

## IX. DEBATE

### QUESTIONS AND REPLIES FROM THE FIELD

Development agents and farmers often pose questions or give replies during field visits in the various countries where techniques have been diffused concerning urea treatment of low quality forages and fabrication of multinutrient blocks.

This Chapter attempts to bring together this series of practical questions and replies. They illustrate the types of worry presented, which tend to be quite independent to the agro-climatic situation encountered.

#### ***1 - Questions posed to the livestock farmers and their replies***

##### **Question 1**

*How do you feed your animals during the course of the year (in the agricultural zone)?*

##### **Reply 1**

During the dry season: by stubble grazing and grazing of border areas during the day and giving rice straw or other crop residues during the evening (stalks from sorghum, millet and maize).

During the rainy season: because the fields are under crops, the animals are often kept at home and fed with straw.

##### **Question 2**

*What are the most important problems which you encounter in raising your animals?*

##### **Reply 2**

- Feed: Mediocre pastures in the dry season and insufficient border areas for feeding off during the rainy season, the fields then being under crops. The animals become weak.
- Water problems (mainly in countries of the Sahel during the dry season).
- Shortage or total lack of veterinary products.
- Problems of parasitic diseases.

### Question 3

*What do you think about treated straw and the animals which are receiving it?*

### Reply 3

- The treated straw has a deep yellow colour, a pungent odour and is supple.
- The treated straw is consumed in larger quantities and with less wastage, particularly in the case of stalks from sorghum, millet and maize.
- Water consumption increases.
- Better quality manure is produced for the crops.
- The general condition of the animals during the dry season is improved; their disease resistance also is improved.
- The animal's pelt condition improves.
- Milk production increases.
- The time required for fattening is reduced; economies may be made in the supplements added to the feed rations; the fattened animals are easier to sell on the market.
- The draft animals have more power and can work longer periods without losing weight.

### Question 4

*What do you think about the treatment technique and its eventual constraints?*

### Reply 4

- Straw is our main forage resource during the dry season; its quality has been considerably improved; the general condition of our animals has also improved in a similar manner.
- The treatment technique is simple to put into practice.
- This technique obliges us to better manage our straw reserves.

**However:**

- We are obliged to make stocks of straw.
- We must have urea available on the market.
- We must have cash available to buy the urea.
- We must have water available.

## Question 5

*During which period of the year do you prefer to treat and why?*

## Reply 5

- Early, just after harvesting the cereals (December and January, in the Sahel) because:
- Forages are in abundant supply and are easy to harvest close to the village.
- Water is available.
- We can undertake several treatments.
- We have time available.
- We have cash available at this time to buy the urea.
- This is the favourite period for buying cattle for fattening with a view to resale in March/April, a period of shortage when our animals are then in good condition and sell at interesting prices.

## Question 6

*Which type of animals do you prefer to feed with the treated straw?*

## Reply 6

- We give priority to our draft animals (the Sahel region and South East Asia).
- To our weaker animals.
- To our milk producing animals.
- To our animals being fattened (particularly in China).
- For our sheep which are being fattened (in the Sahel region).

## Question 7

*How would you advise FAO concerning the setting up of similar projects in other countries?*

## Reply 7

- Choose volunteer farmers who are well motivated.
- Carefully consult the local population, undertake a good publicity campaign and "propose" rather than "impose".

- Explain the advantages of treated straw: less refusal and animals in better physical condition.
- Be patient with the farmers.
- Only choose those extension agents who are very dedicated to their work.

## ***II - Questions most frequently posed by farmers and extension agents***

### **Question 1**

*Why should we treat the straw?*

#### **Reply 1**

- Treatment should never be considered as an obligation.
- Straw has only limited nutritional value. When it is fed in its natural state, it does not even cover the animal's needs for simple maintenance. By treating the straw with urea or anhydrous ammonia, the animal is much better nourished.

### **Question 2**

*How does the urea affect the straw?*

#### **Reply 2**

- Straw is made up of complex cell fibres (walls) which are highly lignified and which are digested slowly and weakly by the microbes in the rumen. Straw thus encumbers the belly of the animal which will only take in small amounts.
- When urea is placed in the presence of water and heat (at ambient temperature), it is transformed into ammonia which diffuses throughout the straw mass. As long as the straw is covered hermetically to avoid any loss of ammonia to the atmosphere, the ammonia will react with the fibres (the straw cell walls) and change their physical and chemical characteristics. The microbes in the rumen can then more readily attack the cell matter, digesting it more rapidly and intensively. The straw thus becomes more digestible, causes less incumbrance to the rumen and is thus better ingested. Its nitrogen content, which is essential for the microbes in the belly, is further improved due to the partial fixation of the ammonia which has been produced.

### Question 3

*Why does the animal have to adapt to treated straw?*

#### Reply 3:

- Urea treatment increases the nitrogen content of the straw. However this is quickly transformed into ammonia in the rumen. Adaptation consists in gradually supplying the treated straw to the animal so that the microbes in the rumen (belly) become accustomed to the new food and to utilising these higher concentrations of ammonia. If no allowance is made for a period of transition, the animal might run a risk of poisoning by absorbing through the stomach wall and into the blood stream, the excess ammonia which has not been transformed by the microbes.

### Question 4

*What is the difference between making silage and urea treatment?*

#### Reply 4

- Making silage consists in conserving the forage whilst it is still green, compressing it and sealing it up within a hermetic enclosure. An anaerobic fermentation process takes place and preserves (rather than improves) its nutritional value.
- Treating with urea or anhydrous ammonia is an operation which consists in improving the nutritional value of a low quality dry forage due to the chemical reaction of the ammonia injected (or generated by the urea) which affects the forage cell matter, making it more digestible.

### Question 5

*Which types of forage can be treated?*

#### Reply 5

- Forages to be treated should be dry, not moist. Treatment is more effective when the forages are of lower quality, in other words, rich in cellulose and thus with low rates of digestibility and weak in nitrogen content. Treatment becomes more interesting if it is undertaken for:
  - straw from cereals: rice, wheat, barley or oats,
  - cereal stalks: maize, sorghum and millet,

- natural forages harvested late (and hence dry and straw like),
- hay from cereals of mediocre quality (at a late stage) such as, for example, hay from late harvested vetch/oats forage which is traditionally cultivated in North Africa.

### Question 6

*When is the optimum season for treatment?*

### Reply 6

- Treatment succeeds better when temperatures are higher. It is therefore recommended to undertake treatment during the dry season, preferably just after harvest in the tropical regions, and in summer to the start of autumn in the Mediterranean regions.

### Question 7

*How long can treated straw be conserved?*

### Reply 7

- Once the straw has been treated, it can be conserved for several months before use, as long as it is correctly covered and protected from the rain (the ammonia atmosphere impedes the development of moulds). Straw which has been treated at the start of the dry season can also be used later when it is most needed and when field operations recommence. Furthermore, once opened, a treated straw reserve may be exploited over several months as long as careful precautions are taken to reseal the stock after each time that the required amounts of straw are taken out.

### Question 8

*What are the effects on quality of storing the treated straw over long periods?*

### Reply 8

- Storage length has no harmful effect on the straw's digestibility: the alkaline effect of the ammonia on the cell walls is irreversible and even has a tendency to continue if the storage enclosure is hermetically sealed.

- In contrast, only part of the ammonia generated during the treatment is firmly “fixed”, the other part being labile and having a tendency to “leave” the forage.
- Consequently, long storage periods will tend to reduce the content of this unattached nitrogen, particularly if complete air-tightness has not been maintained.
- Definitely there should be no problem concerning straw quality due to lengthy storage periods when care is taken to ensure hermetic sealing. This will also avoid any chance of mould development (see above, the Reply to Question 7).

### Question 9

*Can treated forage be transferred from the silo for storage elsewhere?*

### Reply 9

- Yes! within the limitations already given above in the replies to Questions 7 and 8: the treated forage should be sheltered from the rain and covered over again so as reduce any major drop in crude protein content or development of moulds. However, this type of handling which requires a lot of work, should generally be avoided.

### Question 10

*Can we feed treated straw to our pigs?*

### Reply 10

- No! Pigs are monogastrics which do not host micro-organisms which compare to those in the belly of ruminants and which are able to use the non-protein nitrogen from the treated straw. Both treated straw and urea are toxic for pigs.

### Question 11

*Can we treat freshly cut green forage?*

### Reply 11

- No! Treatment should only be undertaken for low quality forages which are almost completely dried out. Green forages contain water and

nitrogenous matter which is mainly non-proteic and fermentable. Urea treatment would present no advantage whatsoever or could even be dangerous because (a) it may supply an excessive amount of non-protein nitrogen and (b) it could be carried out with amounts of ammonia or urea which are too high if one has incorrectly estimated the dry matter content of the green forage being treated (over-dosage).

### Question 12

*Can we feed treated straw to our cows which are in gestation or are suckling?*

### Reply 12

- **Yes!** Treated straw is very beneficial for cows which are either in gestation or are suckling; their general condition improves, milk production increases and the calf will maintain better health.

### Question 13

*Can we stop giving supplements to our animals which are fed the treated forage?*

### Reply 13

**a/ Yes!** They may be stopped for your animals which are under maintenance or which have only feeble production, all except the mineral supplements.

What happens in practice is,

- firstly, the nutritional value of the straw is significantly improved by treatment and thus supplies more nutritive elements to the animal; given as the only ration and *ad libitum*, treated straw can amply cover the animal's maintenance requirements.
- secondly, treatment does not supply any minerals and so these will remain indispensable.

**b/ No!** In order to achieve high performance levels, a supplementation in energy, crude protein and minerals is essential. However this must not erase the effects due to treatment. Such supplements should be supplied through using local byproducts such as cotton seeds, cereal bran, brewer's grain,

cassava tubers, etc.... These should never make up more than half the total ration.

Pasturing, above all of green forage if this exists (along the bunds of irrigated plots) constitutes an excellent supplement for treated straw when this is only available in limited quantities.

### Question 14

*What are the advantages of urea treatment over simply adding an equivalent amount of urea to natural straw?*

### Reply 14

- Treatment affects the straw cell walls: the straw becomes more digestible and richer in nitrogen content.
- Adding urea to natural straw stimulates certain microbial flora in the rumen which can then better digest it, but not in the same proportion as that for treated material.
- Treating therefore remains a better solution than simply adding urea.

### Question 15

*Can we give multinutrient blocks in addition to treated straw?*

### Reply 15

- The multinutrient blocks supply the animal with a supplement of nitrogen, minerals and energy. Their use alongside that of treated straw will thus further improve the nutritional value of the ration.
- However, because of the richness in non-protein nitrogen of the treated straw, it is recommended to limit the level of urea incorporated into the blocks to 5 % in order to avoid any risk of causing poisoning due to an excess of ammonia in the rumen.
- Supplementing minerals, particularly sulphur and magnesium, is highly recommended in order to perfect the benefits of treating the forages.
- However, the economic interest for adding such supplements should be carefully calculated. Normally one will find that a simple mineral supplement will be both sufficient and appropriate.

## Question 16

*What should we do if the animals refuse to eat the treated straw?*

## Reply 16

- You should persevere. The animal needs to become accustomed to this new feed. It has a pungent smell and true, may seem disagreeable and a surprise ... and may even cause the animal to regurgitate it during the first few days. One should not be discouraged and should air the straw before feeding and continue giving it to the animals. After a few days, perhaps a week, the animal will start consuming the ration. Once it is well accustomed, it will be the untreated forage which it rejects .... and it will no longer be necessary to air the straw before presenting it for feed.

## Question 17

*What should we do if we find effects due to an over-dosage?*

## Reply 17

- If you discover parts of the treated straw or forage which are clearly very dark and which give off a very pungent smell, this means that an overdose has occurred in these parts. It is even possible that similar characteristics apply to the whole stack.
- If this affects only part of the treated forage, either this can be rejected or alternatively, mixed with the remaining stock when it represents the major proportion;
- If this problem concerns the whole of the stock pile, there are two possibilities:
  - if the stock size is relatively small, reject it in bulk and use it as manure,
  - if a major stock is involved and rejection represents an important loss, it should be mixed in equal amounts with non-treated forage.

One must note however, that this type of situation is rarely encountered in practice.