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BIHAR VETERINARY COLLEGE, PATNA
Department of Animal Nutrition

ANN-603

Lecture on

**Feed processing technologies for improving
nutrients utilization in farm animals
(Lecture-4)**

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Types of Processing Animal Waste Processing.

- Poultry waste
 - Broiler and layer litter has been used for many years.
 - High nitrogen content.
- Types of processing
 - Deep stacking
 - Several weeks for increased temperature to 160° F growth stopped at 80 ° F and killed at 145 ° F.
 - Used successfully for many years
 - No documented animal health problems.
- Ensiling (fermentation)
 - CHO are converted to lactic, acetic and other acids
 - Heat is generated killing pathogens
 - Nutritive value is improved by blending with other feed ingredients such as cereal grains prior to ensiling and adjust to 40% moisture.
 - Residues from medicines and minerals may not be affected by ensiling Be cautious.
 - No disease problem from ensiling. **Problem ?**

Types of processing- Adding Fats

- Increases Caloric density of ration
- Improves palatability
- Facilitates absorption of Vit. A and D
- Supplies Linoleic acid
 - Animal body requires Linoleic acid – all species. Ruminant microbes can synthesis.
- Delays hunger.
 - Fats require longer period in the stomach that CHO and protein. “Sticking to the ribs” in Human diets.
- Controls dust and fines
- Lubricates equipment
 - Coats and clogs equipment if in excess.
- Solidify in cold weather.
- High levels cause pellet to be soft.
- Fats can become rancid.
- Added at the levels of:
 - 5-10 % swine and poultry
 - 2 – 6 % in ruminants
 - Lower consumption if exceeded.
- Ethoxyquin – effective antioxidant.

Types of processing- Adding Fats

- Degree of unsaturated Fats important in availability of Vitamins.
 - Digestibility decreases with saturation.
 - Relationship between degree of saturation and type of body fat formed. Especially in monogastrics.
 - High levels of unsaturated fats produce soft pork.
 - Cappuccino machines in dairy cows.

Types of Processing

- **Molasses** – 5- 15 % of diet it has about 75 % energy value of corn.
- Appetizer and controls dust.
- In humid conditions should be limited to 5 % of ration as mold can develop.
 - Addition of Calcium propionate can control mold.
- **Organic preservatives**
 - Propionic and Acetic at 1 to 1.5 % at time of harvest to inhibit molds and bacteria.
- **Treatment of High-cellulose feeds.**
 - Rice, barley, oat straw; bagasse; tree bark; corn cobs; gin trash; newspaper; and seed hulls.
 - In their natural state are poor feedstuffs because of lignin or silica or a combination of the two encrust the energy-rich CHO, cellulose, and hemicellulose and keeps microbes from breaking them down to release the energy.
 - Must open up to permit digestion by microbes

Types of Processing

High Cellulose Feeds cont'd

- Chemical treatment
 - Alkali – sodium hydroxide, calcium hydroxide, potassium hydroxide.
 - Increases digestion of cell walls
 - Increase energy digestibility by 10%
 - Decreases nitrogen digestibility through heating effect. Therefore improved performance with added protein sources.
 - Used during WW I in Germany when critical shortages of animal feed occurred.
- Ammoniated
 - Air-tight enclosure and adding anhydrous ammonia or liquid nitrogen.
 - 3.0-3.5 % anhydrous and take about 20 days.
 - Adds NPN
 - No mineral residue such as chemical.
 - Increases CP by 3- 10 %
 - Increases TDN and DE by 3-23 %
 - Increases animal intake
 - Prevents molding.
 - Dangerous to use – very toxic

Types of Processing High Cellulose Cont'd

- Hydrogen Peroxide
 - Residue pH is brought up to 11.5 becomes mushy, then rinsed off and dried.
 - Can be used wet but quick.
 - Has better feed values than corn silage.
 - Right now; toooooo expensive and a patent is pending on the process.
 - Requires a lot of water.
- High pressure steaming
 - Used with and without chemicals
 - Aspen (wood) has been shown to have digestibility of up to 56%.
 - Sheep consumed at 60% of the ration.
 - Normal body weight gains and carcass traits.
- Cost is high - Use in situations of high feed cost

Types of Processing

- Total Mixed Rations
 - Makes greater efficiency in feeding and lessens sorting at feed bunk.
 - Forces consumption of ingredients not highly palatable.
 - Can limit concentrate consumption
 - Easier to get animals on full feed.
 - Easier to automate
 - Provide better control of nutrient intake
 - Species involved.
 - Dairy
 - Beef Feedlot
 - Sheep
 - Chickens
 - Swine

Complete feed system

- Concept of the complete feed is the noble technological approach for increasing the feed intake and nutrient utilization.
- This involves feeding of mixed diets based on local availability and competitive cost of the ingredients.
- Processing of complete feeds comprises of forages concentrates and other supplements in required proportions into uniform mixture either in the form of mash, pellets or blocks. The processing requires the use of grinding, mixing, steaming and extruding.

Merit of the technology

- Stable environment of the rumen fermentation, minimum fluctuation of the ammonia release and stable acetate and propionate ratio favoring normal fat synthesis and enhanced low grade feed stuffs.
- This is the very suitable technology in the era of global market and urbanization.
- Economics is the main criteria for the acceptance or the rejection of the technology

- A method of feed processing may be selected on the basis of nature of feed, its availability, chemical composition, and presence of toxic factor, economic implications, the quantity to be processed and use of processed feed ingredients.
- Amongst the physical methods shani making is oldest and traditional system of feeding animals. Pelleting or complete block making makes it feasible for easy and cost effective transportation and storage of dry roughages, however, the processing cost have been more and facilities are needed at farmer's field or practical feeding.
- The biological methods could not been accepted by the farmers or tried under commercial perspective

Summary

- We process to improve profitability, increase mechanization, utilize poorly digestible feed stuffs.
- To improve rates of gain
- To improve the number of animals each person can handle.
- To utilize products that animals would not normal consume.

Discussion.....

Thank you