FEED MILL SANITATION

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FUENTE: http://www.poultrydeals.com/

Food and feed safety have been very much in public focus in recent times and this has led to some dramatic changes in the practice of feed manufactures and animal production. The small livestock or poultry holdings are gradually decreasing and the concept of large farms, integration's and composite livestock farming's are on the way. The economical livestock and poultry production depends on the quality and quantity of the feed. The farmers and scientists have learnt from the experiences of the past to exploit the present genetic potentially of the livestock and poultry in their productivity. To achieve this, several modifications, innovations and alterations have been made in the feed formulations from time to time. Incorporation of variety of feed ingredients, grains cakes, vegetable, proteins, animal proteins, oils, feed additives, antibiotics, growth promoters are made use in the feed formulations in amplify its quality. Least cost feed formulas has also been designed.
The roles of nutritionists in all these events are remarkable but ultimately they have to develop on the milling and mixing technology. Taking this clue, the bioengineers have designed a variety of equipments starting from old designs of hammer mills, with different sieves, a vertical or horizontal mixer. Even a small farmer made use of these equipments and technology in manufacturing of seed for his livestock and poultry.

Several lessons from past made the engineers to design newer and modern feed mills with grinding capacity of 50 tons per hour and 24 hours of working. Therefore, there are huge feed mills with conveyers, screws, silos to store the ingredients, automation, computerization in dispensing the desired quantity of these ingredients, milling of desired size particles, elevators to mixers and then to mash or pelleting mill. On line injection of amino acids, use of liquid additives, ingredients require a variety of equipments in the system. In all these processes, the mill parts are prone for contamination because the vegetable or animal proteins promote multiplication of pathogenic microorganisms, moulds and fungi in the feed mill. Therefore, the feed mill sanitation or bio-security of the mill is required to prevent contamination of feed ingredients and processed feed thus helps maintain and improve the performance of livestock and poultry and production of healthy animal products to human consumption

The concept of healthy food production what it is called "Farm to Fork" is vital for the animal feed stuffs, to be of highest standards of hygiene and be free of pathogenic organism in order for them to be incorporated in the "Human food chain". Feed mill in any livestock and poultry operation is the most crucial place as the feed made in the feed mill is mainly responsible for the production of nutritionally well-balanced and cost effective feedstuff responsible for best performance and overall profitability of the farm. However, we need to understand the fact that the feed is passing through a biological tube "the digestive tract" of the animal, besides offering necessary nutrients it should not introduce any infection or toxic agents in to the system. Therefore, composition in manufacturing the feed for livestock and poultry.

The strategic points of feed and mill sanitation depends on:
a. Feed mill design

b. Selection of raw materials
c. Storage of raw materials
d. Feed milling technology
e. Feed mill management
f. Storage of processed material
g. Transport of finished product to farm (bulk and bags)
h. Rodent control

a) Feed Mill Design

The most modern feed mills are designed in such a manner as to offer specific control of the traffic, airflow, air filtration and process separation. The modern feed mill design should be built to eliminate entry of any pathogen and help in production of quality and hygienic feed. The structural design consists of three main independent areas:

i. Area of store and grinding: The incoming raw received in an area that is separated from remainder of the faculty. All the materials received into the plant are considered to be contaminated. This includes feed materials, replacement parts and supplies. The receiving areas are encapsulated within sealed building that incorporates an automated process control and air control system. The ingredients are stored and ground within a building that also incorporates an air filtration and dust collecting system. The ground materials are transferred from grinding system to the process building through a sealed conveyer and elevator

ii. The process area: The process building should be totally sealed, that houses the conditioning, pelleting and cooling equipment. The process building has three levels that are sealed independently from one another, each having an air control system. The interior of the building is designed as to allow complete wash down and disinfecting on scheduled basis. The building contains the processing equipment that conditions, pellets, crumbles and dries the feed to the desired moisture level. The building should be secured area with provision of shower at the entry. After showering the entrant must change into sterile cloth before entry into the processing area of the plant.

iii. Feed store and shipping area : The store house for finished products as well as an encapsulated loading area for delivery into the trucks need to be kept separate which should be rat proof and should be kept as clean as possible. The trucks are loaded through a process that incorporate a computerized loading system. The trucks are loaded through a process that incorporates a computerized loading system. The truck driver does not exit the truck while the truck is inside the shipping building. This avoids contamination of the premises.

b) Ingredient selection

The quality of the feed mainly depends on the selection of raw materials. In our country, the feed ingredients used are of second quality which are often unfit for human consumption. The grains stored in warehouse godowns for long time are spoiled grains that are released for livestock & poultry feed. Besides this, the post harvest technology is not developed properly with poor harvest, processes and drying of grains. Often the moisture with grains increases the growth of moulds and mycotoxins. The drying area often contaminated with a variety of dirt and fecal matter especially of other avian spps rats, dog and cat or even human or animal origin. These grains further stored into an already used gunny bags, which are usually contaminated with a variety of dust, bacteria, virus, cysts and spores of fungus of both human and animal origin. Therefore, the quality of ingredients used fir feed production is often not satisfactory. The raw materials either of animal or plant origin should be obtained from known sources of repute, with a supplier warranty. Monitoring of ingredients include selection, inspection and sampling of ingredients for contaminants using risk based protocols. The laboratory methods used for testing the ingredients should be of standard method. The ingredients should meet acceptable standards for levels of pathogens, mycotoxins, herbicides pesticides and other contaminants which may give rise to human healthy hazard. Raw materials found to be high incidence of salmonella should be treated with bactericidal organic acids.

c) Storage of ingredients

The raw material is to be stored for long duration without loss of quality. The sacs of grains, a variety of cakes, soya and whole fish or fishmeal are stored in gunnies and stalked in lots without any proper ventilation, often infested with pests including mice and rats. It is impossible to maintain a successful pest control programme without attention to mill sanitation and pest exclusion. In the modern feed mills the ingredients are stored in bulk bins, therefore it is essential to construct these bins with moisture exhaustion and proper ventilation facility. In godowns, the gunnies containing feed materials should be stored one foot away from the walls to allow adequate room for cleaning and pest control.

d) Feed milling technology and feed mill ecosystem

Feed mills are ecosystem in which the biotic environment, raw materials, finished products, associated residues, and biotic flora and fauna interact with one another. The food energy supply is continuously replenished. Some of the energy and nutrients in the mill as residues constitute an important source for flora and fauna that contaminates raw materials and finished feed products. Because of frequent movement of people, the feed mill ecosystem is unstable. Feed mills grain elevators or wear house are conducive to pest problems and for growth and multiplication of mould and bacteria.

The operating machinery of the feed mills are not usually enclosed. The internal working spaces are clogged with dust and feed residues. The internal mill consists of warm or heated milling and pelleting areas connected by pipes, ducts, doors etc., promote growth microbes and moulds. The contaminants include human hairs, rodent hairs and faeces, insects, alive or dead or fragmented materials, mites, split products and toxic products. Recycling of all these are all ongoing problems of the feed mill. They are the sources of moulds, insect and mite infestation. These are seen in the corners and crevices within the feed mill. Therefore, in-house sanitation and mill sanitation are important to reduce these problems. In the processes of pellet manufacturing, the humidity and moisture in the pellets deteriorates and the quality by growth of moulds.

e) Feed mill management

The feed mills should be designed to eliminate locations where residues and moisture can accumulate, where rodents and birds can enter the mill and where insects and rodents harbour, quality control programme should be planned and included in the mill design. The proper clear-cut programmes for mills need to be formulated at regular intervals.

The exterior surroundings of the mill and storage structures should be cleaned periodically. Any accumulation of debris, dust and garbage all need to be scooped and mill need to be disinfected. Check biosecurity measure. Do not allow vegetable/pellets/scrap materials within two meters of milk. Bulk waste containers should be covered.

f) Feed mill sanitation

The following points can be considered for feed mill sanitation or biosecurity.

1. Maintain proper records for purchase of ingredients and other materials.

* Date of the receipt or purchase or sale or delivery.

- Name and address of the seller
- Name and address of the consignee
- Identification of the product
- Quantity
- Laboratory analytical report.

1. Keep each area of the mill dust free.
2. Check the ceiling area for any leakage.
3. Fill all the crakes, crevices and corners with element to prevent pests.
4. Floors of the mill should be smooth but not slippery for effective dusting, cleaning or mopping.
5. Used gunnies should not be stored in the premises. They need to be fumigated and sold. Avoid used gunnies to store and transport.
6. Remove all unused stocks from storage area, broom down all the walls and the floor. Mop the floor area with 4% moisture (mix-A) of formaldehyde (7.5%) glutraldehyde (7.5%) and Benzalkonim chloride (5%). This solution act as bactericidal, veridical and fungicidal (solution-A).
7. Clean all equipments, scrape all critical points where feed particles are accumulated. Dust the inner areas and wipe with a cloth soaked in a mixture (mix-B) of glutraldehyde (12.5%) Benzalkonim chloride (7.5%) and nonionic detergents. It acts as cleanser and disinfectant. This need to be done periodically once in a mouth.
8. Spray the entire area of the feed mill including roof and walls once a week with solution A(mix-A) @ 1 litre/1000 CFT area.
9. Wet fumigation should be carried out once a month during maintenance.
10. Modern feed mills with storage bins need extra care-round storage bins aids easy cleaning than rectangular bins, polishing of internal surface of the bins also help in maintenance of bin hygiene.
11. Clean-in-place (CIP) meaning an installation in which the equipment can be cleaned without being removed. CIP has become normal practice for food companion as they put hygiene at the heart of the factory design and layout.

The microbial growth and contamination of feed is the prime concern in the maintenance of welfare of both livestock and human beings. Therefore all the efforts need to be made in minimizing microbial contamination in feed mill. Detailed guidelines have been formulated to control salmonella contamination in poultry by cooperative extension service of University of Florida. These points need to be followed for need mill sanitation and prevention of salmonella.

The details of the same are as follows:
Feed mill should follow the guidelines recommended Salmonella Control for Processing of Livestock and Poultry Feeds published by the American Feed Industry Association (1501 Wilson Bibs., Suite 1100 Arlington, VA 22209). No single generic, microbiologically oriented HACCP program is best for all feed mills because each feed mill presents a unique management situation. Some commonalties, however, exist in all feed mills, and these are discussed in general to help minimize contamination of finished feed by pathogenic microorganisms such as salmonella.

* First and foremost, the feed mill premises are important. Prevention of microbial contamination should be a major consideration in the engineering and construction of the facility.
* Every feed mill should identify each critical control point, monitor that point for pathogens on a regular basis, and have a plan for corrective action if contamination is discovered. Ingredients inventories should be matched with the diets mixed and the flocks to which they are delivered. A bank of feed samples should be established so that they are available for analysis in the event a trace-back situation should arise. Feed samples should be sealed and stored in a clean, dry location.
* Each feed ingredient used in the milling of finished feed has its own unique risk of being contaminated. High-risk ingredients should be screened carefully. Generally animal proteins have higher levels of salmonella contamination than do plant proteins. Poultry offal meal and feather meal should be considered high-risk ingredients. These products often contain the same stereotypes that are concurrently identified as causing contamination in local poultry populations. Adequate records should be kept on each feed ingredient supplier, including baseline quality control data.

* It may be advisable at times to minimize the use of high risk feed ingredients in diet of certain animals such as very young stressed, or breeder birds. Young birds are very susceptible to salmonellosis when they are 1 to 14 days of age. Consideration should be given to using palletized/crumbled feed during this time of high susceptibility to salmonellosis since the temperature achieved during the palletizing process is effective in killing salmonella.
* The feed mill should have a functional insecurity programme to minimize contamination. Buffer zones will prevent non-employees from entering the feed milling plant. Visitors should be considered to be contaminated and provided with coveralls, disposable shoe covers sanitized rubber boots, or other appropriate insecurity measures.
* Rodents and wild birds must not be allowed in or near a milling faculty. Nesting materials should be removed and potential nesting site eliminated
* Dust control in the feed milling faculty is essential for controlling salmonella. Dust is the major source of salmonella contamination in feed mills.
* Traffic patterns of employees should be designed to minimize the possibility of cross contamination. Employees working in the ingredients receiving areas should not be allowed to enter the finished feed area and vice versa. Different-colored uniform could be used to ensure compliance.
* The feed ingredient receiving and unloading area should be clean, neat,

organized and well drained. Ingredients should be rejected prior to unloading if they are contaminated with rodent and/or bird droppings or any insect infestation.
* Unloading pits should be free of any visual signs of previous ingredients. Pits cab is flushed with small amounts (1000 lbs) of low risk ingredients at the end of each day. Ground corn (1000 lbs) containing from 0.5% to 1.0% organic acids (Propionic, acetic, or formic) can also used periodically for sanitation to minimize the risk of contamination. Mixture of these acids can also be added as supplements to finished feed to reduce the number of viable salmonella.
* Store all raw feed ingredients in clean, waterproof silos.
* Transportation vehicles should be inspected and sanitized on a regular schedule. Litter, offal, and carcasses should never be hauled by the same vehicles that haul feed ingredients of finished feed. Designation trucks should be used only to deliver feed breeder flocks.

* The feed milling faculty's air handling system should be segregated by location. Air inter areas (stacks) for pellet cooling can be a major source of microbial contamination and should be designed and located so as to minimize contamination of finished pellets by providing clean incoming air. Air handling systems should be cleaned thoroughly on a scheduled basis. Air filters should be able to remove all dust less than 5 microns.
* Bin cleanliness in feed storage area is essential and should be monitored on a regular basis. Unsanitary conditions should be rectified. Feed spills should be cleaned up immediately.
* Milling equipment, including conveyor equipment, should be identified (i.e. by color ring or number) throughout the facility, so if contamination occurs in a specific area the associated equipment can be identified and sanitized.
* Methods must be employed to reduce temperatures in ground grains rapidly to prevent moisture migration and condensation inside the ground grains storage tanks. Thus promoting bacterial as well as fungal growth.

* Flushing of horizontal (screw-type) and boot-type conveyors with 100 pounds of corn containing organic acids on a regular basis will minimize the risk of horizontal contamination.
* Carryover tests and random residue tests should be carried regularly to identify the possible cross contamination of additives.
* Surfaces of batch scales and mixers should be periodically inspected and cleaned of adhering feed materials.
* Finished pellets must not be allowed come into contact with objects prior to falling in to the cooler. Pellets falling on the floor must be considered a possible source of contamination and should not be added back to the finished feed.
* Liquid fat application devices designed to apply fat to pellets must be kept sealed, be operated in dust-free locations, and be cleaned daily. Ground corn containing organic acids should be used daily to clean conveyors between fat application devices and feed storage.
* Separate storage bins and trucks must be assigned for mash and pelleted feeds. These bins and trucks must be inspected and cleaned regularly.
* Feed delivered to farms in bulk or in bags must be placed in clean storage bins or areas. Each poultry house should have two feed bins to allow growers to clean and sanitize the bins properly as needed and without interruption of the feeding schedule. The bins should be completely emptied, once at a time.
* Any animal protein used as a feed ingredient in poultry feed should be purchased from rendering plants participating in the Animal Protein Producers Industry (APPI), Salmonella Reduction/Education program or the Fish meal Inspection programme

sponsored by the National Marine Fisheries Service (NMFS). The APPI or NMFS can provide a list of participants in their respective programs

* Educational programs for all feed mill employees should be considered essential. The HACCP programme should be. Discussed in detail with employees. Suggestion sot improves the HACCP programme should be solicited from employees at regular intervals.

* Consider heat treatment of breeder feed 2 minutes at 80C or additives of standard bactericide/organic acids.

* Swab sampling techniques should be implemented based on HACCP risk assessment to identify the status of bacteriological contamination within the mill.

Conclusion

There is advancement in feed mill design and milling technology in the country. The Feed Mill should aim at production of quality feed with assured nutritive value to livestock and poultry and thereby assured production of healthy meat to human consumption.