

**BIHAR ANIMAL SCIENCES UNIVERSITY**

**Bihar Veterinary College, Patna**

**Department of Animal Nutrition**

**UG Lecture on (UNIT-I)**

**Feed Additives in the Rations of Livestock and Poultry  
(Part-3)**

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#### **4. Arsenicals:**

- **Arsenic compounds, namely *arsanilic acid*, *sodium arsanilate* & *3 -nitro-hydroxyphenyl arsenic acid* are also used as growth inhibitors for pathogenic organism & to restore conditions of recovering animals.**
- **The amount of arsenic retained in the tissues is very low.**
- **It is desirable to discontinue arsenicals from the diet at least 5 days before slaughter.**
- **Arsenicals recommended to add @ 50-70 g/tone of feed.**

## 5. Buffering Compound:

- Buffers are mixtures of weak acids and their conjugate bases.
- A more appropriate term is neutralizing or alkalinizing agents.
- When present in aqueous solution, buffers should resist changes in pH upon addition of acid or base.
- Buffer modify ruminal fermentation by;
  - ✓ Increasing or resisting change in ruminal pH & increasing fractional outflow rate through the reticulo-omasal orifice (ruminal fluid dilution rate).
  - ✓ The increase in fluid dilution rate is due to increased osmolarity which increases both water intake & influx through the ruminal wall.

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- **NaHCO<sub>3</sub> & MgO** are used routinely in dairy cattle, to counteract the depression in milk fat synthesis due to low ruminal pH & reduced acetate/propionate ratio induced by a low roughage & high grain diet.
- Supplements of NaHCO<sub>3</sub> should be 0.6 to 0.8 percent of a total mixed diet & **1.2 to 1.6 percent of a concentrate mixture.**
- MgO should be added @ 0.2 to 0.4 per cent of total mixed diet or **0.4 to 0.6 percent of a concentrate mixture.**
- When feeding a combination of two, 2 to 3 parts NaHCO<sub>3</sub> should be mixed with one part MgO.
- **Feeding large amounts of these mineral salts may depress feed intake.**

## **6. Antioxidants:**

- **Antioxidants are chemical compounds which have the capacity of preventing oxidation of substance by taking up oxygen.**
- **High fat vegetable products (oils/fat), tallow, lard, fish meal & poultry by product meal are more prone to oxidative rancidity.**
- **Cause off-flavours which reduces voluntary feed intake & bioavailability of amino acids & fat soluble vitamins like vitamin A & vitamin E.**
- **Ex- butylated hydroxyl anisole (BHA), butylated hydroxy toluene (BHT) & ethoxyquin & natural antioxidants include vitamin E, vitamin C & rosemary.**
- **Added to feed ingredients & vit. premix @125 to 200g/tonne of feed.**
- **Synthetic antioxidants are comparatively cheaper and long lasting.**

## **7. Enzymes:**

- **Fibrolitic enzymes such as cellulase, Phytase, xylanase & beta-glucanase increase nutrient utilization efficiency, eliminate toxic effects of feed in non-ruminant.**
- **In ruminants, rumen microbes produce sufficient quantity of these enzymes.**
- **Exogenous polysaccharide degrading enzymes are stable in the rumen & may pass to lower tract, hence can improve nutrient utilization by animals.**
- **It is apparent that enzymes substantially improve feed digestibility and animal performance.**

## **8. Hormones:**

- **Hormones are substances produced by **endocrine glands** that activate specifically the target organs to produce the desired result.**
- **Synthesized compounds also have similar response as naturally produced hormones & can be used as feed additive to promote animal growth.**
- **They are used to bring desirable changes in rate of metabolism for efficient productivity.**
- **They can be grouped into **anabolic and catabolic hormones**.**

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- **Anabolics are growth hormone & thyroxine**, used for increasing animal productivity either through **growth or egg or milk production**.
- ✓ **Ex- Bovine somatotropin** – for increasing milk production  
**Iodinated casein** – for increase egg production
- **Catabolics are estrogen & glucocorticoids**, **increase muscle & bone formation** at the expense of fat deposition.
- **But the use of hormones has much public concern due to the residue present in animal products.**
- **Several countries banned the use of these hormonal preparations.**

## **9. Adsorbents:**

- Compounds that are **not absorbed from the GIT & have the ability to bind physically with toxic substances** thus preventing their absorption.
- The use of adsorbents such as **activated charcoal & silicates** are commonly used in livestock exposed to dietary **aflatoxins**.
- Activated charcoal administered @ 20-120 mg/kg to domestic animals.
- Several substances like **alumino-silicates, bentonite, silicon, zeolites** etc. found beneficial in minimizing the toxic effects of mycotoxins.

## 10. Organic acids:

- Some organic acids specially **malic acid & fumaric acid** are potent rumen manipulation agent.
- Malate stimulates lactate utilization by ***Selenomonas ruminantium***.
- Malate was more effective in lactate utilization than fumarate or aspartate
- Forages rich in malate (Lucerne, Bermuda grass) may be used for rumen manipulation.
- Fumarate was also found to be beneficial for fibre rich diets.
- Other ex- **citrate, formic acid** etc.

## **11. Flavoring agent & Pigments:**

- Flavoring agents are used to **enhance the palatability of feeds** especially, fish meal & other vegetable protein meals in the diet of (flavor sensitive) pet animals.
- Pigmentation compounds are used to **satisfy consumer preference.**
- Xanthophylls present in yellow maize and Lucerne meal are used to produce **deep yellow pigmentation in body & egg yolk.**

**Discussions.....**

**Questions, if any.....??**

**THANKS**