to many farmers, especially in the drought prone, low rainfall and desert region of the country.

- The Indian government has a clear direction by not to encouraging ratite family because it believed that the imported chicks could introduce diseases, which might affect other animals. More importantly, the government thinks that it could prove to be a foreign exchange exhaust. But these fears are without any grounds. The ratite will be imported only from export farms which make quarantine, vaccination and other health standards. If other animals such as goat, sheep, horse, cow can be imported, so why not ostrich. The ratite will go through the same strict check before entering the country. So no need fear of new disease being introduced in the country.
- The maximum foreign exchange likely to be spent in one year will be equivalent to importing a few foreign cars. After a few years, when farmers start ratites breeding, no more imports will be required.
- Animal welfare organization of Bangalore and Beauty without Cruelty, international charitable Trust of Animal Right, Pune have started campaign to oppose this venture. It is argued that, India with its heritage of non violence does not need to go in for business that involves killing of beautiful innocent birds for meat purpose to satisfy unusual food enthusiast.

Diseases:

- *Fading chick syndrome* or *Mal absorption* is a usually fatal disease of young ostrich that strike most often between land 3 month of age but may affect chick as old as 6 month. Chicken common diseases like *Starvation, Malnutrition, Intestinal obstruction, Leg abnormalities, Coliform infection.* Some other chicken diseases also occur in ostrich.
- *Salmonella typhimurium* is common in multispecies collection and cause mortality in chicks younger than three months on commercial farms, but is rarely found in chicks older than six months or slaughter of birds of 12-14 months. *Salmonella gallinarum and salmonella pullorum* are unknown in ostriches.
- Crimean-Congo-haemorrhagic fever is transmitted to domestic animals including ostrich principally by ticks of the genus Hyalomma.
- *Pasteurella multocida* occurs but is easily controlled with antibiotics.
- *Campylobacter jejuni* and *Chlamydia psittaci* are occasionally reported in young ostrich.
- n the ostrich, the diseases cause no clinical symptoms during viraemia of approximately 4 days.
- Spongiform encephalopathy has not been reliably reported in ostriches.
- Anthrax caused by *Bacillus anthhracis* has occurred rarely in modern times but was reportedly an important cause of death approximately 100 years ago in South Africa.
- Mycoplasma species are regularly found in a upper respiratory disease syndrome complicated by opportunistic bacterial pathogens.
- Ostrich of all ages are susceptible to challenges by velogenic New Castle disease virus (NDV), but standard inactivated Lasota poultry vaccine can stimulate protective immunity lasting over 6 months.

Conclusion:

Ostrich meat attributed to less % fat, low cholesterol and calories and rich in protein and iron. The demand and interest in ostrich meat has been increasing especially after the threat of “mad cow disease”. Besides meat, the ostrich has been able to produce high premium feather, oils and byproducts. The ostrich skin converted into luxury feather in made for making variety of articles.

PRESS RELEASE

32nd AGM of Poultry Federation of India

The 32nd Annual Geneal Meeting of Poultry Federation of India held at Hotel Pullman, New Delhi Aero city on Thursday the 23rd December 2021 at 10.00 A.M. It has begun with Registration from 9.30 am followed by AGM at 10.30 AM.

Poultry would get total support from Government of India, whatever is needed to its growth and development promised Sri ParshottamRupala Union Minister for Animal Husbandry, Government of India while delivering Chief Guests message. at the 32nd AGM of Poultry Federation of India.

In his Hindi speech, the minister reiterated that whenever the PFI delegates met him in his office, he was assuring the same. Our doors are open for you whenever you tap on your work. Even without work also you are welcome to sit with me and sip your tea on friendly basis. You work out on your problems and come to us, if you cannot solve yourselves" Sri Rupala appealed. Some of you are all very well experienced in your industry and in Integration also. You had a problem for Soya, we tried and solved. But it would be better you use your experience of integration in Soya and Maize Crops to tie up with farmers to improve their productivity and acquire their products directly from their farms to help them and help yourself. So that your problem could be solved easily and if youcould able to procure more produce from the farmers you can export soya to the needy countries, he said. As desired by Industry's demand, if we ban Future Trading of Soya and some other commodities would be a temporary solution and instead you have to find out an alternate sources is the only solution, he asserted. Soya, he said is not only a best plant protein but also can be converted into milk protein whenever needed.

MPEDA is doing its best with Rs. 30,000 to 32,000 Cores exporting of shrimp products. Similarly the poultry products could be exported to the countries wherever possible, he said. He said thatAmrith Mahotsav Celebrations of Bharat are on.AthmaNirbhar programme is taken up by Prime Minister. Funds are available with Government under various Schemes by Animal Husbandry as explained by our Department Officials. Come forward to utilise them., the Minister has appealed. He has also assured that the Vaccine problems will also be resolved by the State Minister Dr. Sanjeev Balyan sooner.

At the end Shri ParashottamRupala said that when we had accepted for BT Cotton, why not we think about other products like Soya and Maize. We seek the assistance of ICAR and in consultation with Agriculture Ministry, may introduce changes and bring new Law also under thumping applauses and cheers from the audience.

The Technical programme started with a presentation from Mr. Naveen Pasupathy of Nandu group, Bangalore. He had elaborated the audience from Hatchery, Feed, Integration to Chicken marketing. The group diversified to ready to cook and ready to eat segment and proved their success. During covid days, when people confined to their houses,online orders and app-based business saved the farmers from losses he said. He further said that Nandus had tie up with other online food marketing companies and developed their own brand. Setting up cold chain facilities and arrangements with Swiggy, Zomato etc.helped them to a great extent. Their value-added products and hi-fi show rooms with modern outlook increased their sales. He said that gathering customer data and regularly monitoring their taste preferences, discount offers, attractive packaging options have enhanced the business. Nandus success story inspired everybody.

Dr. Lipi Sairiwal, the second speaker explained about the Animal Husbandry Infrastructure Fund set up with Rs.15,000 crores. She briefed that the persons from the industry can avail the funds to set up Hatchery, Feed plants, Breeding Farms, Poultry Farms etc.The entrepreneurs, she said can avail ColdStorage facility for meat marketing and otherchannels through this scheme and establish their own businesses.

Dr. SK Dutta, Jt. Commissioner has announced that the Department has been supporting the poultry in several ways and means and contributing its mite. Recommending the state governments to introduce eggs in midday meals schemes, anganwadisetc.States like Andhra Pradesh,Telengana, Karnataka, Tamilnaduand Jharkhand aresupplying eggs with an intention to

improve the health of the beneficiaries as well as boost up the industry. He further said that due to this system, the attendance also in the institutes were improved. With these efforts per capita consumption has also gone up to 86 eggs. He said that though we are very much backward in consumption of eggs and yet to reach the recommendation levels of 180 eggs per capita by National Institution of Nutrition, India has reached 3rd position in the world egg production.

He has informed that Entrepreneurs can log into Department's website and apply online to avail the facility.He said that these schemes are commenced from 24th June 2020 for all sorts of Animal Husbandry activitiesand requested the audience to avail the schemes and establish their own businesses.

Mr. RanpalDhandaread out the Secretary's report. He has welcomed the gatheringto the 32nd AGM and thanked themfor their support. He said that the government has helped the poultry farmers at the time of Avian Influenza to allay the fears of bird flu when the consumption has drastically fallen, and the chicken prices even touched low of Rs. 10 in certain places.The Govt. also helped the industry to clear the movement of chicken from one place to other helping the industry to boost up though the chicken is not root cause of covid. But in initial days consumers had false opinion the Secretary has made announcement from government side to encourage chicken sales. He thanked the Department of Animal Husbandry for guarding the poultry farmers from onslaught attack by the NGOs demand to ban the cage farming.He praised the Government's bold step allowing import of Soya to arrest the steep prices. Mr. Ranpal has also thanked the Union Minister, State Minister, Secretary, Commissioner and Jt. Commissioner. He thanked all the colleagues of PFI and other Associations like CLFMA, representatives of all leading poultry companies for their unstinted support.

futures Trading insoya, a confidence was created with the hope that feed prices could be brought down.,

Many of integrators trying to set up modern marketing strategies. Better than the poultry companies chicken online sales companies like Licious, Tendercuts made good money during the pandemic since consumers have understood the immunity development potency in chicken and eggs.

Mr. Balaram Singh Yadav, Managing Director, Godrej Agrovet, addressed on Future challenges of Poultry Industry. For the last 5 to 6 years poultry farmers are in trouble due to bird flu and later with Covid 19 and now followed by soya crisis. During the pandemic the activity slowed down. Actually India is in race from 3rd position to 2and and 1. We are growing at 16 to 18per cent. Out of it 60 to 80 is covered under integration. 90 percent live markets and only 10% chicken go for processing.

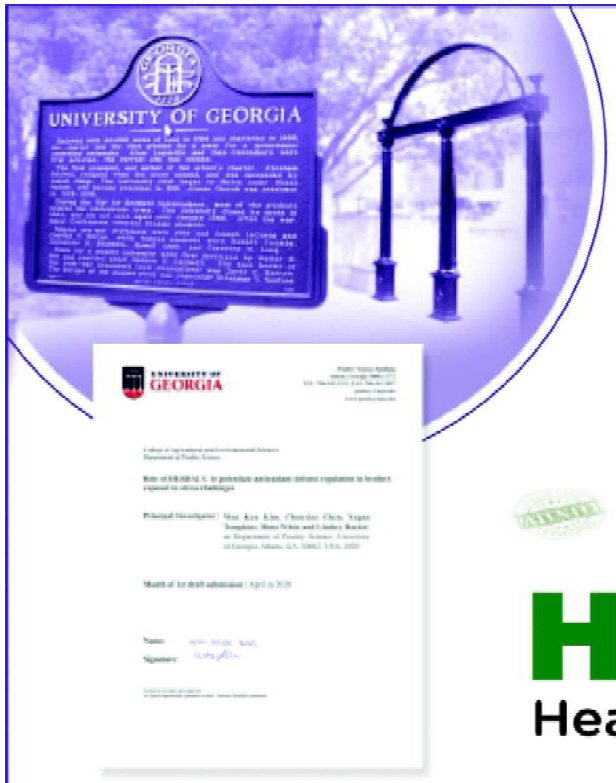
Mr. Bahadur Ali, Managing Director, IB Group thanked the Minister on behalf of poultry fraternity. He has applauded him for his efforts in convincing the Agriculture Minister, Commerce Minister and officials for allowing import of soya to arrest price hike up to 100%. The minister was instrumental for giving a fresh lease of life. The price has come down to Rs.60 from Rs.100/-_ within 3 days of announcement of import. Now with the ban of United campaign with the help of govt. Will definitely boost the image of Industry.

The Southern stars in PFI

In PFIMr. Selvan Kannan for the first time in the year 1996 had been elected asExecutive Committee Memberand serving the PFI uninterruptedly for the last 25 years with his outstanding services. He served Pioneer Farms, Pongalur (near Coimbatore) and later joined Trouw Nutrition and at present he is in Noveltech Feeds.

Similarly Mr. D S Subramaniam of Tara Enterprises, Hyderabadgot elected as Vice President for South Zone in the year 2003 and continuously serving the PFI in the same position.

PFI had served with sumptuous lunch and followed by cocktail, dinner and cultural programme. The day ended with satisfactory note.



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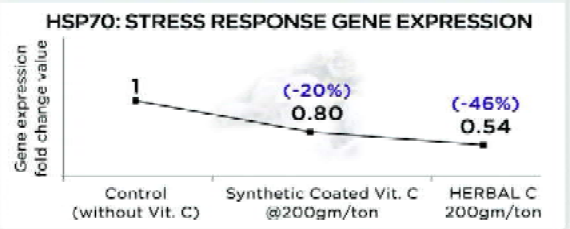
HERBAL C improves stress tolerance and prevents cellular oxidative damage through HSP70 regulation



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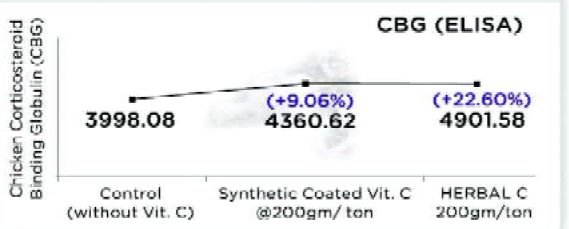

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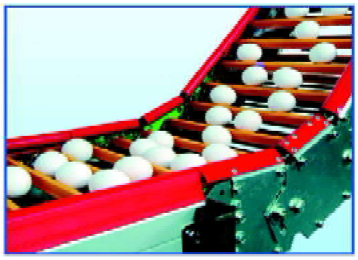

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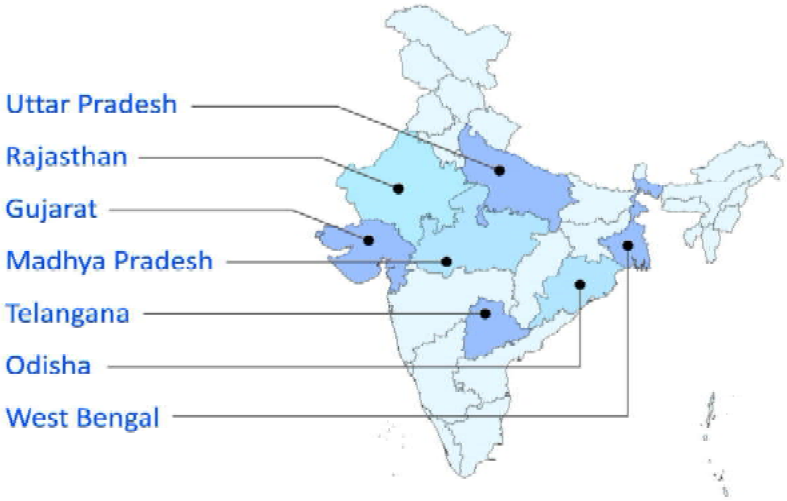

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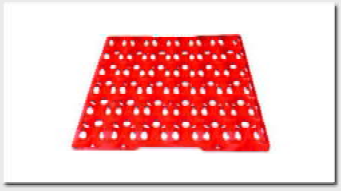

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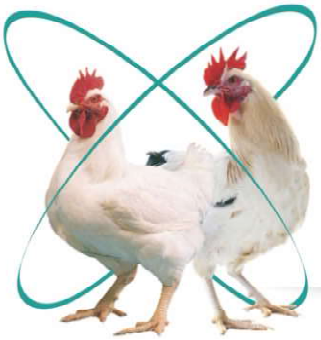

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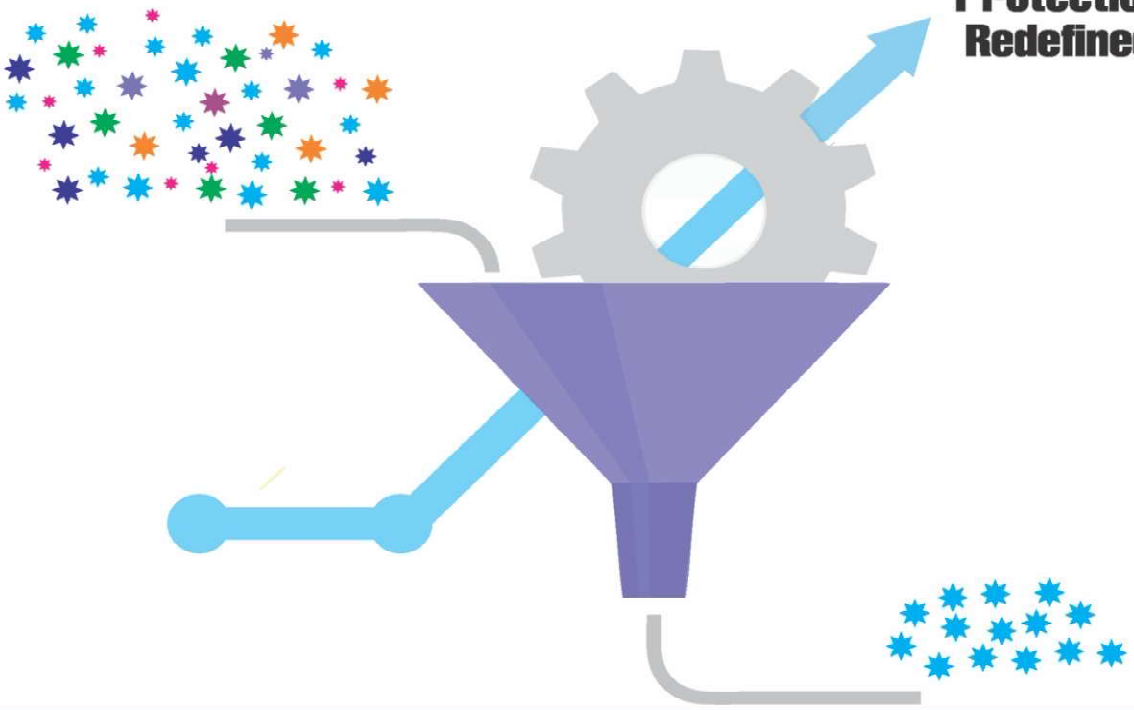

- **Uniformity in titers (Virus and Antibody response)**
- **Less vaccinal reaction**
- **Better immunogenicity**

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