

Feed Plant Sanitation for Better Production

Dr. Ramchandra Ramteke, Dr. M.K.Gendley and Dr. Shraddha Naty
College of Veterinary Science & Animal Husbandry, Anjora, DSVCKV, Durg (C.G.)

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Abstract:

Feed is very important part of livestock rearing and cost around 65 to 70 % of total input in commercial rearing. Feed plant is place where feed is prepared in various forms like mesh, pellet, crumble or powder form as per requirement of livestock and poultry. As per standard operating procedure feed plant sanitation including animate and inanimate object sanitation and disinfection is very necessary for better production, quality assurance and long life of feed plant. In feed plant rodents and pests are very important source of contamination and infection and its prevention and control strategies play vital role in quality assurance.

Sanitation:

Sanitation is a way of life. It is the quality of living that is expressed in the clean home, the clean farm, the clean business and industry, the clean neighbourhood and the clean community. The prime objective of sanitation in feed plants is to assure the consumer a product free of contamination produced in a clean plant from wholesome raw materials.

Plant means the building or buildings or parts thereof, used for or in connection with the manufacturing, processing, packaging, or holding of feed. Sanitize means adequate treatment of surfaces by a process that is effective in destroying vegetative cells of pathogenic bacteria in substantially reducing other microorganisms. Such treatment shall not adversely affect the product and shall be safe for the consumer.

Grounds and plants:

a. Grounds:

The grounds about a feed plant under the control of the operator shall be free from conditions which may result in the contamination of the feed, but not limited to the following:

1. Improperly stored equipment, litter waste, refuse uncut weeds or grass within the immediate vicinity of the plant buildings that may constitute a breeding place, harborage for rodents, insects and other pests.

2. Excessively dusty roads, yards etc. that may constitute a source of contamination in areas where feed is exposed.
3. Inadequately drained areas that may contribute to contamination to feed through seepage or feed borne fifth and by providing a breeding place for insects or microorganisms.

b. Plant:

1. Provide sufficient space for such placement of equipment and storage of materials as is necessary for sanitary operations and production of safe animal feed.
2. Provide separation or by other effective means for those operations, which cause contamination of food products with chemicals or other extraneous materials, microorganisms etc.
3. Provide adequate lighting and ventilation facilities.
4. Provide effective screening or other protection against birds, animals and vermin (including insects and rodents).

Processes of controls:

All operations in the receiving, inspecting, transporting, packing, segregating, preparing, processing and storage of feed shall be conducted in accordance with adequate sanitation principles.

- a. Raw materials and ingredients shall be inspected and segregated as necessary to assure that they are clean, wholesome and fit for processing into animals feed and shall be stored under conditions that will protect against contamination and minimize deterioration.
- b. Containers and carriers of raw ingredients should be inspected on receipt to assure that their conditions have not contributed to the contamination of products.
- c. Chemical, microbial or extraneous material testing procedures should be utilized to identify sanitary failures or feed contamination and all feed ingredients that have become contaminated shall be rejected, treated or processed to eliminate the contamination.

The following warehouse sanitation practices are recommended as an aid in protecting the product from contamination.

- I.** Inspect all incoming products for possible rodents, insects and other forms of contamination. Look for these signs of possible contamination.
 - a. Live insects crawling on product containers.
 - b. Insect ‘trials’ in the dust on bags or cases.
 - c. Mouse or rat pellets on product containers.
 - d. Rodent gnawed bags.
 - e. Undesirable odors.
 - f. Stains on product containers.
- II. Product storage conditions:**
 - a. Store product on clean pallets. Do not store directly on floor. All emptied storage bags should be swept clean before being refilled with the product.
 - b. Leave an 18” floor space between pallets of product and the wall. Do not store pallets directly against wall.
 - c. Do not store dog foods etc. adjacent to flour, cake mix, etc. do not store flour, cake mixes etc. adjacent to feeds containing strong odors.
 - d. Practice stock rotation, use older stocks first. Frequent restack older stocks and carefully examine exterior of containers for signs of possible contamination.
 - e. Remove to rework room daily, all warehouse and/or rail road Jamaged product. Any torn containers should be taped or otherwise closed to prevent the entrance of any contamination.

Damages caused by rodents:

- a. Consume large quantities of food (one rat consumers 20 lbs of food in a year).
- b. Contaminate much more foods than they consume.
- c. Damage structure like package materials, wooden structures etc. Each rodent produces about 70 faecal pellets and about 16 ml of urine a day. They damage electrical wiring and so can cause fires, short circuits etc.
- d. They are sources of fleas, hair, filth and other contaminates.
- e. They are reservoirs for leptospirosis, salmonella and cause rat bite fever.

I. Rodent control:

- a. Keep weeds and high grass form growing on the property immediately adjacent to the warehouse premises.

- b. Do not allow scrap wood or other debris to collect on outside perimeter or premises.
- c. Place an adequate number of rodent bait boxes, containing anti-coagulant type rodenticide, on the exterior and interior perimeter of the warehouse. Service these boxes at least once in two weeks.
- d. Place an adequate number of snap type and/or wind-up type rodent traps at strategic locations throughout the warehouse.
- e. Rodent proof the building as much as possible by scaling holes through which rodents may enter.

II. a). Highly toxic rodenticides

- Thallium sulfate
- Strychine
- Zinc phosphide
- Arsenic trioxide.

b). Moderately toxic rodenticides

- α - naphthyl thio-urea
- D.D.T.

c). Anti – coagulants

- Warfarin
- Fumarin
- Coumachor.

Insects:

Principle stored grain insects:

1. Granary weevil (*Sitophilus granaries*)
2. Saw toothed grain beetle (*Oryzaecastaneum*)
3. Red flour beetle (*Triboliuminclusum*)
4. Larger cabinet beetle (*Trogodermainclusum*)
5. Lesser grain borer (*Rhyzoperthadominica*)
6. Rice weevil (*Sitophilusoryzae*)
7. Indian meal moth (*Plodia inter punctella*)
8. Cadelle (*Tenebroidesmauritanicus*)
9. Flat grain beetle (*Cryptolestespusillus*)

Most important and effective means of preventive pest control.

1. Accumulation of debris, junk, improperly stored equipment and products etc. provide cover and harborage for rodents and situations difficult to inspect and clean.
2. Accumulation and spillage of food material attracts insect, rodent and bird pests and helps maintain their populations.
3. Although difficult to measure, a clean plant probably, provides an environment conducive to increased productivity.

Chemical control of insects – Insecticides:

1. Insecticide classification based on mode of action.
 - a. Stomach poisons.
 - b. Contact poisons.
 1. Applied in liquid or dust forms
 2. ‘Contact’ with insects in two ways:
 - i. Direct application of insecticide to insect body.
 - ii. Indirect contact with insecticide by crawling over a treated surface

Most important types of insecticides (based on chemical classification).

a. Insecticides of vegetable origin (Pyrethrins): From dried flowers and buds of pyrethrum plant.

1. Paralyzes insects by penetrating the waxy covering on the exoskeleton.
2. Good knock down effect, better than its killing effect.
3. Short residual life, deteriorates rapidly on exposure to light and air.
4. Used in conjunction with materials called synergists – improves effectiveness by more than additive effects, e.g. Piperonylbutoxide N-octylbicycloheptenedicaboximide
5. Uses: Grain protectant -
 - direct application to grain prior to storage.
 - Residual spraying
 - Fogging – misting
 - Insecticide treatment of product containers.

b. Chlorinated hydrocarbons: persistent

1. Methoxychlor

- i. Used only as a bin spray, no direct application to grain.

- ii. Tolerance established for raw agriculture commodity but not on finished foods

2. D.D.T

- i. No use in feed plants
- ii. No tolerance established for raw agriculture commodities or processed feeds.

3. B.H.C or Lindane

- i. Lindane is γ isomer of BHC – low odour.
- ii. No tolerance established for grains or finished feeds.

4. **Other** chlorinated hydrocarbon insecticides which should not be used around feed plant – Chlordane, Aldrin, Dieldrin, Endrin, Heptochlor, Toxaphene.

C. Organic phosphorus compounds: Short residual life

1. Malathion: Relatively low mammalian toxicity

Uses: Grain protectant –Direct application to grain – residual spray
(grain bins, elevators, warehouse etc.)

2. Dichlorovos, DDVP or Vapona: A volatile material used primarily for fly control.

Shows promise for cereal product insect control in grain and warehouses. Used in various forms: Impregnated resin bars for fly and mosquito control, baits for fly control, surface spraying.

3. Organic phosphates that should not be used in or near feed plants – parathion, Tetraethyl pyrophosphate (TEPP)

D. Diatomaceous earth:

- 1. General
- 2. Fossilized diatoms – abrasive
- 3. Results in dessication of the insect
- 4. May be impregnated with insecticides.

Fumigation:

All fumigants volatilize to form toxic gases. In a way they are also insecticides.

Ideal fumigant:

- 1. Low cost for effective dosage and application
- 2. High toxicity to insects, low to man
- 3. High volatility and penetration, low absorption
- 4. Non-corrosive

5. Non-explosive, non-flammable
6. No damage to product quality
7. Aerate rapidly, no residue
8. No damage to germination
9. Readily available

Fumigants:

Solid	Liquid	Gas
1. Aluminium Phosphide	1. Carbon tetrachloride	1. Hydrogen cyanide
2. Calcium cyanide	2. Carbon disulphide	2. Methyl bromide
	3. Ethylene dibromide	
	4. Ethylene dichloride	

Conclusion:

Sanitation requirements exist for the feed industry. A sanitation program will control many potential biological, chemical and physical hazards. Sanitation is an essential prerequisite program. Written SSOPs should include at least, detailed description, Corrective actions and Daily records keeping.

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