

## Prebiotics and Probiotics as Health promoter

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### Prebiotics

A prebiotics substance has been defined as a non-digestible food ingredient that beneficially affects the host by selectively stimulating the growth and or activity of limited number of bacteria in the colon. Therefore, compared to probiotics which introduce exogenous bacteria into the colonic micro flora, a prebiotic aims at stimulating the growth of one or a limited number of the potentially health promoting indigenous microorganisms thus modulating the composition of the natural ecosystem.

Prebiotic have been found to stimulate absorption of several minerals to improve mineralization of bone by increasing the availability of Ca, Mg, Zn and Iron etc. Effects of prebiotics depends on dose, the time of administration, content of calcium in the diet and age.

Among the food ingredients, it includes non-digestible carbohydrate (oligo and polysaccharides) some peptides and proteins and certain lipids (both ester and ether). Because of their chemical nature these compounds are not absorbed in the upper part of gastrointestinal tract.

When enter into the caecum/colon, it serves as a substrate for the endogenous bacteria, thus directly provides the energy, metabolic substrates and essential micronutrients. Oligosaccharides such as galacto-ologosaccharides, mannonoligosaccharides, fructooligosaccharides have been tried in poultry and other non-ruminants. The mechanism of action includes lowering pH through lactic acid production by inhibiting colonization of pathogen and producing systemic effect on utilization of feed ingredient, stimulation of immunity and neutralizing the toxin.

Amongst prebiotics, the important like hexoses (glucose, fructose, galactose, mannose); natural disaccharides like sucrose, lactose and maltose and polysaccharides like guar gum (produced from the

seeds of the guar bean). Disaccharides help in decreasing total number of positive *Salmonella* infection due to improvement in balance of intestinal flora. Their effects are indirect and mediated by metabolites generated by the intestinal flora that uses these prebiotics for their own metabolism. Such metabolites include short chain fatty acids, lactate, polyamines and bacitracin. However, they can also have direct effect either by binding to pathogens or by increasing the osmotic value in the intestinal lumen. They also modify metabolic activity of normal intestinal flora.

A few studies with broilers have shown that MOS @ 0.2% have no effect on the growth rate or feed efficiency but Total Viable Count (TVC) and coliforms were reduced in intestinal contents of birds and TVC in meat was also low (Elangovan, *et al.*, 2005). Under commercial condition, the combination of probiotic and prebiotic with turmeric in broiler diet have shown increase daily weight gain and feed efficiency than feeding alone of prebiotic and probiotic (Manishkumar *et al.*, 2005).

### Characteristics of ideal prebiotics

- Neither hydrolyzed nor absorbed by mammalian enzymes or tissues.
- Selectively enrich for or a limited number of beneficial bacteria.
- Beneficially alter the intestinal micro flora and their activities.
- Beneficially alter luminal or systemic aspects of the host defense system.

### Probiotics

In contrast of the use of antibiotics as nutritional modifiers, which destroy beneficial bacteria, the inclusion of probiotics in foods is designed to encourage certain strains of bacteria in the gut at the expense of less desirable ones. Over the last several years considerable attention has been given

to the use of probiotics, yeast cultures and acidifiers in pig and poultry feeds generated because of increased public awareness and objection to the use antibiotics as growth promotant feed additive.

Probiotics mean for life which is just opposite to antibiotics i.e. against life. Probiotics is defined as a live microbial food/feed supplement that beneficially affects the host by improving the intestinal microbial balance. Probiotics supplement are composed of single or multiple strains of microbial cells which can survive or establish in intestine of host. Certain strains of yeast (*Saccharomyces cerevisiae*) and fungi (*Aspergillus oryzae*) are also included under probiotics.

Digestive tract of all animals is sterile at birth, contact with the mother and the environment leads to the establishment of a varied micro flora. The beneficial microorganisms produce enzymes which complement the digestive ability of the host and their presence provides a barrier against invading pathogens. Digestive upsets are common at times of stress (eg. weaning). Feeding with desirable bacteria such as lactobacilli in these situations is preferable to use antibiotics which destroy the desirable bacteria as well as the harmful species.

It has been suggested that the desirable bacteria exert their effects in number of ways :-

- Adhesion to the digestive tract wall to prevent colonization by pathogenic microorganisms.
- Neutralization of entero toxins produced by pathogenic bacteria which causes fluid loss.
- Bactericidal activity:- lactobacilli ferment lactose to lactic acid, thereby reducing the pH to a level that harmful bacteria can not tolerate.
- Enhanced immune competence :- oral inoculation of young pigs with lactobacilli has elevated serum proteins and white blood cell counts.

Microorganism used as probiotics

Some important are *Lactobacillus acidophilus*, *L. bifidus*, *L. bulgericus*, *L. casei*, *L. fermentum*, *L. lactis*, *Aspergillus oryzae*, *Streptococcus faecium* and *Saccharomyces cerevisiae*. In monogastric animal, strains of *Lactobacillus*, *Bacillus subtilis* and *Streptococci* have been used as probiotics.

In ruminants, the application of yeast (*Saccharomyces cerevisiae*) in the form of live cultures or dead cells with culture extracts has proved successful in beneficially modifying remen fermentation.

Characterization of good probiotics

- The culture should exert a positive effect on the host. It should be acid resistant, bile resistant and contain minimum  $30 \times 10^9$  CFU (colony forming unit) per gram.
- The culture should possess high survival rate and multiply faster in the digestive tract. It should be strain specific.
- The culture microorganisms should neither pathogenic nor toxic to the host.
- The adhesive capability of microorganisms must be firm and faster.
- Be durable enough to withstand the duress of commercial manufacturing, processing and distribution so that can be delivered alive to the intestine.
- The cultured microorganisms should possess the ability to reduce the number of pathogenic microorganisms in intestine.

Probiotics, containing lactic acid bacteria lowers the intestinal pH due to production of lactic acid and organic acid while cells adhere to intestinal cell wall and prevent colonization by pathogens. Probiotic microbes start competition for nutrient with pathogenic bacteria. Probiotics on one hand suppresses the growth of pathogenic microorganisms in the intestine and incidence of diarrhoea, on other hand increases the bioavailability to dietary minerals and increases the growth rate and feed conversion efficiency. They also have anticancer activities which reduce the risk of colon cancer.

In commercial broilers the inclusion of *L. sporogens* @ 100 mg/kg feed resulted into increased body weight gain, improved FCR and humoral immune response in broiler chicks during 0-6 weeks of age (Panda *et al.*, 2005).

In another study the addition of probiotic @ 50 g/100 kg feed in broilers mash significantly increase growth performance (Gohain and Sapkota, 1998). Live yeast culture (*S. cerevisiae*) plus lactic acid producing bacteria (*L. acidophilus* and *S. faecium*) was supplemented in broiler (1 kg/ton) and the results showed improved weight gain and feed conversion. With laying hens lactobacilli resulted in an improvement in egg production and feed efficiency (Mohan *et al.*, 1996).

Probiotics, products are available in the form of oral paste, water dispersible powders or liquids or dietary feed additives and include microbial cells, microbial cultures and microbial metabolites.

Curd is considered as cheap and easily available source of probiotic. Commercially available probiotics are Lactosacc, Biospur, Probiolac etc.

Thus, the combine use of lactobacillus and yeast cultures in the feed and water has been shown to be effective in reducing morbidity and mortality and improving growth performance and production.

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## Bengal bird flu source lies in Bangladesh

**Sanchita Sharma and Rahul Singh, Hindustan Times**

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Bangladesh has been identified as the source of outbreak of bird flu in south Dinajpur, one of the two affected districts in West Bengal, a senior Animal Husbandry official said. "The germs were brought by winds blowing from Bangladesh," Assistant Commissioner of the Central Animal Husbandry Department Sujit Dutta said in Balurghat, the headquarters of south Dinajpur. Dutta said that the Centre is constantly monitoring the situation in the district. The BSF guarding the Indo-Bangla border in the district has been alerted to ensure that no poultry products could enter from Bangladesh, said Inspector General of Police RJS Nalwa. However, there are reports on Thursday of spreading of the dreaded bird flu virus among chickens to new areas of Birbhum and Murshidabad districts of West Bengal.

Considering the serious implication of the situation, the Union Health Ministry has directed the West Bengal government to adopt quarantine measures to prevent transport of people, animals and birds from the bird flu-hit areas of Birbhum and South Dinajpur districts.

The West Bengal government has set a target of culling 3.76 lakh birds. Many poultry owners in Birbhum had sent their birds for sale outside the affected area despite there being a ban on movement of poultry, reports from the districts said. Meanwhile, P Krishnan, heading a high-level delegation of the Union Health Ministry, said: "There is no cause for panic as the deadly virus has not infected any human as yet."

**Assam on high alert:** Alarmed by the outbreak of bird flu in neighbouring West Bengal, a health alert on avian flu has been sounded in all the bordering districts of Assam to prevent the spread of the disease in the state.

The alert was sounded in Kokrajhar, Dhubri, Goalpara and Bongaigaon districts after a confirmation about the outbreak of bird flu in West Bengal, a senior official of the animal husbandry and veterinary department said.

**WHO: outbreak is serious:** The dreaded H5N1 bird flu virus is more infectious than previously thought, said World Health Organisation experts in The New England Journal of Medicine, creating worldwide panic. It can travel by sticking to surfaces, get kicked up in dust and feed to infect people, or contaminate ponds and lakes used for swimming or bathing, says the report.

**Army in East bans chicken:** The bird flu outbreak across West Bengal compelled the army on Thursday to order a ban on the supply of chicken to troops in the state to rule out the possibility of soldiers getting infected by the virus. Lieutenant General Narayan Mohanty, Director General, Remount Veterinary Services, told the Hindustan Times, "We do not want to take any chances with the health of troops. Instructions have been issued to the Eastern Command to ban chicken." (*With inputs from PTI*)

#### Rising cull

- January 2008: 20,00,000 birds have been slaughtered in Birbhum, Murshidabad, Burdwan, Nadia, Bankura, Malda, Cooch Behar, South 24 Parganas, South Dinajpur, East Midnapore and Hooghly districts of West Bengal.
- July 2007: 3,36,000 birds had to be slaughtered in the eastern Imphal district of Manipur.
- February 2006: 6,57,000 birds were slaughtered in Nandurbar and Jalgaon districts of Maharashtra; Surat in Gujarat and Burhanpur district in Madhya Pradesh.