

# **BIHAR ANIMAL SCIENCES UNIVERSITY**

**BIHAR VETERINARY COLLEGE, PATNA**

**Department of Animal Nutrition**

**Class: M.V.Sc.**

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## **Chemical & Biological Methods of Evaluation (Part-3)**

**Dr. Kaushalendra Kumar**

**Assistant Professor, Animal Nutrition, BVC, BASU, Patna**

**e-mail ID: [drkaushalbvc@gmail.com](mailto:drkaushalbvc@gmail.com)**

# Unit - 1

**Point to be discuss.....**

- **Detail of evaluation by chemical and biological methods.**

# Chemical treatments

## Treatment with NaOH

- **Beckmann method (developed in 1921):**
  - **Treated chopped straw in 8-10 times its weight of cold 1.2 -1.5% (w/v) solution of NaOH for at least 4hrs.**
  - **Treated straw is drained and washed with large quantity of water until free from alkali.**
  - **The quantity of water used to wash the treated straw varies from 40 – 50 % of the added NaOH.**

- **Straw is sprayed or sprinkled with small amount of concentrated solution of NaOH.**
- **4-6 kg of NaOH dissolved in 200 litre of water is adequate for 100kg straw.**
- **Ammonia:** It an alternative to NaOH for treatment of poor quality roughages.
- **Anhydrous NH<sub>3</sub> treatment:** Stacks of straw are wrapped with polyethylene and injected with 3% anhydrous NH<sub>3</sub>.
- **Aqueous NH<sub>3</sub> treatments:** Aqueous ammonia (20-35%) is also used commercially for treatment of straw.
- **Advantage of this method is that NH<sub>3</sub> concentration of about 20% the solution can be transported and handled at normal temperature and pressure.**

## **Ammonia through urea hydrolysis**

- ✓ **Take 100kg wheat or chopped paddy straw and spread in a 6-9 inches layer over a impervious cemented floor or on a polythene sheet.**
- ✓ **Dissolve 4 kg urea solution in 60 liters of plain water.**
- ✓ **Spray and mix urea solution thoroughly with straw.**
- ✓ **Pile up the mixed material in round shape and cover with polythene sheet.**

- ✓ **Roll the ground level sheet with bricks to make it stay air tight.**
- ✓ **After 4 weeks, open from side, aerate for 12 hrs and offer gradually to animals.**
- ✓ **This treatments improves the voluntary intake of straw and increases its TDN and CP value.**

## Urea – molasses method of impregnation of wheat straw

### Materials:

Wheat straw/ paddy straw	: 100kg
Molasses/ Flour (wheat/ maize/barley)	: 10kg
Urea	: 1kg
Mineral mixture	: 2kg
Water	: 5 litre

- **Spread wheat straw in a pile of 3/4” to 1” thickness.**
- **Make the solution of 1kg urea in about 2 lit of water.**
- **Add 2 kg mineral mixture and mix all these with 3 lit of remaining water.**
- **Urea should be thoroughly dissolved before mixing with other materials.**
- **Prepare the above solution and mix with molasses / flour.**
- **Spray these solution on the straw/ dry fodder / chopped grasses carefully and mix the material thoroughly.**
- **Feed this material as such to animals or may be dried, stored and fed to the animals as and when required.**



## **Treatments using oxidizing agents:**

- ✓ **Oxidizing agents like  $H_2O_2$ ,  $O_3$  sodium peroxide etc.**
- ✓ **Can be used for the treatment of wheat straw.**
- ✓ **Unlike alkali, which does not disrupt the lignin molecule, peroxides are known to oxidize lignin and disrupt its complex with hemicellulose.**

# Biological treatments

- This treatment involves the use of microorganisms such as *Phanerochaete chrysosporium*, *Streptomyces viridosporus*, *Coprinus fimetarius* etc. or their enzymes for depolymerization of complex structures present in highly fibrous feed materials.
- It is based on the principle that lignolytic fungi will selectively degrade lignin and may leave behind better digestible cell-wall carbohydrates for further use by the ruminants.

## Karnal process

- It is essentially a biological treatment of lignocellulosic material in a *solid state fermentation*.
- In the first stage, the wheat or paddy straw is treated with 4 % urea, keeping moisture level at 40% and then ensiled for 30 days.
- In the second stage, 10 kg treated straw is mixed thoroughly with 60 g single superphosphate and 6g calcium oxide dissolved with 8 lt of water.

- The inoculum of *Coprinus fimentarius* culture grown on millet seeds is evenly cast on the mineralized and moisturized (to about 65% moisture) treated straw.
- This process is repeated again and again till the required material is treated.
- Substantial increase was noted in the amino acids content of the treated straw and also indicated that the ammonia captured by *Coprinus fimentarius* was mainly utilized for synthesis of amino acids losses.

**Discussions.....**

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

**THANKS**