

Anti-Nutritional factor

# Gossypols

- Gossypols are polyphenolic pigments in *Gossypium* (cotton plant)
- Gossypol is reactive and exhibits acidic properties
- High levels of gossypol cause unfavourable physiological effects such as a reduction in succinic dehydrogenase and cytochrome activity
- The reaction between gossypol and protein during processing reduces protein quality, especially by reducing the bioavailability of lysine.

- General symptoms of gossypol toxicity are depressed appetite and loss of body weight
- Gossypol react with Fe to form inactivate ferrous gossypolate complex.
- Soaking/cooking will reduce the content

# Antivitamin factors

- Antivitamin D and antivitamin E factors are known to be present in raw soybeans and raw kidney beans respectively. These anti-nutritional factors are destroyed by heat.

## **Antivitamin B1**

- In fresh fish, mussels, herrings, clams, shrimp contain thiaminase (B1).
- In raw soybean an enzyme called lipoxygenase which catalyze the oxidation of carotenoids (Precursor of vitamin A).
- Autoclaving will reduce the content.

## **Antivitamin D**

- Present in raw soybeans.
- Isolated soya proteins has rachitogenic activity
- It is destroyed by heat

## **Antivitamin E**

- Present in raw kidney bean (*Phaseolus vulgaris*).
- Autoclaving will reduce the content

## **Antivitamin K**

- Sweet clover disease is characterized by fatal hemorrhagic in cattle
- It will reduce the prothrombin level and interfering with blood clotting mechanisms
- Autoclaving will reduce this content

## **Antipyroxidine**

- Linamarine (antagonist of pyridoxine) has been identified in Lin seed meal.
- Extract the Lin seed meal with water and autoclaving will reduce this content

# Mimosine (Free Amino Acids)

- It is present in Ipil-ipil (or) suba bull and affect the production of thyroxin; often, mimosine resembles with tyrosine and function as antagonist against to this amino acid.
- Soaking in water for 24 hrs will reduce this content



# Cyanogens

- Cassava and sorghum are the two feeds most often associated with cyanide poisoning in livestock.
- Other feeds are linseed meal and certain legume seeds, including the lima bean, the kidney bean, the Bengal gram and the red gram.
- Cooking in water not only destroys the enzymes responsible for cyanide release, but also volatilizes the HCN released

- In plants, present in trace amount in the form of cyanogenic glucosides and present in cassava, sorghum, root crops and kernels.
- Specific enzyme glucosidase which hydrolyze cyanogenic glucosides to HCN.

# Fungal Toxins

- **Aflatoxins:** Produced by the mould *Aspergillus* spp., which grows, particularly in high temperature/high humidity conditions, on ingredients and compound feeds, particularly groundnut means and cereals.
- **T-2 toxins:** originating from the mould, *Fusarium* spp.
- **Vomitoxin:** Caused by *Fusarium* spp.
- **General deterioration of feed quality:** caused by *Penicillium* spp. moulds

## **Bacterial infection**

**Salmonella contamination:** Contaminated ingredients, especially animal proteins, together with insects and rodent droppings.

- **Mycobacteriosis:** Unpasteurized trash fish and viscera

## **Bacterial Toxins**

- **Botulism:** Trash fish stored anaerobically

# Chemical contaminants

- Pesticides and Herbicides, such as organo chlorine and poly chlorinated biphenyls (PCB'S).
- Plant ingredients, contaminated by spraying and accumulation in fish and fish products used as ingredients
- Heavy metals, e.g., Mercury concentrated by animals and plants used as ingredient sources.

## **Volatile N-nitrosamines (VNA)**

- Fish meal, especially that dried by hot air exhausted from an oil burner (direct heating/drying method)

## **Peroxides**

- **Oxidized oils:** Poorly stored and inadequately protected (by antioxidants) ingredients, particularly those with high poly-unsaturated fatty acid levels such as fish oils and meals.