Feed additives and preservatives

Feed additives are defined as drugs, chemicals, or biological substances added directly to animal feeds in small quantities, usually in concentration of a few ppm for the purpose of modifying some aspects of performance or production. Flavoring agents, preservatives, emulsifiers, sweeteners, vitamins and coloring agents, etc. are added to human food to increase its palatability, acceptability, taste, keeping quality and nutritive value.

However, use of such agents in animal or poultry feed is not there except for the pets feed. Rather to increase the feed efficiency, growth rate and production of animals and birds, certain agents which are not nutrient and not considered as dietary essential are used as feed supplements.

Such substances/agents are termed as feed additives. In veterinary practice, growth promoters-such as anabolic steroids, antibacterials, antiparasitic drugs, non specific chemicals and rumen fermentation modifiers etc. are added to animal and poultry feeds.

Certain feed additives are absorbed and persist in the body system and can be detected in sufficiently high concentrations in milk, meat or eggs of animals or birds. Consumption of such animal/bird products is not recommended for public health point of view.

Indiscriminate use or incorporate levels of these agents, instead of increasing growth rate and efficiency, may cause toxicity and economic losses and even be fatal at times.

For convenience, feed additive may be classified in various classes:-

(1) Antibacterials:

Antibacterial growth promoters play an important role in the effective use of animal feeds, both in poultry and pig production. Only those antibacterial agents should be used as feed additives which have little or no therapeutic application in animals and man and those that will not impair the

efficacy of antibacterial through the development of resistant strains of microorganisms.

The growth promoting action of antibacterials is due to:

(1) Reduced activity of pathogens.

(2) Eliminate bacteria which produce toxins that reduce the growth of animals.

(3) Stimulate the growth of those microorganisms which synthesize nutrients.

(4) Increase the absorptive capacity of intestine.

Toxic effects:

Antibacterials are generally added in calf starter, poultry feed, and pig diet. Feeding of antibacterials at higher than recommended amount may cause toxicity. Such as scour in calves, and other side effects such as allergic reactions, eosinophilia, aplastic anemia, hepato- and nephro-toxicity etc. in other species of animals. Continued and prolonged administration of antibacterials through feed in farm animals could pose a human health hazard because of the potential for the development of resistant strains of enteric bacteria in human beings. Lincomycin produces severe gastrointestinal hemorrhages and necrosis. Sulphonamides result in anorexia, depression, hematuria, albuminuria, and oliguria. Concurrent use of tiamulin with ionophores causes ionophore toxicity, myonecrosis and death.

(2) Ionophores:

Monensin, lasalocid, salinomycin, narasin and maduramicin are used in feeds as anticoccidial agents and for promotion of growth in ruminants, pigs and poultry. Supplementation should be gradual. These should not be given to horses and other equines.

Toxic effects:

Feeding of monensin in feed in excess of the recommended doses or improper mixing of feed may produce toxicity. Signs of acute monensin toxicity are dyspnoea, tachycardia, congestive heart, diarrhea, cardiac failure etc. Feed consumption in cattle is reduced, sometimes by 90% within 3 days of feeding.

(3) Hormones and anabolic steroids:

Hormones having growth promoting properties such as estrogens, androgens and progesterons, thyroxine and pituitary growth hormones are used as growth stimulants. Anabolic steroids increase nitrogen retention and protein deposition in animals, thereby increasing feed conversion efficiency, lean content and growth rate. Iodinated casein is a commercial product which has activity several times greater than that of dried thyroid gland.

Toxic effects:

Anabolic steroids delay the age of puberty, impair udder development and incidence of dystocia is increased. Other effects are restlessness and milk secretion from rudimentary teats. These side effects are more liable to occur with excessively high doses of hormones. Besides side effects in animals, human health is also adversely affected due to carcinogenic potential of the residues of certain synthetic estrogens in milk or meat.

(4) Non specific chemicals:

Certain chemicals which are used as feed additives are arsenicals in the form of arsanilic acid, copper sulphate, cobalt oxide, selenium, tranquilizers, organic iodine ect.

A-Arsenicals:

Arsenic compounds have long been used in veterinary medicine as tonics to improve the general health and general appearance of animals. Care

is required in the use of arsenicals in animals/birds feed because of the potential risk of building up of dangerous levels of arsenic in the body.

B-Copper sulphate:

Copper sulphate is used as a growth promoter mainly in the pigs ration. Copper content in majority of the forages and grains is below the dietary requirement of most of the animal species. Soil deficient in copper, reduced bioavailability of copper inspite of adequate levels in the soil and certain elemental interactions with sulfur and molybdenum are responsible for further deficiency of copper in forages and grains. Low roughage and high concentrate diets also interfere with the availability of copper as these promote sulfide production. Therefore supplementation of copper in diet of animals is recommended.

C-Tranquilizers:

Certain tranquilizers such as reserpine, the natural alkaloid of Rauwolfia serpentine and metoserpate have been tried to improve the growth rate in fattening beef cattle and poultry. Chlorpromazine along with reserpine has been used in poultry to reduce the stress as well. Chlorpromazine in high doses/concentrations may produce toxic manifestations characterized by variable degree of shivering, lethargy, relaxation of anal sphincters, diarrhea, loss of righting reflex etc. Similarly, reserpine or related compounds due to their catecholamines depleting action may result in severe depression, diarrhea, polyuria etc. in animals and birds.

Organic iodine:

Iodine is a trace element and is added to the ration of animals particularly cattle to correct iodine deficiency. Potassium iodide is used for the treatment of actinobacillosis while ethylenediamine dihydroiodide is used for prevention of foot rot, lumpy jaw and as a mild expectorant. Acute toxicity is rare, but sub acute and chronic toxicity are more likely on long term use. Iodine toxicity or adverse effects are characterized by focal dermal exfoliation, congestion of conjunctiva, and tracheal mucosa, nasal discharge, bronchopneumonia, and enlargement of mediastinal lymph nodes.