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INDEX OF ADVERTISEMENTS

Significance of snail meal in Poultry Production

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Feed is the single largest item of expenditure, accounting for more than two-thirds of the total cost of production of poultry farming. Indian poultry feeds are commonly formulated based on conventional feed ingredients i.e., corn-soya. Protein is provided from both vegetable and animal sources. The main conventional animal protein sources used in poultry diets are fish meal and meat meal. Limited availability of conventional animal protein sources in recent years, lack of uniformity, and higher cost relative to plant protein sources has limited its inclusion in poultry diets. These conditions have forced the poultry nutritionists to look for various novel locally available cheaper alternative animal protein sources for their use in poultry feed formulations to reduce the feed cost. Snails are slow-moving gastropod molluscs that live on land (lung snails) or in water (gill snails) and have a spiral protective shell or are shelless. Snails are human food but are also ectoparasites and predators. Major edible snails are the land snails (*Helix spp.* and *Achatina Spp*). All these snail species appear in large numbers and are a potential feedstuff for on-farm feed preparation.

Snail farming

Snail farming is the process of raising land snails specifically for human consumption. It has a high rate of protein, iron, low fat and almost all the amino acids that are needed for human body. Snail farming is also an important source of income to farmers (Omole, 2006). In captivity, snails have been fed leaves, unripe fruits and other plant materials which are of low nutrient content. This has resulted in slow growth and long maturity time. Intensive indoor rearing, supported by formulated served feed may enable the harvesting of matured snails earlier than in their wild state (Akinnusi, 1998). It is estimated that a box with a capacity of one cubic metre capacity on a snail farm can yield 40 snails each year.

Golden apple snail, apple snail, channeled apple snail are the common names. live snails, fresh snail meat, snail meal, fresh snail meal, dried snail meal, ensiled snail meal are the snail products commonly available in the market. Snails are present in stagnated or muddy fresh water or in lands. They can also be introduced and raised on agricultural waste provided that they cannot escape and become a threat for the environment. They can be collected and processed into a viable supplementary source of protein that can be used to replace other animal protein sources in feed rations (Heuze et al. 2016). A notable snail species that can be used to feed livestock is the golden apple snail (*Pomacea canaliculata* and other *Ampullariidae* species). The golden apple snail (*Pomacea canaliculata*) is a freshwater snail indigenous to South America. It is used as a high-protein food for both humans and farm animals, particularly for ducks, fish, prawns, pigs and other livestock species (GISD, 2012).

Processing methods

There are different ways to prepare snails for animal feeding. Apple snails can be fed live, freshly dead or processed. Live snails are eaten directly by fish and ducks in ponds and rice fields. Collected snails can be fed whole or without shells (snail meat). Whole snails or snail meat is fed fresh or ensiled, cooked and/or dried. Snail shells can be a source of minerals similar to oyster shells. A kg of whole snails, when washed and unshelled, yields about 250 g of fresh snail meat and 100 g of dried snail meat (Ulep et al., 1991). Because fresh snail meat spoils easily, cooking, drying or ensiling should be considered whenever the snails cannot be eaten immediately.

Fresh snail meal

Snails are cleaned, washed and then crushed. Shells are separated from the meat. The meat is ready to be mixed with fish meal or soybean oil meal (Salazar et al., 2003).

Processed snail meal

Dried snail meal

After removing from the shell, the visceral mass is washed in alum solution to remove slime, then washed again, cut into small pieces and transferred into an oven to dry at 60-70°C for 72h. It can then be ground.

Boiled & dried snail meal

Freshly collected snails are boiled in water for 15 to 20 minutes. The flesh is separated from the shell, minced and dried at a temperature of not more than 60°C. The adult Helix aspersa maxima has a liveweight of about 40 g. The shell portion amounts to around 15% of the liveweight.

Ensiled snail meal

a) After snail meat extraction, washing in clear water, drainage and chopping into 0.5-1.0 cm long pieces, snail meal was complemented with a source of carbohydrates (1 kg per 1, 2 or 3 kg snail meat) such as molasses and/or rice bran to start the ensiling process. Silage was then stored for 24 weeks (Kaensombath et al., 2005).

b) After meat extraction, chopping and grinding, the addition of 15-20% molasses resulted, after 28 days in closely tight plastic bags, in satisfactory silage with a brownish colour and a pleasant smell (Phonekhampheng et al., 2009). Snails ensiled with citric acid deteriorated rapidly.

c) After boiling whole snails in water for 2 min, meat was extracted, minced and blanched for 5 min, and then mixed with molasses and inoculated with lactic acid bacteria. Silage was done during 15 days and pH dropped from 8 to 4 (Rattanaporn et al., 2006).

Chemical composition and nutritional value of various snail meals

1. Snail meal with shells
2. Snail meal without shells

Whole snails

Whole snails are relatively poor in protein, about 14-18% on a DM basis, particularly rich in calcium (28-31% DM), and poor in phosphorus (< 0.5% DM). Shells are mostly mineral matter and contain about 35% calcium with minimum amounts of residual protein. The reported lysine content of the

Table 1. Chemical Composition and Nutritional Value of various snail meals

Main analysis	Unit	Snail Meal with Shells	Snail meal without shells
Dry matter	% as fed	90.8	91.0
Crude protein	% DM	50.5	60.7
Crude fibre	% DM	8.8	4.3
NDF	% DM	12.9	
ADF	% DM	7.7	
Ether extract	% DM	4.2	7.3
Ash	% DM	21.7	5.8
Gross energy	MJ/kg DM	15.3	20.0
Minerals			
Calcium	g/kg DM	71.5	13.3
Phosphorus	g/kg DM	5.6	5.0
Potassium	g/kg DM	1.5	22.3
Sodium	g/kg DM	2.2	23.2
Magnesium	g/kg DM	77.4	2.8
Amino acids			
Alanine	% protein	4.8	
Arginine	% protein	6.1	15.4
Aspartic acid	% protein	8.5	
Cystine	% protein	1.1	
Glutamic acid	% protein	11.9	
Glycine	% protein	5.0	
Histidine	% protein	1.5	2.3
Isoleucine	% protein	2.9	7.8
Leucine	% protein	6.9	8.4
Lysine	% protein	4.6	11.3
Methionine	% protein	1.6	1.7
Phenylalanine	% protein	3.5	6.3
Proline	% protein	4.0	
Serine	% protein	4.2	
Threonine	% protein	4.0	7.4
Tryptophan	% protein	1.0	1.2
Tyrosine	% protein	3.3	
Valine	% protein	3.6	7.3
Poultry nutritive values			
AMEn broiler	MJ/kg DM	8.9	

(Ali et al., 1995; Diomandé et al., 2008; El-Deek et al., 2002; Göhl, 1982; Lim Han Kuo, 1967; Melgar Arnaiz, 1964; Salazar et al., 2003)

protein, for instance, ranges from 2.9 to 9.7% of crude protein, a range that is abnormally large for animal products.

Snail meat

Snail meat (without shells) contains 52-63% protein (DM). It is similar to a fish meal of moderate quality. Ash content varies between 11 and 27% DM, and depends on the amount of residual shell material included. Snail meat contains about 3-4% calcium and 0.4-1.2% phosphorus. Fat content is generally less than 5%, much less than that of a typical fish meal (about 7-14%). Snail meat compares favourably with other conventional sources of animal protein like beef, pork and poultry meat. The low cholesterol level and high iron content of the meat make it a good antidote for fat related diseases (Bright, 1996).

Effect of Snail Meal on broilers

Snail meal is a suitable substitute for more traditional protein sources in poultry diets. It can usually be added at 10-15% (diet DM). Creswell and Kompiang, (1981) found that snail meal (*Achatina fulica*) inclusion up to 15% of the dried boiled snail meal in broiler diets gave similar weight gains to the control. Whereas, supplementing a diet containing 20% snail meal with 0.25% methionine completely reversed the negative effects on broiler performance. Elmslie (1982) showed that flesh of snail meal replacing fishmeal up to 15% of the diet had no negative effect on growth of broiler chicks. However, supplementing 20% or more snail meal (flesh) to diets decreased growth of broilers, as it was caused by the use of raw snail meal. Also, Ulep and Buenafe (1991) included snail meal in broiler diets at 0, 4, 8 and 12% and found that final body weight was not affected by feeding dried shelled snail meal and different protein sources (snail meal, fishmeal, meat and bone meal). They concluded that snail meal is a suitable protein source in broiler diets. It was found that ground snail shells could be used as a good source of minerals for poultry as they contain (g/kg) 387 Ca, 0.35 P, 0.25 Mg, 0.35 Na, and 0.066 Mn (Nadazdin et al., 1988).

In studies with broilers, Creswell and Kompiang (1981) evaluated snail meal as a replacement for soyabean up to its 15% level. The results also suggested the presence of unidentified growth factors in snail meal similar to those claimed for fish meal. Catalma et al., (1991) reported that the feeding of 10% uncooked snail meal in chicks, resulted in a 31% increase in total weight gain and 35% improvement in feed efficiency, compared to the control diet. In the Philippines, for broilers fed 12% cooked or raw snail meal, cooking improved the feed conversion ratio and the palatability of snail meal. Boiled snail meal led to similar production results and higher intake in chicks when compared to fish meal (Venugopalan et al., 1976). Cooked snail meal led to better performance than raw snail meal, and to slightly lower performance than the fish meal based control diet (Barcelo et al., 1991). Snail meal fed at 4, 8, 12% in broiler diets replaced fish meal and meat and bone meal with good results (Ulep et al., 1991). Snail meal replacing 50% of fish meal gave similar growth and feed conversion rates (Arockiam et al., 1992). Body weight and live-weight gains were similar for broilers fed a maize-soybean diet and broilers fed snail meal (Ali et al., 1995). Whole (including shells) dried giant snail meal was included in broilers at up to 6% of the diet, but the best results were obtained at the 2% inclusion level (El-Deek et al., 2002). Snail meal replaced up to 30% of the fish meal in starter phase of broilers, and up to 100% of the fishmeal in the grower stage, with an increase of growth rate and no negative effects on the taste of broiler meat (Diomande et al., 2008).

Effect of Snail Meal on Layers

Creswell and Habibie (1981) reported that up to 5% snail meal can be included in layer diets without reducing egg weight and up to 10% without significantly reducing egg production. Snail meal can also partially replace fish or meat meal in poultry diets (Gohl, 1981; Venugopalan et al., 1975). Layers performed best when snail meal was fed at the 10% level (Serra, 1997). In the Philippines, studies with laying hens have produced contradictory results. Crushed snails given to White Leghorn layers as a supplement (20 g/bird/day) to a commercial mash resulted in a 88% mean hen-day egg production rate compared to 84% without the supplement (Ancheta, 1990). Also in the Philippines, ground snail meal included at 11% or 25% in layer diets resulted in lower hen-day egg production than for the control diet rate (72% and 84% respectively). However, feed intake, feed conversion, shell thickness and albumen weight were not affected, and feeding snail meal to layers resulted in a higher value of eggs (Catalma et al., 1991). Replacing fish meal in layer diets had no negative effects on egg numbers or egg quality, in addition of being cheaper than fish meal (Diomande et al., 2008). Similarly, up to 15% golden snail meal was fed to layers without depressing performance.

Effect of Snail Meal on Ducks

Ducks are commonly used for the biological control of apple snails in paddies and taro patches. In China, young ducks readily eat young snails (hatchlings and juveniles) weighing less than 1.5 g, while 60 day old ducks are the main predators of older and adult snails (1.5 g to over 6.5

g) (Kaiming Liang et al., 2013). In experiments in the Philippines, Pekin ducks were fed fresh apple snail meat and fresh banana peels (1:1) replacing 50%, 70% or 90% of a commercial mash. The diet consisting of 45% banana peels, 45% snail meat and 10% commercial mash gave the best performance and yielded the highest profit (Ulep et al., 1995). In the Philippines, laying Mallards ducks fed fresh and crushed snails mixed with rice bran and broken maize grains at a ratio of 1.1:1 exhibited a 60-70% egg production rate (Tacio, 1987), while feeding *ad libitum* fresh snails and small amounts of rough rice resulted in a 68% egg production rate (Aquino, 1990). The use of a 2:1 ratio of fresh snails and rice bran has also been reported (Serrano, 1988). Mallards can be fed economically on a 50:50 mixture of apple snails and rice bran, and although ducks fed the snail and bran diet had a lower final body weight and feed efficiency than ducks fed on commercial diets, economic returns were higher (PCARRD, 2006). The combination of snails and commercial duck layer feeds at a ratio of 1:1.3 resulted in optimum egg production rate and low production cost (Datuin et al., 1990).

Potential constraints

1. Deficiency of methionine – supplementation of synthetic methionine in poultry diets is necessary.
2. The bodies of snails contain 70-90 mg/kg hydrocyanic acid (Ravindran,1987), presumably accumulated from the ingestion of cyanogenic materials. The hydrocyanic acid can be completely eliminated by cooking for 15 minutes. Cooking also enables easy separation of the body from the shell.
3. Whole dried snail meal contains a relatively high level of ash, which limits its recommended level for continuous feeding.
4. Apple snails may concentrate dangerous pollutants from freshwater bodies, such as mercury, arsenic and uranium, in their midgut, kidney and foot. They are thus considered good bio-indicators for water contamination but unrestricted feeding by humans and animals might be considered with caution (Vega et al., 2012).
5. Anti-nutritional factor that depressed growth, which was obvious when the raw snails were fed above 10% of the diet. However, boiling for 15–20 min completely overcame this effect.

CONCLUSION

Snail meal is a good substitute for fish meal and can be used as one of the non-conventional alternate animal protein source to broilers, layers and ducks. The use of alternative protein-rich Snail meal could be an additional component that could contribute to reduce feed costs and thereby improve the economic viability of the industry. The significance of snail meal feed resources in poultry production mainly depends on their local availability in sufficient quantities for farm use, simple preparation and processing methods, nutritive values and the price for its exploitation for the preparation of various commercial feeds.

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NATIONAL EGG CO-ORDINATION COMMITTEE

DAILY / MONTHLY EGG PRICES DECLARED BY NECC AND PREVAILING PRICES AT VARIOUS PRODUCTION CENTRES (PC) AND CONSUMPTION CENTERS (CC) SEPTEMBER 2020

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	Average
NECC Prices																															
Ahmedabad	460	465	470	470	470	470	470	473	500	520	535	540	545	547	547	547	525	525	528	495	540	546	551	555	555	530	530	532	534	545	517.33
Ajmer	445	447	447	437	415	422	431	461	474	479	479	483	483	470	450	455	463	466	480	495	500	507	511	515	500	500	500	500	511	535	475.37
Asansole	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Barwala	441	441	441	441	411	415	427	451	415	475	475	475	475	475	445	452	458	462	472	486	491	491	493	493	493	493	493	493	500	512	466.17
Bengaluru (CC)	435	440	445	445	445	445	445	450	470	500	510	515	520	520	520	520	500	500	505	510	515	520	525	525	525	525	510	510	515	520	494.33
Brahmapur (OD)	452	455	455	455	452	452	454	454	476	488	496	498	501	501	501	501	501	491	491	491	504	504	507	507	507	507	507	507	507	513	487.83
Burdwan (CC)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chennai (CC)	440	440	440	440	440	440	440	440	460	485	500	510	515	515	515	515	515	495	495	505	505	515	515	515	515	515	495	495	495	495	486.83
Chittoor	433	433	433	433	433	433	433	433	453	478	493	503	508	508	508	508	508	488	488	498	498	508	508	508	508	508	488	488	488	488	479.83
Delhi (CC)	460	460	460	460	441	441	445	465	478	482	482	482	482	482	461	461	477	477	485	501	503	503	505	505	505	505	505	505	511	540	482.3
E.Godavari	450	455	455	455	455	455	455	455	475	485	495	498	501	501	501	501	501	501	501	504	507	507	510	510	510	510	510	510	510	513	489.87
Hyderabad	413	418	418	418	418	418	421	451	470	485	495	501	504	504	504	480	480	483	488	495	501	505	507	507	490	490	490	490	495	503	474.73
Ludhiana	438	440	440	440	430	420	420	443	463	472	472	472	472	472	466	459	459	459	463	475	489	491	491	493	493	493	486	486	493	503	466.43
Midnapur (KOL)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Mumbai (CC)	463	468	473	473	473	473	473	476	505	525	540	550	555	558	558	558	535	535	538	543	550	556	560	562	562	545	545	545	545	550	526.4
Muzaffurpur (CC)	490	490	490	486	477	477	477	490	509	524	524	524	524	519	514	500	500	510	519	533	545	545	545	543	543	543	543	543	548	557	517.73
Mysuru	440	440	445	445	445	445	445	450	473	503	513	518	520	520	520	520	500	500	505	510	517	522	527	527	527	527	510	510	515	520	495.3
Nagpur	423	430	430	425	425	420	448	475	500	540	545	540	530	530	530	520	500	500	510	525	525	550	555	555	545	530	520	520	520	547	503.77
Namakkal	410	410	415	415	415	415	420	420	445	470	470	490	490	495	495	495	480	480	485	485	495	495	495	495	495	480	480	480	480	480	466.29
Patna	486	486	476	467	467	467	471	500	509	519	514	509	500	500	500	495	500	507	524	524	543	543	545	538	538	538	538	538	548	552	511.4
Pune	470	475	475	475	475	475	480	485	515	535	550	560	570	570	570	570	550	550	553	558	570	575	575	575	575	550	545	545	547	552	535.67
Ranchi (CC)	495	500	500	495	477	486	486	490	509	509	514	514	514	514	500	500	500	510	519	533	543	548	548	548	543	548	548	548	548	557	518.13
Vijayawada	450	455	455	455	455	455	455	455	475	485	495	498	501	501	501	501	501	501	501	504	507	507	510	510	510	510	510	510	510	513	489.87
Vizag	456	458	458	458	458	458	458	460	500	500	500	500	502	502	502	502	502	502	505	507	515	515	515	515	515	515	515	515	515	517	494.67
W.Godavari	450	455	455	455	455	455	455	455	475	485	495	498	501	501	501	501	501	501	501	504	507	507	510	510	510	510	510	510	510	513	489.87
Warangal	416	421	421	421	421	421	424	454	473	488	498	504	507	507	507	483	483	486	491	498	504	508	510	510	493	493	493	493	498	506	477.73
Prevailing Prices																															
Allahabad (CC)	476	476	452	452	443	448	467	500	505	509	509	509	500	490	490	490	490	495	510	524	538	538	538	524	524	524	524	524	529	548	501.53
Bhopal	452	453	453	453	447	440	431	460	490	510	510	513	506	506	506	506	490	498	503	503	530	530	545	545	545	535	535	514	530	545	499.47
Hospet	400	405	410	410	410	410	410	415	435	465	475	480	485	485	485	485	465	465	470	475	480	485	490	490	490	490	475	475	480	485	459.33
Indore (CC)	445	440	440	440	440	440	440	450	485	505	515	515	510	510	490	490	490	490	510	520	525	530	530	535	520	520	500	500	510	540	492.5
Jabalpur	452	452	452	452	452	444	467	500	500	500	510	510	505	505	505	505	505	505	505	515	525	535	535	535	535	520	520	512	517	535	500.33
Kanpur (CC)	448	448	448	448	438	438	438	457	490	490	490	490	490	490	476	476	476	490	490	510	510	510	519	519	519	519	519	519	519	543	487.23
Kolkata (WB)	502	502	502	485	485	485	485	502	525	540	550	550	550	550	550	550	536	536	550	553	555	555	555	555	555	555	555	555	555	555	534.6
Luknow (CC)	493	493	493	493	493	477	477	473	500	500	510	510	510	507	500	500	500	500	510	530	530	533	533	533	533	533	533	540	550	560	511.57
Raipur	457	460	464	462	462	453	480	480	510	520	545	545	545	545	545	505	505	505	505	505	515	520	520	525	525	525	525	510	514	530	506.9
Surat	495	500	505	505	505	475	475	478	505	525	540	545	550	552	552	552	530	530	538	543	553	565	575	580	580	560	560	560	565	570	535.6
Varanasi (CC)	487	487	487	477	477	467	473	500	517	523	523	523	516	516	507	513	516	516	523	530	533	537	537	540	548	540	540	547	550	560	517

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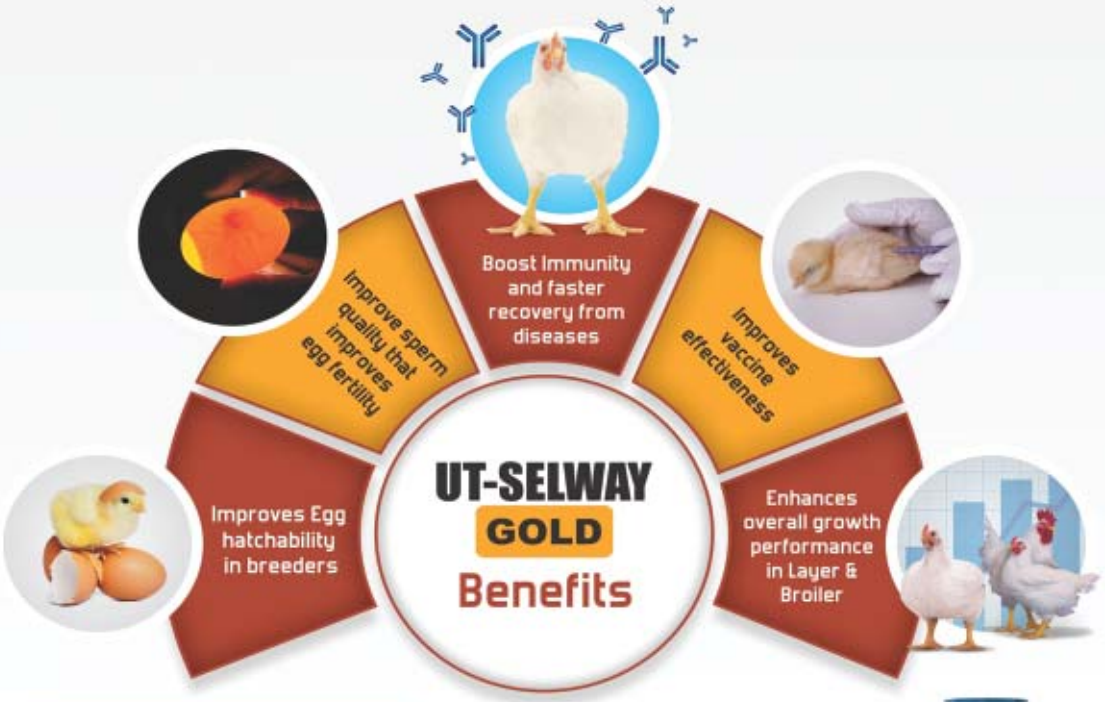

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Avian Chlamydiosis: An emerging threat to poultry industry and zoonotic potential

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Introduction

Avian chlamydiosis is a systemic, bacterial infection caused by *Chlamydia psittaci*. Among poultry, turkeys and ducks are more susceptible than chickens. The disease varies from asymptomatic to high morbidity and mortality. Clinical signs are nonspecific and include anorexia, apathy, drop in egg production, diarrhea, ocular discharge, and respiratory disease. It can be an inapparent subclinical infection or acute, subacute, or chronic disease in wild and domestic birds. It is a zoonosis referred to as psittacosis, parrot fever, or ornithosis, which can cause serious health problems such as pneumonia in humans. Infections occur worldwide and have been identified in at least 465 avian species, particularly caged birds (primarily psittacines), colonial nesting birds such as egrets, herons, ratites, raptors, and poultry. Among domestic species, turkeys, ducks, and pigeons are most often affected. The disease is a significant cause of economic loss and human exposure in many parts of the world.

Etiology and Transmission

The disease caused by an obligate intracellular bacterium called *Chlamydia psittaci*. Eight avian serotypes are recognized till now. Two new *Chlamydiaceae* species have been identified in the past decade and have a worldwide distribution; *C gallinacea* in chickens and guinea fowls and *C avium* in pigeons and psittacines. The pathogenic and zoonotic potential of these new *Chlamydia* species yet to be determined.

The main mode of transmission in birds is by the fecal-oral route or by inhalation. Respiratory discharge or feces from infected birds contain elementary bodies that are resistant to drying and can remain infective for several months when protected by organic debris (eg, litter and feces). Airborne particles and dust spread the organism.After inhalation or ingestion, elementary bodies attach to mucosal epithelial cells and are internalized by endocytosis. Elementary bodies within endosomes in the cell cytoplasm inhibit phagolysosome formation and differentiate into metabolically active, noninfectious reticulate bodies that divide and multiply by binary fission, eventually forming numerous infectious, metabolically inactive elementary bodies. Newly formed elementary bodies are released from the host cell by lysis. The incubation period is typically 3–10 days but may be up to several weeks in older birds or after low exposure. Arthropod-borne transmission by blood-sucking ectoparasites is possible. Vertical transmission has been documented in several bird species, including turkeys, chickens, and ducks.

Source of infection to birds

- contact with infected sick birds or asymptomatic carriers
- vertical transmission from infected birds
- infected mammals and arthropods
- contaminated environments

Stressors (eg, transport, crowding, breeding, cold or wet weather, dietary changes, or reduced food availability) and concurrent infections, especially those causing immunosuppression, can initiate shedding in latently infected birds and cause recurrence of clinical disease. In turkeys, *C psittaci* and *Ornithobacteriumrhinotracheale* infection are often concurrent. Carriers often shed the organism intermittently for extended periods. Persistence of *C psittaci* in the nasal glands of chronically infected birds may be an important source of organisms.

Clinical manifestations in birds

Severity of clinical signs and lesions of avian chlamydiosis depends on the virulence of the organism, infectious dose, stress factors, and susceptibility of the bird species; asymptomatic infections are common. Clinical signs include:

- Nasal and ocular discharge, conjunctivitis, sinusitis
- Green to yellow-green droppings, inappetence, weight loss
- Fever,weakness,inactivity, ruffled feathers, drop in egg production

Respiratory signs predominate in turkeys and chickens. Watery diarrhea is often present in ducks. Young birds are more likely to develop severe disease.Clinical pathology test results vary with the organs most affected and severity of the disease. Hematologic changes most often present are anemia and leukocytosis with heterophilia and monocytosis. Plasma bile acids, AST, LDH, and uric acid may be increased. A radiograph or a laparoscopy may reveal an enlarged liver and spleen and thickened air sacs.

Necropsy findings

- serofibrinouspolyserositis (airsacculitis, pericarditis, perihepatitis, peritonitis)
- bronchopneumonia, hepatic necrosis, hepatomegaly, splenomegaly

Similar lesions are seen in other systemic bacterial infections and are not specific for avian chlamydiosis. Small granular, basophilic intracytoplasmic bacterial inclusions might be observed in multiple cell types (eg, epithelial cells, macrophages) on cytology and histopathology. In chronic infections, enlargement and pale spleen or liver may be noted. Necrosis and bacterial inclusions are not seen. Lesions are usually absent in latently infected birds, even though *C psittaci* is often being shed.

Diagnosis of Avian Chlamydiosis

- For flocks, serologic testing, necropsy, and PCR
- For individuals, demonstration of shedding of the organism by PCR or culture, a rise in antibody titers, or a combination of serologic test and PCR test or culture

Treatment and Prevention of Avian Chlamydiosis

Tetracyclines

Human and avian chlamydiosis is a reportable disease; state and local governmental regulations

should be followed wherever applicable. No effective vaccine for use in birds is available. Treatment prevents mortality and shedding but cannot be relied on to eliminate latent infection; shedding may recur.

Tetracyclines (chlortetracycline, oxytetracycline, doxycycline) are the antibiotics of choice. Drug resistance to tetracyclines is rare, but reduced sensitivity requiring higher dosages is becoming more common. Tetracyclines are bacteriostatic and effective only against actively multiplying organisms, making extended treatment times (from 2–8 weeks, during which minimum-inhibitory concentrations in blood must be consistently maintained) necessary. When tetracyclines are administered orally, additional sources of dietary calcium (eg, mineral block, supplement, cuttle bone) should be reduced to minimize interference with drug absorption.

Outbreaks of clinical disease in poultry flocks are not common. Treating infected flocks with chlortetracycline at 400–750 g/ton of feed for a minimum of 2 weeks has effectively decreased potential risk of infection for plant employees. The medicated feed must be replaced by nonmedicated feed for 2 days or more before slaughter and processing. Medicated feed should be provided for 45 days if elimination of the organism is attempted.Persistence of oxytetracycline residues in eggs of laying hens is 9 days, and persistence of doxycycline residues is 26 days after administration at 0.5 g/L for 7 days. Use of some tetracycline antibiotics and doxycycline in poultry is prohibited, and state regulations must be followed.

In pigeons and companion birds, use of chlortetracycline-medicated feeds for 45 days was historically a standard recommendation for imported birds. Difficulties in palatability of the feed itself or the high level of antibiotic necessary for adequate blood levels have limited its use. Doxycycline is the current drug of choice, because it is better absorbed, has less affinity for calcium, better tissue distribution, and a longer half-life than other tetracyclines. Doxycycline added to feed or water can also result in adequate blood levels and has less effect on normal intestinal flora than does chlortetracycline.

Appropriate biosecurity practices are necessary to control the introduction and spread of chlamydiae in an avian population. Minimal biosecurity standards include:

- quarantine and examination of all new birds
- prevention of exposure to wild birds
- traffic control to minimize cross-contamination
- isolation and treatment of affected and contact birds
- thorough cleaning and disinfection of premises and equipment (preferably with small units managed on an all-in/all-out basis)
- provision of uncontaminated feed
- maintenance of records on all bird movements
- continual monitoring for presence of chlamydial infection

The organism is susceptible to heat (it may be destroyed in <5 minutes at 56°C).All surfaces should be thoroughly cleaned of organic debris (e.g. litter or faeces) before disinfection. Appropriate disinfectants are quaternary ammonium compounds such as benzalkonium chloride, 3% hydrogen peroxide, alcoholic iodine solutions or 70% ethanol. Hospital grade disinfectants based on sodium hypochlorite are also suitable. A 1:100

dilution (10mL/L) should be prepared immediately before use, and discarded at the end of each disinfection session.

Zoonotic Risk of Avian Chlamydiosis

Avian chlamydiosis is a zoonotic disease that can affect people after exposure to aerosolized organisms shed from the digestive or respiratory tracts of infected live or dead birds or handling of infected birds, tissues (eg, slaughterhouse), or bedding. Human disease most often results from exposure to pet psittacines and can occur even if there is only brief contact with a single infected bird. Other persons in close contact with birds, such as pigeon fanciers, veterinarians, farmers, wildlife rehabilitators, zookeepers, and employees in slaughtering and processing plants or hatcheries, are also at risk. Zoonotic transmission of *C psittaci* in poultry industry workers is likely underestimated.

Precautions should be taken when examining live or dead infected birds to avoid exposure (eg, dust mask and plastic face shield or goggles, gloves, detergent disinfectant to wet feathers, and fan-exhausted examining hood).Infection in people varies from asymptomatic to flu-like symptoms and respiratory disease (eg, pneumonia). Rarely, endocarditis, myocarditis, hepatitis, and encephalitis occur. Immunocompromised people are at increased risk of developing clinical disease.

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PRESS RELEASE

Vetphage Pharmaceuticals rebranded with its mother company brand Proteon Pharmaceuticals

The exercise will bring financial savingswhich will be translated to enhancing customers' support.

September,2020: Vetphage Pharmaceuticals, a company operating in the animal health industry, known for their support to Poultry farmers and Aquaculture, has been successfully rebranded to Proteon Pharmaceuticals India Pvt. Ltd.Being established in India in 2017, the Vetphagehas proven to be a reliable partner for Proteon Pharmaceuticals S.A, its mother company headquartered in Poland, Europe. Proteon is a leader in bacteriophage (phage) technology for livestock farming. Proteon's products modulate the microbiome, enhancing sustainability and improving performance on the farm.The company currently operates worldwide with footprints in Europe, APAC and Middle East.

Vetphage has shown a promising potential in the firstfew years of its operations. Having recorded 175% revenue increase in the first 6 months of 2020 despite of the general countrywide lockdown, the company is forecasting more than 200% growth in H2 of 2020 comparing to H1. "Since poultry producers are switching over to safer and efficient feed additives, we expect to see substantial growth in our sales volume and market share. A bulk of the growth is likely to accrue from the South and West markets, with sizable contributions from the North, Central and Eastern Indian regions. We expect 40% growth in revenue in the Southern region comprising AP, Karnataka, TN, Kerala, Telangana, and a 20% growth in the Western region, comprising of Maharashtra and Gujarat"said Dr Ramdas Kambale, Director of Proteon Pharmaceuticals India.

Indian Poultrymarket is currently valued at Rs. 10,000 crores and growing annually with a compounded growth rate of 10 percent,which is among the highest in world.

"Proteon strives to capture the Indian market under one global brand. It'll bring savings that we will translate to even bettersupport our customers" said Mr.Nipun Gupta, Chief Commercial Officer at Proteon Pharmaceuticals S.A. The new approach of poultry integrators is fostering growth in the retail segment, which includes integrator owned or franchised frozen poultry shops, home delivery of frozen poultry products and sales counters in existing establishments. However, this organized sector is expected to only grow post-COVID. India is also experiencing rapid urbanization, reflecting the drift to an increasingly urban lifestyle, the 10 major cities in the country account for over 60 percent of all poultry meat consumption. There has been a gradual shift in eating habits, with the well-informed younger generation with disposable incomes increasingly adopting non-vegetarian diets. "The market is ready to grow and farmers need to make use of all the technology they can to increase production and minimize losses" added Mr. Gupta.

About Proteon Pharmaceuticals

Professor Jaros³aw Dastych is the founder,CEO and President of the Board of Proteon Pharmaceuticals. With a PhD in Medical Biology, a full-fledged scientific career and several years of hands on experience in research and technology, he set up the first research laboratory at the International Institute of Molecular and Cell Biology in Warsaw in the year 2000, and in 2005 sawthe inspired beginning of Proteon Pharmaceuticals S.A.Professor Jaros³aw Dastych is supported by a strong team led by Nipun Gupta, Chief Commercial Officer, responsible for the company's global sales, sales support, contract management, client services, distribution and marketing, and Dr. Ramdas Kambale Director of Sales – APAC Region.

Proteon created a precision phage development platform that uses omics technologies, molecular biology, bioinformatics and artificial intelligence (AI) to create effective, reliable and safe antibacterial solutions for animal health. Proteon was the first company to develop precision bacteriophage-based feed additives to manage bacterial challenges in poultry. The company's flagship anti-salmonella feed additive increases food safety in poultry whiles its aquaculture product improves fish health by reducing bacterial loads. Proteon's team is developing phage products across the fields of livestock farming, including products that prevent avian pathogenic E.coli in poultry and mastitis in dairy cows.

Phages are the most numerous and oldest organisms on the planet. They are organic, natural and omnipresent in the environment. A critical part of the global microbiome, phages naturally protect animals and humans from bacteria. Controlled delivery of phages, using precision biological tools promises to reduce antibiotic usage, overcoming the growing threat of antibiotic resistant bacteria, as well as to increase sustainability in agriculture and to improve human health.

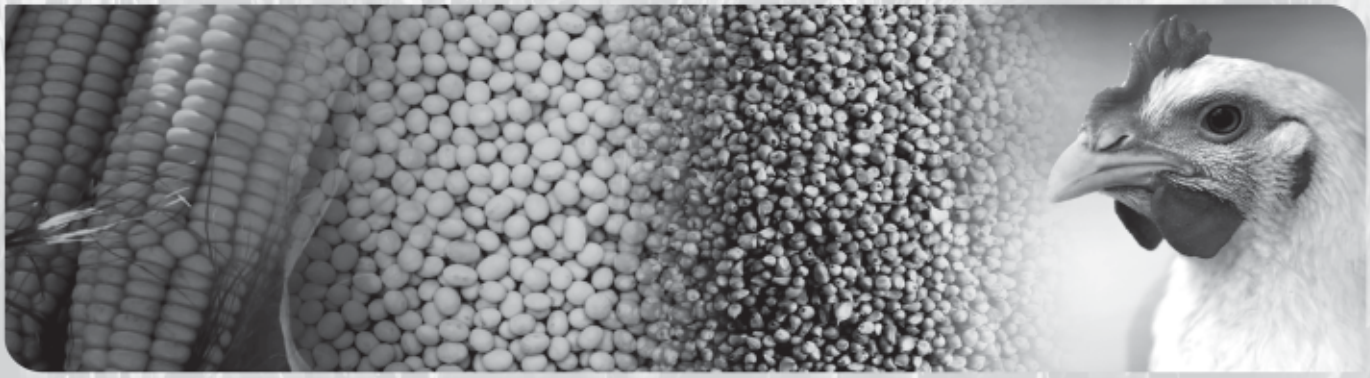
Cargill Mycotoxin Survey

Mycotoxin Prevalence in India

Main Highlights of Mycotoxin Survey

- 1705 samples have been collected for more than 3 years (May'2017 – June'2020) from 13 states.
- Mycotoxin risk matrix have been evaluated for four mycotoxins i.e. Aflatoxin, T2 Toxin, Ochratoxin & Fumonisin in six ingredients; soya bean meal, mustard deoiled cake, rice polish, corn, corn gluten meal, dried distilleries grain soluble, predominantly used in poultry diet.
- 78% samples were contaminated with more than one mycotoxin. Co contamination of various mycotoxin can amplify negative effects on animal performance.
- 20% samples were contaminated with two mycotoxins, 34% samples were contaminated with three mycotoxins and 24% samples were contaminated with four mycotoxins.
- Aflatoxin is majorly found mycotoxin in all ingredients, almost 41% samples were above tolerance limits for aflatoxin followed by T2 & Fumonisin, 29% and 25% respectively.
- Corn Gluten Meal is highly contaminated with all mycotoxins.
- DDGS is highly contaminated with aflatoxin & T2.
- MDOC & SBM are comparatively cleaner ingredients in terms of mycotoxin contamination.
- West Bengal comes under extreme risk zone, where more than 76% samples were above tolerance level for at least one mycotoxin.
- Andhra Pradesh comes under severe risk zone, where 51% - 75% samples were above tolerance level at least for one mycotoxin.
- Rest of other 11 states come under high risk zone, where 26% - 51% samples were above tolerance level at least for one mycotoxin.

Keep yourself ahead of mycotoxin threat
By analysing ingredients for various mycotoxins and applying appropriate measures



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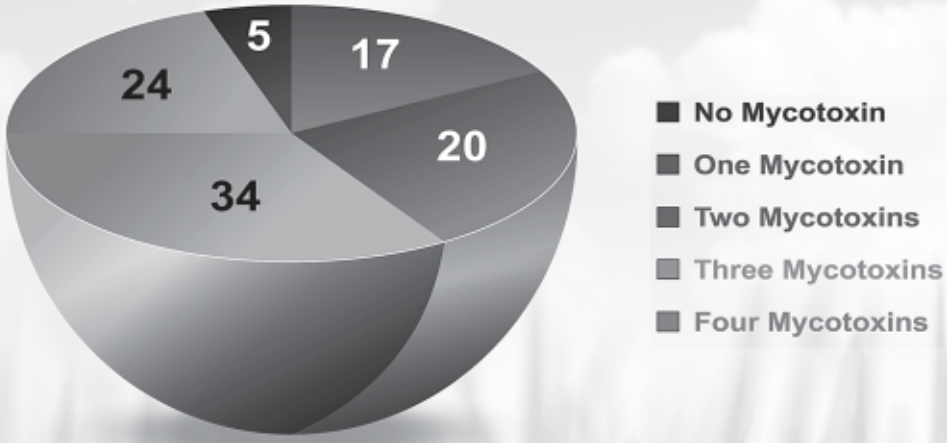
Cargill Mycotoxin Survey

Co-contamination of Mycotoxins is major risk for poultry, which amplify negative impact on poultry performance

Co-Contamination of Mycotoxins (%)



88% samples were contaminated with more than one mycotoxin

24% samples were contaminated with four analysed mycotoxins

DDGS	
Aflatoxin	100%
Ochratoxin	97%
T2	90%
Fumonisin	44%

CGM	
Aflatoxin	99%
Ochratoxin	93%
T2	87%
Fumonisin	91%

Corn	
Aflatoxin	83%
Ochratoxin	55%
T2	77%
Fumonisin	54%

Total Number of Samples : 1705

Total Analysis : 5350

Time Frame: 3 years 2 months (May'17 – Jun'20)

Ingredients 18

States Covered : 13

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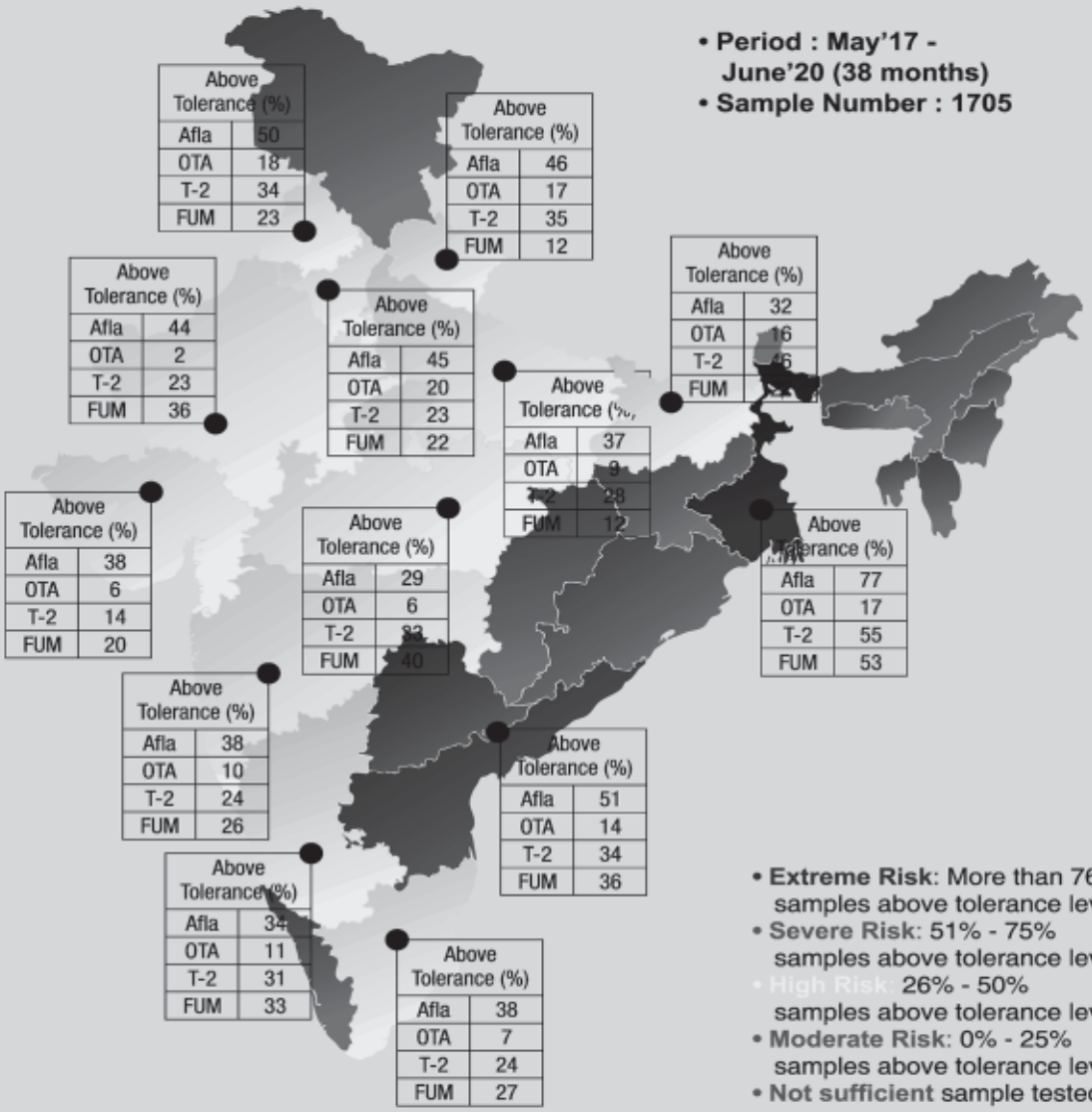
Cargill Mycotoxin Survey

Mycotoxin Prevalence in India (State wise)



- **Period : May'17 - June'20 (38 months)**
- **Sample Number : 1705**

- **Extreme Risk**: More than 76% samples above tolerance level
- **Severe Risk**: 51% - 75% samples above tolerance level
- **High Risk**: 26% - 50% samples above tolerance level
- **Moderate Risk**: 0% - 25% samples above tolerance level
- **Not sufficient** sample tested

Total Number of Samples : 1705	Total Analysis : 5350	Time Frame: 3 years 2 months (May'17 – Jun'20)	Ingredients 18	States Covered : 13

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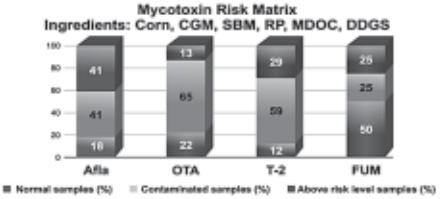
Cargill Mycotoxin Survey

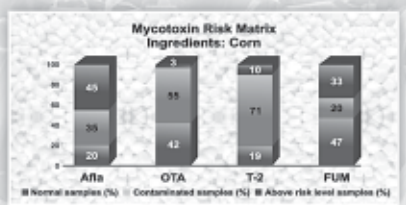
Mycotoxin Prevalence in India (Ingredients wise)

Total Number of Samples : 1705	Total Analysis : 5350	Time Frame: 3 years 2 months (May'17 – Jun'20)	Ingredients 18	States Covered : 13



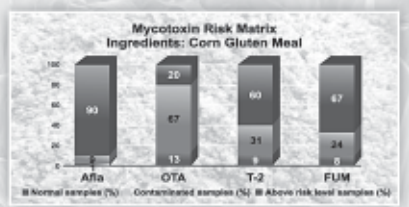
	Aflatoxin	Ochratoxin	T2	Fumonisin
Average (ppb)	45	20	246	1343
Maximum (ppb)	899	1007	4990	8441

Figure 1: All selected ingredients *- Percentage of normal samples, contaminated samples and above risk level samples for each mycotoxin*



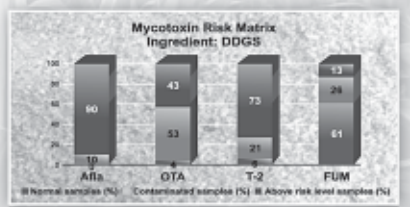
	Aflatoxin	Ochratoxin	T2	Fumonisin
Average (ppb)	57	5	100	1420
Maximum (ppb)	640	91	1180	14150

Figure 2: Corn *- Percentage of normal samples, contaminated samples and above risk level samples for each mycotoxin*



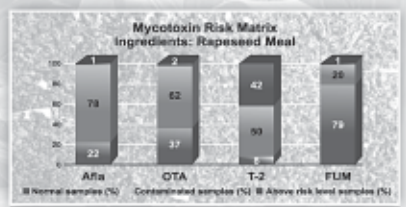
	Aflatoxin	Ochratoxin	T2	Fumonisin
Average (ppb)	101	28	364	5018
Maximum (ppb)	620	220	2114	8441

Figure 3: Corn Gluten Meal (CGM) *- Percentage of normal samples, contaminated samples and above risk level samples for each mycotoxin*



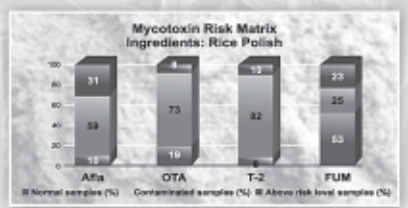
	Aflatoxin	Ochratoxin	T2	Fumonisin
Average (ppb)	125	67	799	729
Maximum (ppb)	899	1007	4990	1210

Figure 4: Dried Distillers Grain Soluble (DDGS) *- Percentage of normal samples, contaminated samples and above risk level samples for each mycotoxin*



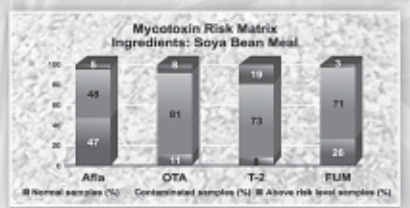
	Aflatoxin	Ochratoxin	T2	Fumonisin
Average (ppb)	5	6	210	140
Maximum (ppb)	42	139	901	920

Figure 5: Rapeseed Meal *- Percentage of normal samples, contaminated samples and above risk level samples for each mycotoxin*



	Aflatoxin	Ochratoxin	T2	Fumonisin
Average (ppb)	24	13	120	804
Maximum (ppb)	179	141	968	8160

Figure 6: Rice Polish *- Percentage of normal samples, contaminated samples and above risk level samples for each mycotoxin*



	Aflatoxin	Ochratoxin	T2	Fumonisin
Average (ppb)	6	15	132	251
Maximum (ppb)	254	142	1396	6960

Figure 7: Soya Bean Meal (SBM) *- Percentage of normal samples, contaminated samples and above risk level samples for each mycotoxin*

Three levels of contamination have been defined for each mycotoxin

Above Risk Level: Level of mycotoxins were found to be more than tolerance limits that can impose serious threat on consumption.
Contaminated Ingredients: Level of mycotoxins were more than LOD, but less than maximum tolerance limit (above risk level). These ingredients were considered positive samples.
Non contaminated Ingredients: Level of mycotoxins were found to be below LOD, limit of detection. These ingredients were considered normal samples.

List of ingredients for mycotoxin risk matrix evaluation

Ingredients	Corn	CGM	DDGS	Rapeseed Meal	Rice Polish	SBM	Total	*Others	Grand Total
Number of Samples	376	145	141	171	128	239	1200	505	1705

Maximum Tolerance Limits of various Mycotoxins

Name of Mycotoxin	Limit of Detection - ppb (LOD)	Maximum Tolerance Limit (ppb)
Aflatoxin	2	20
Ochratoxin	1	40
T2	10	200
Fumonisin	200	1000

*Others :- Sun Flower Meal, Wheat, Wheat Bran, Rice Gluten Meal, Broken Rice, Sorghum, MDM, Cotton Seed Meal, Excle, Sesame cake etc.

Contact : Dr. Nidhi Madnawat, email : nidhi_madnawat@cargill.com

BROILER LIFTING RATES FOR THE MONTH OF AUGUST 2020

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	90	100	100	100	100	96	92	85	85	80	83	83	85	85	88	88	88	83	79	79	79	81	85	85	88	88	90	90	92	95	95
Karimnagar	90	100	100	100	100	96	92	85	85	80	83	83	85	85	88	88	88	83	79	79	79	81	85	85	88	88	90	90	92	95	95
Warangal	90	100	100	100	100	96	92	85	85	80	83	83	85	85	88	88	88	83	79	79	79	81	85	85	88	88	90	90	92	95	95
Mahaboobnagar	90	100	100	100	100	96	92	85	85	80	83	83	85	85	88	88	88	83	77	77	79	81	85	85	88	88	90	90	92	95	95
Kurnool	90	100	100	100	100	96	92	85	85	80	83	83	85	85	88	88	88	83	79	79	79	81	85	85	88	88	90	90	92	95	95
Vizag	92	97	97	97	97	97	97	97	97	97	97	97	97	97	92	92	92	87	87	87	87	87	87	87	90	90	90	90	92	92	92
Godavari	92	100	100	100	100	100	95	90	90	90	90	90	90	90	90	90	90	90	90	90	90	90	92	92	97	97	97	97	99	99	99
Vijayawada	92	100	100	100	100	100	94	89	89	89	89	89	89	89	89	89	89	89	89	89	89	88	92	92	95	95	95	95	97	100	100
Guntur	92	100	100	100	100	100	92	87	87	87	89	89	89	89	90	90	90	90	90	90	90	86	90	90	93	93	95	95	97	100	100
Ongole	92	100	100	100	100	100	90	85	85	85	89	89	89	89	90	90	90	90	90	90	90										

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PRESS RELEASE

Biomin®

Mycotoxins Contribute to Poultry Diseases and Vaccine Impairment

Several lesser-known effects of mycotoxins in poultry related to disrupting gut integrity reinforce the importance of mycotoxin risk management to protect the health and profitability of flocks.

by Dr. Timothy Jenkins

A look at how mycotoxins may be harming your poultry flocks, and what you can do to mitigate the risk.

The discovery that mycotoxins affect animal health was surprisingly recent. It was in the 1960's and it explained the sudden death of 100,000 turkeys in the United Kingdom. It turned out that Aspergillus growing on peanut meal produced small amounts of a compound called aflatoxin. The problem had been in the detection of such secondary metabolites of fungi that are often highly toxic but usually present in tiny quantities. Tiny but lethal in the case of those turkeys.

Mycotoxins and poultry disease susceptibility

Now there is growing awareness of the variety of mycotoxins, how frequently they are present in animal feed and, importantly, how much of their effect can simply be impaired performance and increased susceptibility to disease (Table 1).

Table 1. Some known links between mycotoxins and disease susceptibility

Area Affected	Mycotoxin Effect	Example References
Intestinal Tract	Direct lesions formed opening pathway to infection (e.g. T-2 toxin)	Sokolović et al., 2008
	Reduced mucus protection, including reduced production of mucus producing goblet cells	Antonissen et al., 2011; Bracarense et al., 2012
	Decreased production of tight junction (TJ) proteins, weakened TJ's allow pathogen entry	Antonissen et al., 2014; Basso et al., 2013
	Faster rate of epithelial cell death (apoptosis can reduce intestinal barrier integrity)	Antonissen et al., 2014; Gitter et al., 2000
	Slower rate of cell replacement in epithelium	Antonissen et al., 2014
	Mucosal damage leading to nutrient availability for pathogen proliferation	Antonissen et al., 2014
	Intestinal inflammatory response impairing animal growth and health and interfering with appropriate immune response to pathogens	Przybylska-Gornowicz et al., 2015
Immune Cells	Protein synthesis inhibition reducing rate of immune cell production and activity	Maresca, 2013
	DNA fragmentation in immune cells reducing immune response. Also exacerbates DNA damage caused by pathogens.	Payros et al., 2017
	Faster rate of immune cell death	Pestka et al., 2008
Cytokines and Antibodies/ Immunoglobulins	Cytokine production leading to inflammation	Pestka et al., 2010
	Reduced response of antibodies when required	Grenier et al., 2011
	Also wasteful increased production of antibodies as part of inflammatory response	Grenier et al., 2011; Obremski, 2014
	Reduced vaccine response	Grenier et al., 2011 (Figure 2)

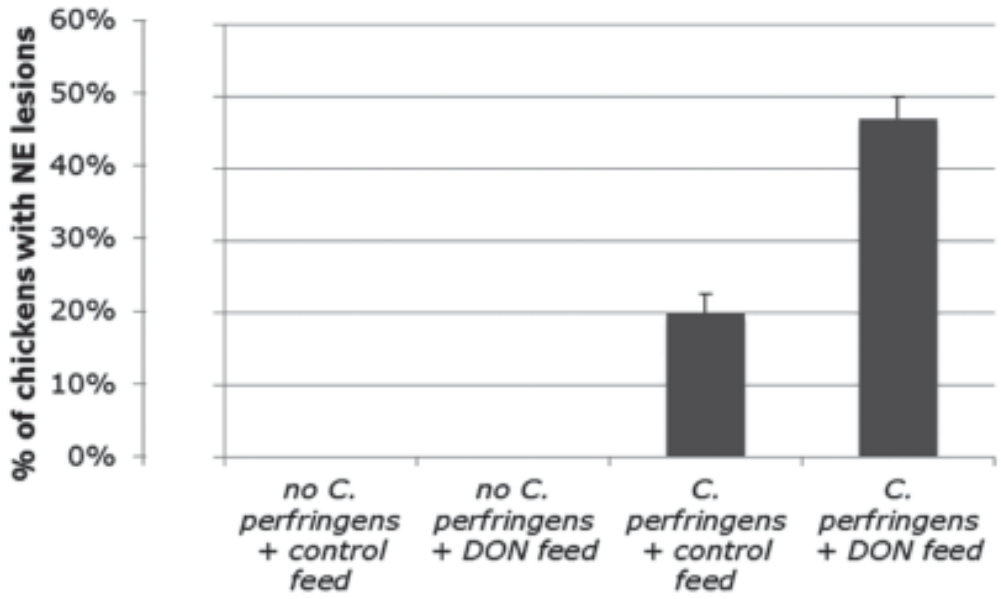
Source: BIOMIN

A growing trend of pathogenic diseases such as **salmonellosis**, **necrotic enteritis**, etc., are putting a pressure on poultry production, reducing productivity and increasing the cost of therapeutic treatment. While we historically link **mycotoxins in poultry** to classic symptoms such as reduced feed intake, oral lesions, reduced productivity, etc., producers are often unaware of the link between mycotoxins and health.

Lesser known effects in poultry

Some of the common mycotoxins are actually quite poorly absorbed in a normal poultry gut. Trichothecenes (Deoxynivalenol or DON, T-2, etc.) and fumonisins (FUM) are very poorly absorbed in poultry, approximately 10% and 1%, respectively (Grenier et al., 2016).

Figure 1. DON can increase the prevalence and also severity of necrotic enteritis lesions in chickens.



Source:

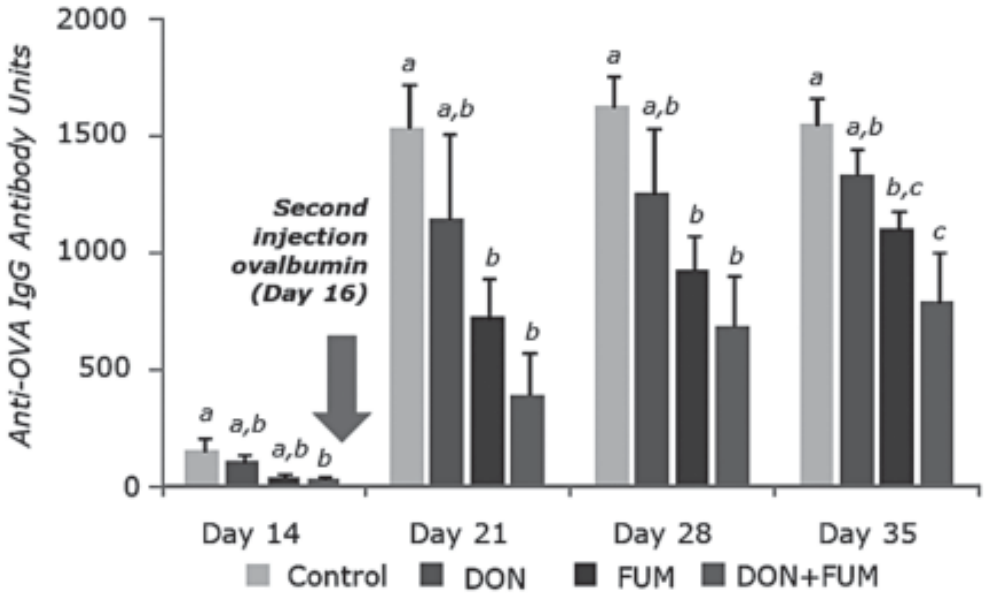
Adapted from Antonissen et al., 2014. Error bars indicate standard error, the myco-toxin difference was statistically significant ($P < 0.05$).

There is now clear evidence that even if these mycotoxins are not in the bloodstream, they can still affect the gut wall. This in turn can increase the colonization of the epithelium by pathogens, the entry of pathogens into the animal and reduce the ability of an animal to fight infection.

Energy loss

The inflammatory response to these mycotoxins is an energy cost to the animal that can result in significant loss in productivity. This overresponse of the immune system to mycotoxins also interferes with the appropriate response to disease.

Figure 2. DON and FUM can reduce the response to vaccines with more pronounced effects seen when there is co-occurrence of DON and FUM.



Source: Adapted from Grenier et al., 2011. The response to ovalbumin vaccination (OVA, laboratory antigen) was evaluated via the measurement of anti-OVA IgG antibodies in the serum, and this response was reduced and particularly marked after the second injection. Differences due to mycotoxins remained after 19 days. Treatments not sharing the same letter (a, b or c) on the same day were statistically significantly different ($P < 0.05$).

Gut barrier erosion: *The gut wall is the first barrier that pathogens must overcome to infect a bird. Mycotoxins compromise the integrity of this barrier in many ways. Reduced barrier integrity increases the potential for colonization and uptake of pathogens e.g.* **Salmonella** *spp. (Vandenbroucke et al., 2011, increased uptake of bacteria),* Clostridia *(Antonissen et al., 2014, increased necrotic enteritis lesions as seen in Figure 1) and* **Eimeria** *(Grenier, 2016, increased lesions and shedding of oocysts).*

At the same time mycotoxins compromise the immune system causing wasteful inflammation and a reduced ability to combat mycotoxins.

Vaccine response: Another more hidden link between mycotoxins and diseases has also been identified: that mycotoxins can impair the response to vaccines (Figure 2).

Mycotoxin risk management

Given all of the links between mycotoxins and disease, a mycotoxin risk management program is necessary to safeguard poultry health. This includes monitoring of mycotoxin levels in feed, good feed storage and hygiene as well as an effective mycotoxin deactivator product that can effectively address particularly the trichothecene mycotoxins such as DON and T-2.

DON is not able to be bound effectively by binder products. With proven biotransformation of trichothecenes, **Mycofix®** is the only mycotoxin deactivator to successfully obtain the worldwide benchmark of European registration for activity against trichothecenes.

PRESS RELEASE

Evaluating Ammonia Binders - B50 Value

A Critical Test To Evaluate Ammonia Binding Capacity

Poultry industry is one of the fastest growing sectors in India today. Though the growth rate is high, the poultry industry regularly faces different types of challenges. Out of all the challenges, ammonia emission is one of the major ones the industry is facing, especially in the winter season. Ammonia is a colourless gas produced by the microbial decomposition of organic nitrogen compounds found in the manure. It is highly soluble in water and very toxic. It has a direct negative effect on the birds and farm workers.

There are several ways to control ammonia in the farm that includes ventilation, dietary management, litter management, feed additives etc. All these methods have some merits and demerits. Though ventilation is one of the most economical methods to control ammonia, its limitation is that it is completely dependent upon the external environmental conditions. Good sunlight with proper airflow makes it more effective. In winter season, when farms are completely covered with curtains this method is not effective. Similarly, in dietary management, specialists are required to reformulate the nutrient content in the feed on a regular basis.

To overcome these limitations and to control ammonia, one of the convenient and safe methods is the use of Yucca extracts as a feed additive. Yucca extract is obtained from the Yucca schidigera plant. This plant contains some active components like saponins and glycocomponents. Saponin helps to increase the permeability of the intestinal wall, thus allowing better nutrient absorption of the feed. Glycocomponents helps bind and neutralize ammonia. Yucca extract is very effective in binding of ammonia but most important point to be considered is its potency and therefore the required inclusion level to neutralize ammonia. The potency of any Yucca Extract is measured by its B50 value.

AMMONIA AND ASSOCIATED RISKS IN POULTRY FARMING

Ammonia accumulation in poultry sheds is a common challenge especially during winter season because of limited ventilation. Ammonia accumulation can also occur due to the usage of old litter for a long period.

Ammonia is a highly irritating, colourless gas having a sharp pungent odour. It is produced by the breakdown of uric acid present in the manure by bacteria. Temperature and moisture act as catalysts in this process. Ammonia is harmful both for birds and humans.

Harmful effects of Ammonia:

High level of ammonia is found to depress feed consumption, body weight gain, onset of sexual maturity and egg production.

Petkov (1966) has reported as much as 9% drop in egg production upon two-month exposure to high NH3 levels.

Birds show watery eyes, closed eyelids and rubbing of eyes with wings due to irritating nature of ammonia.

Due to high ammonia levels, egg white also starts deteriorating and there is discolouration of egg yolk which reduces the market value of the egg.

Birds exposed to higher ammonia levels developkerato conjunctivitis, air sacculitis, and show reduced respiratory rate and increased susceptibility to coccidiosis and various respiratory diseases due to damaged ciliary and epithelial lining of the respiratory tract.

Poor carcass quality in terms of increased breast blisters has been reported in broilers.

Ammonia is a potent immune- suppressant, and therefore, lesser the quantity liberated within the

system of bird or animal, the better the health and healthier the environment.

Ideal solution to ammonia problem:

There are various approaches available to control ammonia. Dietary treatment seems to be most logical in terms of efficacy and convenience. Any dietary ammonia binder should have the following properties:

- It should inhibit Urease enzyme
- It should bind preformed ammonia
- It should be effective in the gut as well as in the litter

BIOPOWDER

Biopowder is a 100% natural and organic product, produced by the milling, pulverizing and standardization of stems of the *Yucca schidigera* plant.Biopowder reduces and controls ammonia which affects the performance of birds. It improves productive parameters increasing the weight and increasing efficiency in production performance.

Biopowder has two active components, Saponins and Glycocomponents.

Saponins:

- Saponins do not allow the uric acid to get converted into ammonia, by binding with urease inside the cell.
- Saponins also work as a surfactant, and reduce the surface tension, thereby enhancing the absorption of nutrients
- Improve the microbial activity in the GIT
- Improve digestion

Glycocomponents:

- Glycocomponents bind directly with ammonia in the digestive tract, and remove it from the system, improving intestinal conditions
- They also continue to act in the environment by binding with ammonia and preventing its release into the air thereby maintaining a healthy environment within the shed

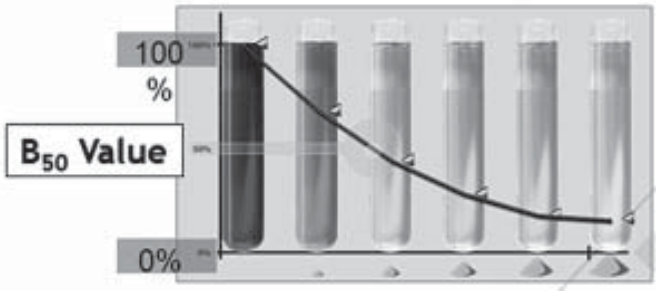
EVALUATION OF EFFICACY OF AN IDEAL AMMONIA BINDER

Nowadays, there are quite a few products available in the market based on Yucca. While selecting, one should ask for B50 value as it is a true indicator of the efficacy of product. It is also important that the extract should be specifically from the Yucca schidigera plant. There are many species of Yucca, but the extract from Yucca schidigera is considered to be the most ideal one in terms of efficacy and performance.

B50 Value:

Several commercially available ammonia binders are either diluted or contain non-Yuccaschidigera components. These products can easily be identifiedby testing the B50 value of the product.

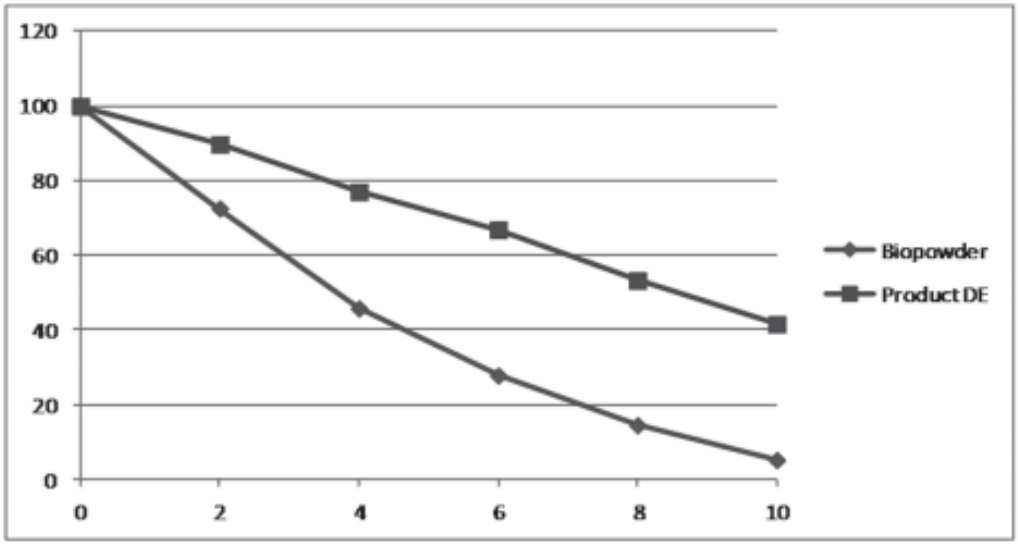
The B50 value indicates the milligrams of a *Yucca* extract necessary to reduce 50% of ammonia in aqueous solution.



In the B50 value test, it is the amount of Yucca extract required to bind 50% of ammonia produced by 0.2 milliliter of a 5 millimolar solution of ammonium sulphate. The result is interpreted by the change in the colour(blue to light blue) of the solution.Biopowderguarantees aB50 value of less than 5.0 mg. Lower the B50 value, better is the ammonia binding property.

Also lower the B50 value, lower is the product's inclusion required to bind the same quantity of ammonia. Biopowder is generally recommended to be included into finished feeds at a standard inclusion of 100 grams/MT of feed and therefore the product offers the best 'value proposition' in terms of investment to return.

COMPARISON OF B50 VALUES OF A COMPETING BRAND WITH BIOPOWDER



In a comparative study B50 value of Biopowder and a competing brand was conducted.

Results of study indicate that Biopowder has a B50 value of 3.6 mg whereas product DE has a value of 8.6 mg.

Which means that to bind with a quantity of Ammonia, if 3.6 mg of Biopowder is needed, then for same performance 8.6 mg of other brand is required which means that ammonia binding capacity of Biopowder is 2.4 times more as compared to another product. As per the comparison, Biopowder is far more cost effective and efficacious as compared to product DE.

For any additional information, please contact ….

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Vetphage Pharmaceuticals
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What Does The Future Hold For The Poultry Sector?

Rajesh Babu, Owner of Krishna Farms and
Dr. RamdasKambale, Director - Sales APAC and Board Member, Vetphage pharmaceuticals.

Rajesh Babu

Dr. Ramdas Kambale

India is gradually experiencing an increase in urbanization and increasingly disposable incomes. Reflecting the drift to an increasingly urban lifestyle, the 10 major cities in the country account for over 60 percent of all poultry meat consumption. There has also been a gradual shift in eating habits, with the well-informed younger generation increasingly adopting non-vegetarian diets.

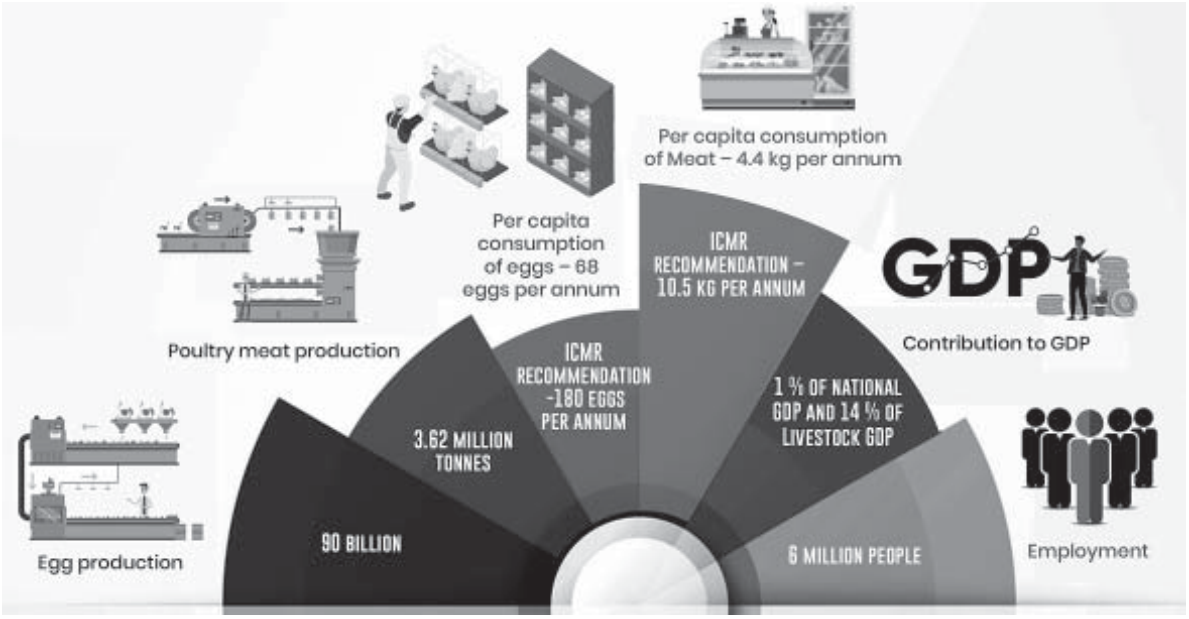
Demographic changes happen to favor both broiler and egg industries as proteins derived from poultry are more affordable and are not associated with any religious taboos. Although consumption levels are rising, per capita consumption of meat is still 4.4 kg per annum against the ICMR recommended 10.5 kg per annum. The per capita consumption of eggs is 68 eggs per annum against the ICMR recommended 180 eggs per annum. Food processing is expected to become one of India's major industries in the coming years. The production chain is rapidly evolving with increased production and processing, better storage facilities, and evolving preferences. At present, only 10 percent of the agricultural produce is processed, resulting in a lot of wastage. The government plans to triple the sector's capacity and has also committed investments of 6000 crore rupees in mega food parks across the country. The production is becoming more integrated in the broiler sector. Meanwhile, 85 percent of all egg production is accounted for by commercial farms. The increasing demand for poultry meat and the improved organization has made India the third largest producer of eggs and the fifth largest producer of broilers.

The benefits of processed meat

A mature processed meat market will be beneficial to producers and customers alike. Processing technology will increase the shelf life of all meat products, which will make it easier for farmers to absorb any shocks due to the improved control over the inventory. Also, the fact that the product can be stored will shield them from unexpected crashes in prices.

With social distancing being the new normal for foreseeable future, and the need for hygienically stored meat which is not touched by hand is going to go up. Customers are going to educate themselves and start looking for traceability, t, and fresh and hygienic meat. Processed meat is the logical answer to all the above demands, and it will allow producers to adhere to the strict quality requirements. Players who can integrate themselves into a brand-driven processed meat market could gain a lot from this trend.

However, there are a number of challenges that need to be addressed if we want the industry to flourish.



Challenges

1) Transportation:

Over 60 percent of broiler birds and eggs are produced in six major states. Birds are usually transported alive in unhygienic and inhumane conditions resulting in mortalit during transport.Lack of dry processing and proper cold chain facilities make transportation of good poultry produce a logistical challenge.

2) Licensing and Regulatory control

There is no regulatory authority ensuring quality standards in farms, processing and transportation in the domestic market. Licensing is done on the municipality level, and they lack the knowledge and expertise to enforce unified quality standards.

3) Multidrug resistant pathogens

The rampant use of antibiotics to treat infections and promote growth has led to the rise of multidrug-resistant pathogens. The industry must shift to bacteriophages and enzybiotics to minimize losses and increase productivity. Oncethese areas are properly addressed, it might improve the outlook for the sector.

4) Current Crisis

Although an increase in consumer demand was able to restore poultry products' prices, the lockdown had already affected the poultry farmers in several ways. As soon as the lockdown commenced, the sales started to plummet. It also led to disruption in transportation, which prevented the movements of poultry products and other supplies to the markets. The loss of two sales broiler cycles proved to be costly for small-time poultry farmers. The bigger producers were able to tide through tough times by channeling their sales into processed meat and other value-added products.For poultry producers who sell products to the restaurant, hotel and catering sector, the current situation is quite challenging. These outlets accounted for 40 percent of total sales before the pandemic and a lot of them still remain closed despite easing of restrictions. Full recovery of the sector is not going to happen till large public gatherings like parties, weddings, and conferences are allowed to take place again.

Although restrictions are being eased in a phased manner, new hotspots continue to emerge due to which various local governments are re-imposing mobility. Meanwhile, the periodic outbreaks of avian influenza led to the recirculation of false claims that chickens are potential carriers of coronavirus. However, the temporary obstacles aside, the situation is expected to stabilize soon.

Chicken to boost our immunity

The Coronavirus pandemic has shaken everyone across the world. While doctors, medicare staff, and the police are working hard to fight the pandemic, it is very important for the public to take care of themselves too. That can begin by consuming healthy food for a stronger immune system. Kids below 10 years and the elderly have to be more cautious and maintain a healthy diet to fight the virus. Chicken is something many say, will provide the body with required proteins and help maintain a better immune system. Anushka Baindur, Senior Dietician, Fortis Hospital, find out ways to build a stronger immune system by eating chicken, other diets to follow, and more…

1) How can we build our immunity by eating chicken? What are the elements that chicken consists that helps boost the immunity of people across all age groups?

Anushka Baindur: Our immune system has several components like antibodies and immune cells that depend on protein. Hence, protein is a quintessential requirement for our immune system. Chicken being a source of high-quality protein can, therefore, help in boosting one's immunity. Apart from protein, chicken is also a good source of various other nutrients, like Retinol (an active form of Vitamin A) Vitamin B B3, Vitamin B9, Zinc, etc. that also have some or the other role to play in immune functioning.

2) Is it advisable to consume chicken during summer since many feel chicken increases the amount of heat production in our body not knowing whether its a myth or a fact?

Anushka Baindur: There is no scientific evidence stating that chicken intake should be avoided in the summer. Although one needs to take care that it is cooked well to eliminate any chances of stomach infection which can be more prevalent in the summer season.

3) How much quantity of chicken is advisable to consume in a week and in what form?

Anushka Baindur: The quantity and frequency of consumption in a week depends on a person's requirement and also activity level. An athlete or a person doing high-intensity workouts can take it more often than a sedentary person. Also as protein intake corresponds to a person's body weight, intake can vary from one person to another. Also, use healthier methods like boiling and grilling rather than deep fat frying.

4) What are the benefits of having chicken?

Anushka Baindur: Chicken is a source of high biological value protein. Adding chicken in the diet can help meet daily protein needs. It helps in faster wound healing due to its high protein and zinc content. Being a good source of niacin it boosts brain function, protects the skin from sun damage, and can ease symptoms of osteoarthritis. Moreover, a bowl of warm chicken soup is comforting and can alleviate cold symptoms as it may contain substances that have anti-inflammatory properties.

5) If not chicken, what is the substitute food one can consume for their vegetarian diet?

Anushka Baindur: Chicken is a good source of high biological value, which means it has all the essential amino acids present in it. Vegetarian foods do not have any such source, but a combination of cereal and pulse, e.g. rice and dal together will have all the essential amino acids, making it a complete protein. There are numerous protein sources even in the vegetarian diet like all dals, whole pulses like channa, rajma, green moong, soya milk, and milk products like paneer, nuts, tofu, etc. It is imperative for a vegetarian to include these sources in their daily diets.

6) What is the best dish that goes along with chicken?

Anushka Baindur: Chicken can be paired with wheat/ millet rotis, rice, or even with just a bowl of vegetable salad.

7) Can you share the diet chart to be followed by kids for a healthier immune system?

Anushka Baindur: A diet chart is always individualized and can vary from person to person. Hence, there is no "one size fits all" diet chart even for kids. But for a healthier immunity include protein foods like eggs, chicken, fish, paneer, dal, and pulses, nuts, etc. in their daily diet. Kids can be given a concoction or kadha or kashaya made by boiling onions, tulsi leaves, ginger, and spices like pepper, cumin, coriander, turmeric with some added honey. Ensure adequate vegetable intake in forms acceptable by kids like a palak, methi or drumstick leaves paratha, mixed vegetable and protein cutlets, pasta or noodles made in a healthy way with plenty of added veggies. Nuts and dried fruits like almonds, pistachios, rains, dates, etc. can be eaten as such or made into milkshakes, chikkis, ladoos, etc. Include 2-3 servings of fruits daily. Maintain good hydration using water, buttermilk, coconut water, traditional beverages like kokum, and bael ka sharbat.

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PRESS RELEASE

NOVUS

Project Destiny Media Question – SCA

Dr. Vaibhav Nagpal

1. What is Project Destiny?

Project Destiny is Novus's multi-phase strategic plan aimed to establish the company as "a leader in gut health solutions for the sustainable production of protein through nutrition."

2. What was the reason for the restructuring?

The main purpose of restructuring was to develop organization structure and capabilities to establish Novus as a leader in gut health solutions. We also took this as an opportunity to develop a decentralized customer-centric organization so that wecan provide the regional teams (sales, technical, marketing, etc.) with more autonomy to make decisions close to the customers.

3. Explain Strategic/tactical/operational Level Changes?

The first step was creating our new Executive Leadership Team, which was established in April. From there we reorganized our teams into three regions – Americas, EMEA and ASIA. Americas is comprised of two sub-regions – North and Central America, andSouth America. We consolidated our services in Europe and Middle East, Turkey, and Africa to create EMEA. Asiais comprised three sub-regionsEach of the three regions has a chief commercial officer and each sub-region (we call them our world areas) has a director to oversee operations. In Asia the world areas are Northeast Asia, headquartered at Shanghai; Southeast Asia Pacific, headquartered at Bangkok; andSouth-Central Asia, headquartered at Chennai.We have also established strategic marketing and technical teams at the global and regional levels that will allow us to better understand our customers' needs and industry trends. We also decentralized corporate functions to support more agility within our regional offices.

4. Novus completed a restructuring just a few years ago. Why change again?

As with any company, we believe in continuous improvement and adapting to our customers' needs. Corporate or organizational structures that may have fit several years ago may not be effective in today's environment, and we want to provide our employees with a structure that allows them to succeed and serve our customers to their utmost capability.

5. How will this affect the customers?

Our customers should experience a heightened level of service and responsiveness from their Novus representatives. Our plan through this change is to bring us closer to the customer by thinking the way they think.

6. How will this affect the industry?

The industry should see a renewed focus from Novus and that our efforts, energy, and resources are invested in ways that establish us as a leader in gut health through nutrition.

Mr.Neeraj Kumar Srivastava

7. Future goals after the implementation of Project Destiny?Where do you see Novus in next five years?

Our goal as we implement Project Destiny is to establish a more agile working environment where Novus employees can execute quickly on behalf of the customer while also being held accountable for their own professional success. By empowering our employees, we allow them to create better relationships with customers who come to value our expertise and view us as a trusted partner.

We are learning from our successes over the last 29 years to create a clear and recognizable Novus brand within the global animal agriculture industry. Our overall goal is to have Novus be known as the gut health expert in the industry. It will take some time to get there but we are committed to this path. Gut health is vital, and we have solutions that can make a difference on the farm.

8. Are there any new Gut Health products in pipeline?

We have an outstanding opportunity in the HMTBa molecule, which is the methionine source for our ALIMET® feed additive. The molecule is surprisingly versatile and has allowed us to create our line of bis-chelated MINTREX® trace minerals and a powerful acidifier that has the added benefit of methionine, ACTIVATE® nutritional feed acid,to name a few of our current HMTBa-based products. We are certainly exploring new differentiated products and solutions that we can bring to our customers.

9. What is the biggest change management challenge you've faced? And how did you handle it?

Change always comes with some difficulty and this change has been especially challenging because many of the Novus employees globally are working remotely due to the coronavirus pandemic. We recognize that being physically apart can stifle conversations that would occur naturally in an office environment. As such, our objective during Project Destiny has been to be transparent with our employees about our goals and how we aim to achieve them as well as have regular structured communications so that they can understand the context and what is coming.

A very positive aspect of Project Destiny is that it has provided a great opportunity to professionally advance/elevate some exceptional employees into new and more complex roles.

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Feeding Solutions Private Limited

Innovista-Vetina enrich poultry industry on gut integrity and anticoccidial program planning

Dr. Shaveta Sood, Marketing Head, Vetina Animal Health LLP, the marketing tie up company of Innovista Feeding Solutions Pvt Ltd organized a webinar on the 12th of September, 2020 with key speaker Dr. Sudheer Rukadikar, an eminent pathologist and freelance Consultant from Pune and Dr. Sekhar Basak, MD, Innovista on Gut Integrity and Rational use of Anticoccidials in broiler nutrition.

Dr. Sudheer Rukadikar
Poultry Consultant

Dr Shekar Basak
MD Innovista

The live webinar was attended by over 450 delegates on zoom and had a viewership of over 1000 plus on Facebook live. Dr. Rukadikar discussed about bacterial, viral, protozoal nutritional and toxic causes for damages caused in the GI tract of chicken and also highlighted solutions to maintain a healthy gut. The major solutions suggested Dr. Rukadikar to maintain a healthy gut are – ensure good quality feed with minimum non start polysaccharides, follow proper anticoccidial program, periodical lesion scoring to ensure proper intestinal health,
Prevention of entry of bacterial and viral infective agents in the gut and lastly prudent use of antibiotic growth promoters and natural growth promoters to maintain a healthy gut.

Dr. Sekhar Basak highlighted on the relationship between the protozoal disease coccidiosis caused by Eimeria spp and bacterial disease necrotic enteritis caused by clostridium perfringens.

He claimed coccidiosis triggers necrotic enteritis and a good anticoccidial program planning for the whole year can ensure a healthy gut and super performance for producers. Further Dr. Basak discussed about anticoccidial polyether ionophores and synthetic chemicals and established the fact about how wide dosage range of anticoccidials can ensure good performance and also minimize chances of low efficacy or toxicity, that is a major limitation with drugs having narrow dosage range. He illustrated the theory giving examples of ionophores and chemicals in both categories of wide and narrow dosage ranges and how their usage is extended or limited for this reason. He voiced a strong message to the audience that there is no new product in the pipeline when it comes to anticoccidials and therefore the producers need to rationally use anticoccidials and AGPs with scientifically and judiciously designed rotation and shuttle programs so that we can extend the use of the currently existing product in a long run. The presentation by both speakers was followed by a questions from the attendees which were addressed by the panel to the satisfaction of the participants.

Mr. Prakash Khaire, CEO, Vetina thanked the participants and the speakers in his address. The distribution partnership of Vetina with Innovista Feeding Solutions which started in the beginning of the lockdown in the country in March has taken off with flying colors, with Vetina steadily and confidently spreading across the trading circles in all zones with strong brands from Innovista in the AGPs, Anticoccidials and natural products space.

Mail us your queries on "Gut Integrity" and Anticoccidial Program Planning to shaveta.sood@vetina.com or call us @ 7020396946/9871203111

PRESS RELEASE

VIPWA webinar on Entrepreneurship Opportunities in Poultry Sector

Vets in Private Welfare Association (VIPWA) organized a webinar on 13 September 2020 on Entrepreneurship Opportunities in Poultry Sector and speaker was Prof. P. K. Shukla, Registrar and Dean PGS, DUVASU, Mathura. Dr. Dinesh Bhosale, President VIPWA welcomed the speaker and participants.Dr.ShavetaSood, Hon' Secretary, VIPWA introduced Dr.Shukla. Bio.

Prof Dr PK Shukla is renownedpersonality in Animal Husbandry Sector and has served many institutions during his career. His last assignment was as Joint Commissioner Poultry, Govt. of India in Ministry of Agriculture, Department of AH, Dairying and Fisheries.He is decorated with numerous prestigious awards and honours. He has almost 295 publications in his credit besides 3 book chapters and 2 lab manuals.

Dr Shuklaemphasised on the need to develop entrepreneurship skills in young budding veterinarians, profile of Indian Poultry sector anddrivers for this industry. He emphasized in understanding the new normal and way ahead. He believes that Entrepreneurship is like treating a businessoffering as innovative service. Dr. Shukla discussed about themalnutrition, which prevails in our country and contributes to 50% of deaths in children below 5 years of age. Food habits has changed across country.Ithas been observed that population above 15 years of age, almost 70% of it has turned to Non vegetarians.

Total Global meat production is around 107 MMT and only around 10 per cent of this is entering in international marketing channel. India ranks 3rd in egg production and 5th in chicken meat production, having 3.3 % share.Indian Poultry sector targets food security, improving the livelihood and empowering women.Global egg production is around 1387 billion. Poultry contributes nearly 0.5 per cent to the National GDP and 10 per cent to total livestock GDP. Currently Poultry sector values 130,000 crores in which organized sector contributes 80% and unorganized contributes 20%.With 1.37 billion population and 5-6 per cent of per capita increase in annual income makes India, a very large market. India is fourth largest Poultry producer in volumes but per capita consumption is still lowest in World. The total broiler market was estimated at 4.7 million tons. Per capita meat consumption is 3.4 kgs per annum. Total broiler meat market size was over 85,000 crores in terms of retail price.

Domestic table egg production for 2019 was 109 billion eggs, translating per capita egg consumption of 80 eggs per annum with a market size of 45,000 crores.Total Poultry population in India is 851.81million, out of which 30% is Layer sector, 40% Broiler sector and 30% backyard sector.

Poultry meat exports fromIndia 2017-18 was 0.45MMT, which values around$ 87.71MMT and major importing countries are Oman, Maldives, Vietnam, Indonesia, and Russia.India produces 11 million chicks per day and table eggs of 250 million per day. 97% of the total eggs sold in the country are astable eggs, 2% as branded eggs and less than 1% as processed eggs. In 32 days, the chicken weighs 2 kgs and figure goes to 4 million Broilers in our country. 95% of the chickens goes to wet markets, 4% in processed market, 1% in further processed products. Almost 350 million Layers weighing around 1.3kgs in 52 weeks produces 320 eggs in a laying cycle.

In broilers, India is growing @8-10%and in Layers it is @4-6% on year to year basis.

Dr Shukla also mentioned about the opportunity in being Entrepreneur in Poultry sector as with 1.37

Billion population and per capita income increase of 5-6% makes India a very big market. Recommendation of 180 eggs and 11 kgs meat can create million jobs, 5-fold increase in Egg industry and 10-fold increase in Broiler industry.Increase in per capita consumption of 1 egg or 50gm poultry meat will generate estimated 25000 additional jobs in the country.

Dr. Shukla said that commercial poultry production in India is a major venture of the private sector with about 75 per cent under its control. He informed that rural backyard poultry farming is being strongly encouraged by the public sector as a mean of livelihood support for the rural poor.India is having strength of world class infrastructure, production, self-sufficient genetic stock, highestreturn on capital and per unit land and thebest biological efficiency in animal meat category.

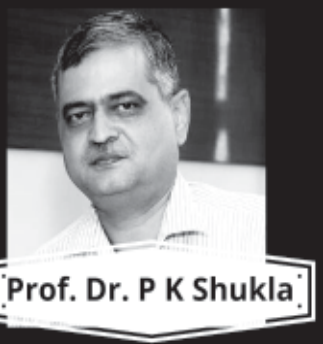
Dr. Shukla explained about the nutritional value of egg and poultry meat. He also focused upon new normal COVID scenario in poultry sector. There is need to create awareness among people regarding consumption of egg and poultry meat. He further said poultry sector can play a significant role in making Self Reliant India. Dr. Shukla also briefed about the government support to develop poultry sector in the country. He urged the budding veterinarians to explore the poultry allied fields also, such as poultry feed industry, poultry disease diagnostics, vaccine production etc. Dr. Shukla also answered the queries of many participants.

Lastly, Dr. Shukla discussed about the National Education Policy which will be now Transformed Education system with 5+3+3+4 year course. Almost all the regulatory bodies will go off including VCI, only higher education commission will be there rest will be only suggestive bodies. One university in every district with not less than 3000 students has been envisaged. University will not have affiliated colleges or institutions and every steam will be open to the students. This system will be more student centric, proposed with ABC system that is Academic bank for Credits and multiple exits system will be available to the students. There will be credit management system with multiple institutions options. So, some new thoughts with some innovations are there in New Education Policy. Main aim is that people all over the world should be attracted to India as education hub.

The webinar was live on the Facebook page of VIPWA and more than 4000+ views were recorded. VIPWA was established in year 2008 and it's an association of 230 vets working in private sector and staying in Pune.

VIP Vets Welfare Association (VIPWA)(Regd.)

VIPWA webinar on Entrepreneurship Opportunities in Poultry Sector



Prof. Dr. P K Shukla

Registrar, DUVASU, Mathura
Former Joint Commissioner(Poultry),
Govt. of India

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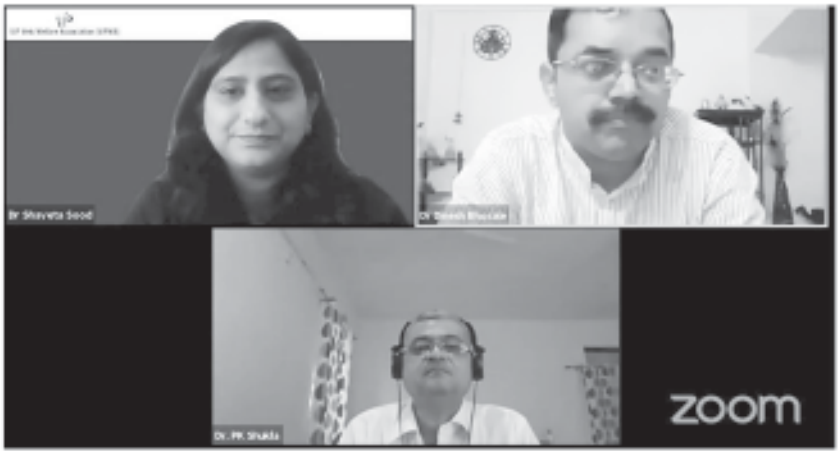

Effect of dietary acidifier on performance of broiler chickens

Dr Onkar Pawaskar and **Dr Mangesh Sagar**

Feed additives containing low-molecular-weight organic acids are called as acidifiers. The importance of low-molecular-weight organic acids in livestock nutrition increased considerably in response to the ongoing ban on feed antibiotics. Different combinations of organic acids are used in feed of animals against bacterial infections. The dry form acidifiers contain organic acids, organic acid salts or their blends, usually based on carriers, which do not react chemically with the active ingredient. They are used in poultry nutrition for the purpose of maintaining the digestive pH at a level to prevent the growth of pathogenic bacteria. They also show bactericidal activity against pathogenic intestinal microflora. Most often, pathogenic bacteria begin to develop in the digestive tract when the lumen pH of the small intestine and caecum exceeds 5.8, and that of large intestine exceeds 6.2 The multiplication of pathogenic micro organisms in the intestine may result in the inflammation of intestinal mucosa or necrosis of intestinal epithelium. This causes increased secretion of intestinal fluids which leads to diarrhoea. Diarrhoea and the associated dehydration cause birds to go off fed and may lead to their death in a very short period of time.

Cereals used for feed production may contain pathogenic bacteria and moulds, which may synthesize harmful mould toxins under poor storage conditions. Low-molecular-weight organic acids, particularly propionic acid have a strong inhibitory effect on the growth of moulds.

The amount of acidifier recommended for inclusion in poultry diets depends on several factors, mainly on alkalizing effects of feed ingredients and mineral supplement such as calcium sources. Under production conditions, the ban on feed antibiotics may result in considerable mortality rates, especially during the first 21 days of the birds. According to modern farming standards, chicken mortality rates must not exceed 3%. Excessive mortality may be due to the strong alkaline effect of high protein content of diets for young birds, when the digestive tract and its secretary capacity are not fully developed.

The aim of the study was to determine the effect of various organic acids on broiler performance.

Materials and methods

A total of 1024 day-old cobb broiler chicks were randomly divided into 4 groups, with 4 replicates of 64 birds. Birds in each replicate were kept in pens covered with saw dust. Shed temperature, humidity and ventilation were maintained in accordance with hygiene standards for young birds. The birds were vaccinated against F1 and IBD at day 5 and 12 respectively. All chickens received ad libitum starter type diets (1–21 days) followed by grower type diets (22–42 days). The diets were composed of ground maize and soybean meal as the main ingredients (Table 1). Water was provided ad libitum throughout the trial. I P CID an acidifier from Volschendorf was added to trial diets at different dose rates and the control group was fed without any acidifier.

Feed consumption and mortality were recorded throughout the study and the feed conversion ratios were subsequently calculated.

Table1. Components and nutritive value of the diets

Item	Diet	
	Starter (1–21 days)	Grower (22–42 days)
Feed ingredients (%)		
Maize	60.10	64.10
Soybean meal	32.50	28.50
Oil	4.00	4.00
Dicalcium phosphate	1.70	1.70
Limestone	0.60	0.60
NaCl	0.35	0.35
L-lysine HCl (78%)	0.11	0.11
DL-methionine (99%)	0.14	0.14
Mineral Mixer	0.10	0.10
Vitamin premix	0.05	0.05
Percent Nutrients in diet		
Lysine	1.2	1.0
Methionine	0.52	0.57
Crude fat	2.7	2.4
Crude fibre	3.5	4
Calcium	0.97	0.92
Phosphorus	0.52	0.51

Results: Adding the acidifier to chicken feeds reduced the pH of starter diet from 6.90 to 5.89, and that of the grower diet from 6.28 to 5.73. Supplementing diets with the increasing amounts of acidifier (from 1.5 to 3 kg/ton of feed) significantly increased body weight of chickens at 21 and 42 days of age compared to the control birds (Table 2). Mortality decreased significantly, with significant differences in relation to the control group. Feed consumption has slightly increased at 2kg and 3kg IP CID added groups but feed conversion remained approximately same. Feeding the acidifier significantly increased carcass weight at 43 days of the experiment (Table 3). Significant differences were found in dressing percentage, which was the highest with the acidifier supplemented at 2 kg/ton and the lowest at 3 kg/ton, but was still higher compared to the control value.

The results of this study show that the dietary level of 0.15, 0.2 or 0.3% acidifier, increases the growth rate of chickens during both the first 21 days of age and over the entire 42-day period. Better body weight gain was accompanied by increased feed consumption, although no significant differences were found in feed conversion ratio.

These data may be indicative of the superior conversion of the amino acids and energy from the acidifier supplemented diets and of the superior conversion of energy into broiler tissues.

The gradual increase in acidifier amounts in the experimental diets prevented mortality in chickens. The mortality had drastically reduced. This suggests that the acidifier protected the chickens from intestinal infections and gastrointestinal disorders, which are a common cause of mortality. In the present experiment, in terms of stocking density and body weight per unit floor area, the housing conditions were similar to the conditions used in large scale production.

The I P CID acidifier used in the current experiment contained acetic acid, propionic acid, formic acid, butyric acid, citric acid and lactic acid. The acidifying effect persisted into the final section of the digestive tract, which is the least acidic and most vulnerable to growth of pathogenic bacteria.

The results cited above indicate that the increase in chickens' body weight is in response to acidifying additives. It is of economic importance that the acidifiers significantly reduced chicken mortality in the study mentioned above.

Table2. Growth performance of broiler chickens

Item	Control	I P Cid at different dosage (g/kg diet)		
		1.5	2	3
Body weight at 21 days (g)	702	764	758	759
Body weight at 42 days (g)	2687	2732	2776	2772
Mortality (%)	2.6	0.4	0.58	1.2
Feed Intake (g/bird) at 42 day	4621	4617	4885	4795
F.C.R.	1.72	1.69	1.76	1.73

In conclusion, due to the high protein contents, in addition to minerals, conventional broiler diets may have a highly alkalizing effect. Because the digestive tract of chickens is not ready to counteract the effects of alkaline digesta, the administration of acidifiers and additives that reduce digesta pH seem the most important factor regulating the status

Table3. Carcass weight and dressing percentage

Item	Control	I P Cid at different dosage (g/kg diet)		
		1.5	2	3
Slaughter weight (g)	2795	2846	2881	2894
Carcass weight (g)	1977	2056	2099	2082
Dressing percentage	70.73	72.25	72.86	71.95

of intestinal microflora. Our study with I P CID acidifier showed that the most advantageous dietary level of this feed additive ranges from 1.5 to 3 kg/ton, with 2 kg/ton regarded as the optimum dose.

For more details please contact

Volschendorf

Tel: 022 25976100/300 * Email Id: ipms.sales@gmail.com * Website: www.volschendorf.com

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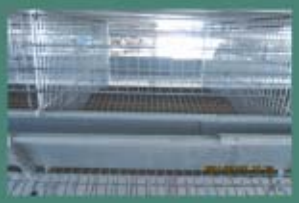
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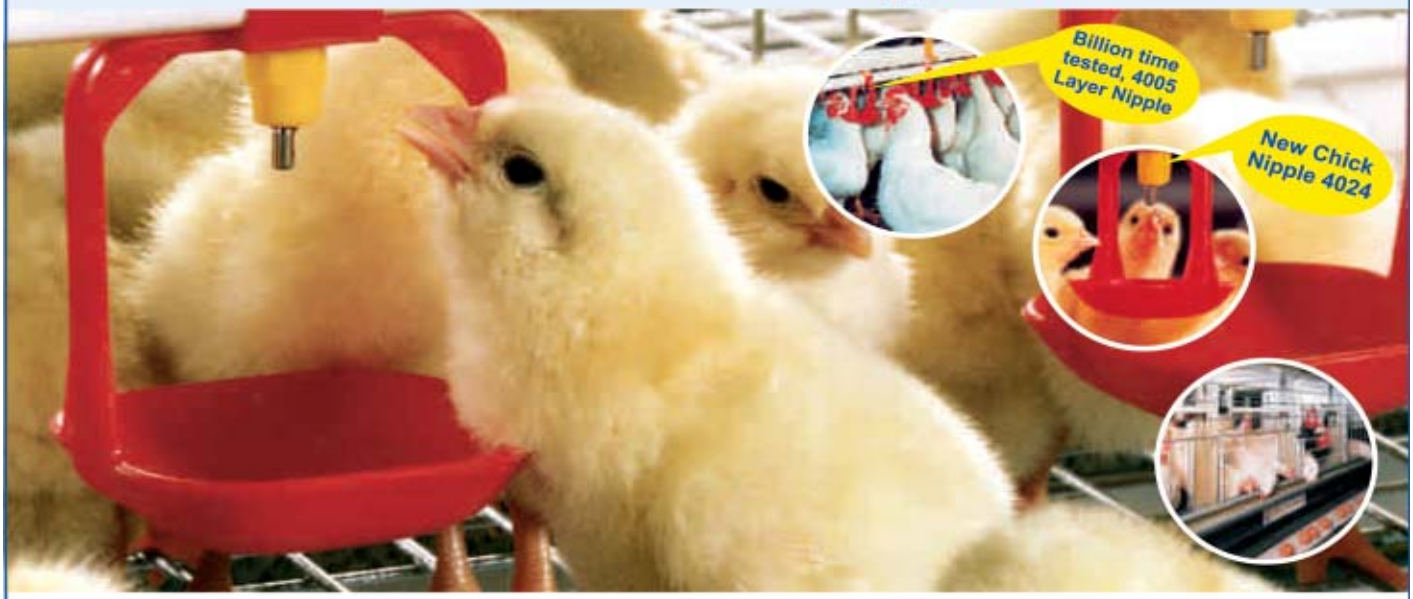

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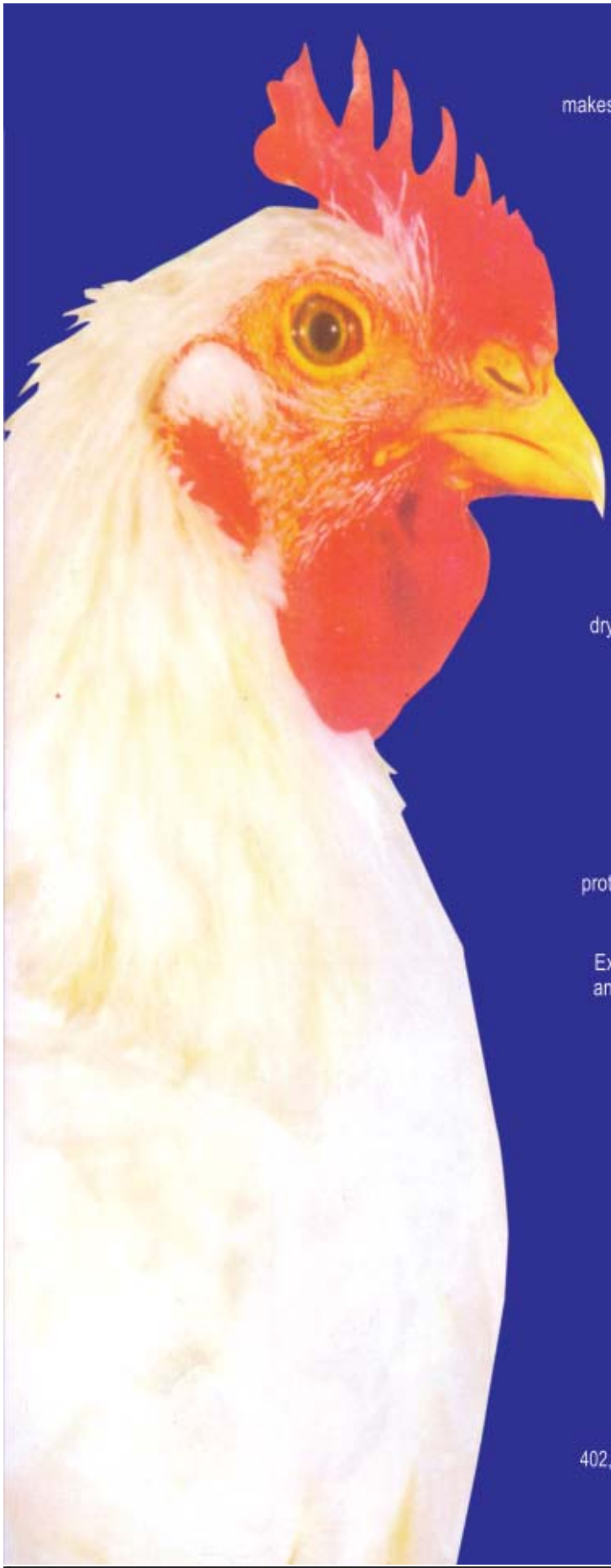

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