

TRAINING IN THE DEVELOPMENT OF FEED RESOURCES

by

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INTRODUCTION

FAO/RDDTTAP (Team) has been engaged since 1972 in training of extension workers and milk plant personnel. Some 2500 officers from 15 countries of the Asia and Pacific region have been participating in specialized courses of 2 - 6 weeks duration and self-teaching programmes. Training of smallholder milk producers consists of short courses and demonstrations at dairy development training units (small demonstration farms) in Sri Lanka, Thailand and Indonesia and the operation of mobile dairy extension units in selected areas of Thailand and Indonesia.

Having noted the lack of specialized knowledge and experience of field extension workers in forage preservation, the Team designed training activities in making silage and hay, which provide the trainee extension worker with adequate practical experience to handle these subjects competently on the village level. The Team has contributed to the development of small scale preservation practices: silos, hay drying racks, hay stores and feeders, which fit the means, skills and requirements of the small farmer. A better utilization of various field crop residues and industrial by-products as cattle feed has been promoted.

The successful introduction of new practices benefitting the village community depends a great deal on the proper presentation to the farmer. Part of all training activities in forage production/preservation and use of alternative feed resources is the development of training material, "persuasive" posters and handouts for the farmer.

DEVELOPMENT WITH AND FOR THE SMALLHOLDER

Sites and Modes of Training

A sound development of smallholder (dairy) farming and the designing of realistic extension and training programmes supporting this development require, first and above all, to listen to the farmer. The small farmer is a professional. His profound knowledge of his environment, his experience and practical skills are valuable assets of development.

The researcher (extension worker) must realize that it is no use to drop a new idea (farming practice) on the practical man and hope for the right adjustments at the practical level. Developing his ideas requires

the researcher (extension worker) to take into account the height of the hill to be reached, the obstacles in its way and the weight of the idea or recommendation.

Introducing to smallholder farmers a new method of forage utilization, such as silage or hay making, requires considerable experience on the part of the extension worker. A thorough analysis of training courses, conducted in 7 countries of the region for extension workers in dairy husbandry, reveals that the time allocation for practical forage preservation is completely inadequate. The lack of experience endangers the success of extension activities on the village level.

To reinforce practical training facilities for trainee extension workers and smallholder milk producers, the RDDTTAP (Team) has set up small scale demonstration farms (Dairy Development Training Units) in 3 countries of the region: Sri Lanka, Thailand and Indonesia. It is here that small numbers of farmers gather for repeated one-day training activities and are acquainted with new farming practices and developments. They include aspects of forage production/preservation.

Besides training rendered by extension workers operating from DDTUs, training is being extended to other areas relevant for dairy development through mobile extension units (Thailand and Indonesia). The Team developed and is developing a special tool for mobile operations: the training kit. It contains a comprehensive collection of equipment and training material required by the extension worker to demonstrate particular points of the subject matter and to enhance the understanding of it by the farmer. Training kits on forage production and preservation are in the state of being completed.

An integration of DDTUs, mobile dairy extension units and agricultural colleges in support of the resident extension worker is envisaged as part of the development strategy pursued by the Team.

On the basis of encouraging experiences in South America with self-teaching programmes, the Team has introduced self-teaching programmes on ration formulation in Sri Lanka. The programme is aiming at a better knowledge of the field extension worker on ruminant nutrition and balanced feeding, as well as to encourage the establishment of a closer network for his support by research and teaching institutions.

SILAGE MAKING

A Technology for the Smallholder

If silage making and feeding is to be introduced to smallholders, the extension worker tends to organize a "Field Day" on one of the nearby government farms. What does the small farmer observe? An

impressive technology - but nothing which could fit his own farming conditions. The extension worker, with the tower silo in his mind, may even build one on his own. It is too big for one farmer, so he calls it "community silo." But is it practical? A more simple and inexpensive approach to "persuade" smallholders to adopt silage making is still the famous pit silo. But what about silage quality? What about losses reducing the amount of feedable plant matter?

Silo pits are of temporary nature. When not reinforced (costs!), they may even encourage erosion and their walls collapse during the rain. If silage making becomes a regular practice on a smallholding, other building materials may be considered, e.g. bamboo. Silos must be airtight to provide anaerobic conditions for fermentation. Wire netting (chicken-wire) can be connected to the inner wall of the silo, to provide the reinforcement for a thin layer of concrete. A plastic jacket may provide for the same conditions, but lasts only through one silage campaign and feeding period. Even after years, when the bamboo structure may have disintegrated, the concrete wall is still intact, the silo still usable.

The time which is required to fill a silo and seal it appears to be the most decisive factor for the production of quality silage. Chopping of forage is a necessity for appropriate compaction of the forage mass. But chopping by hand needs many hands and is time consuming.

Forage choppers of many kind are available. They often exceed the capacity which is required for the smallholder's operation: chopping of forage for fresh feeding and ensiling. Animal driven forage choppers have been successfully used for many years in India and Pakistan. The two-wheeler tractor is a common piece of equipment for the small farmer in Thailand as elsewhere in the region. It is used for all the land tilling operations connected with the cultivation of paddy. A technology, which is not to burden the smallholder and to increase his cost of production, must be linked to existing elements and resources. Two-wheeler tractors can be engaged as power source in forage chopping (e.g. in Sri Lanka).

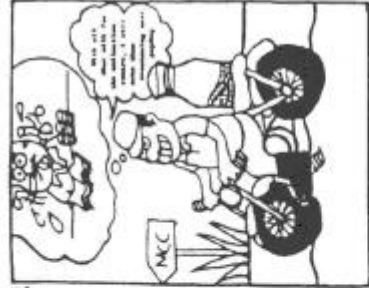
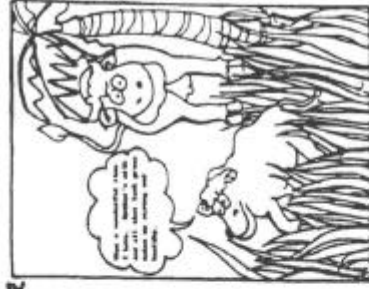
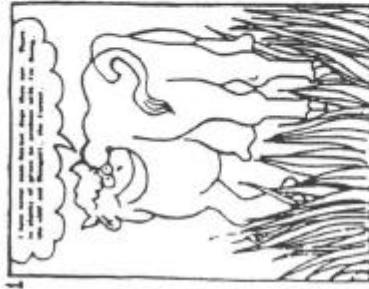
Training and demonstration methods which can persuade the smallholder

Methods and practices used in training of smallholders must help the trainee to identify the demonstrated practices and techniques as within his reach and means. To introduce silage making on smallholdings through the use of big machinery and equipment is a didactic mistake. Sometimes also too many trainees are gathered, too many trainees not occupied. The demonstration, more often than not, has no follow-up. The farmer observes that grasses can be "buried". Since he does not see the result, he may think: 'What a waste!'

Figure 1a.

TOPIC : INTRODUCING SILAGE MAKING

THONGSRI AND HIS ANIMALS HAVE A WONDERFUL TIME



THONGSRI RESTS WHILE HE SHOULD PREPARE HIMSELF FOR THE DRY SEASON

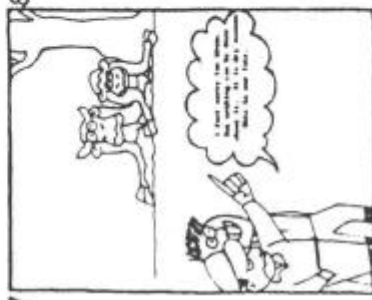
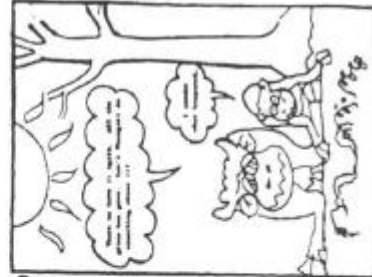
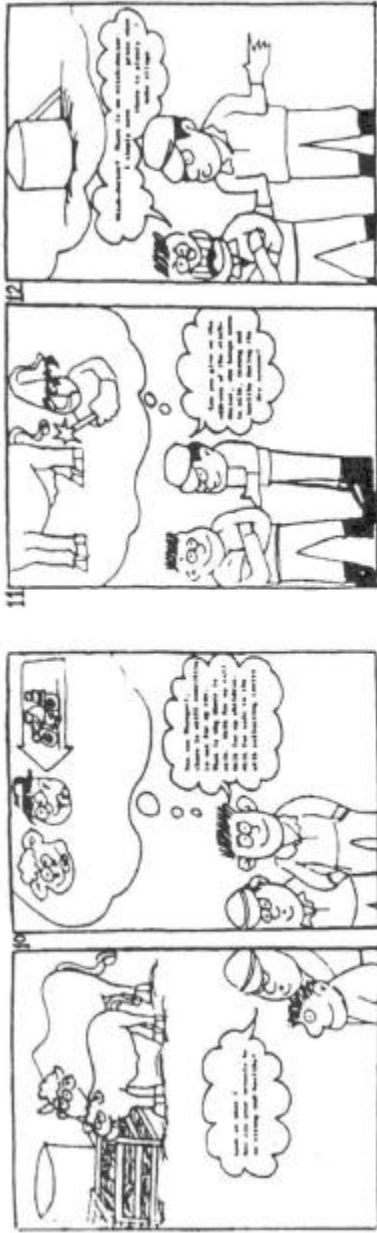


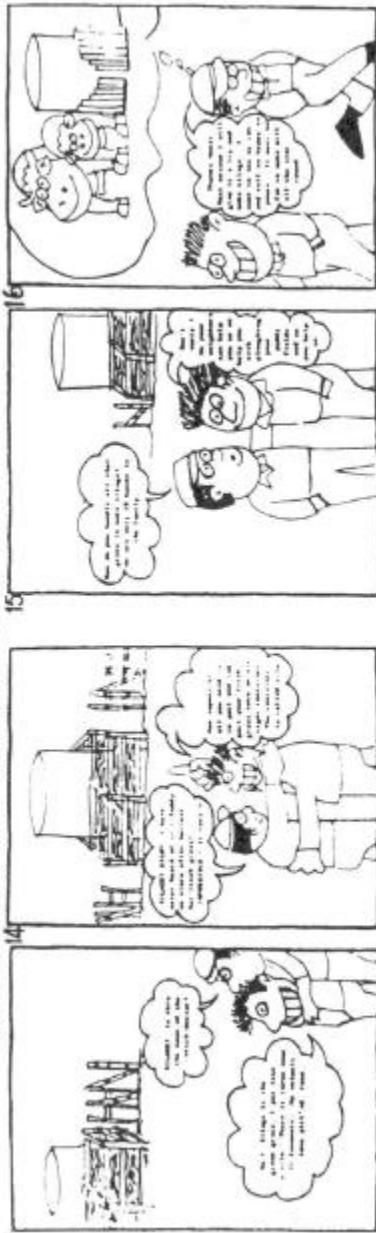
Figure 1b.

TOPIC: INTRODUCING SILAGE MAKING

MANIT HAS NO PROBLEM TO FEED HIS ANIMALS DURING THE DRY SEASON. HE PRESERVED GRASSES.



MANIT EXPLAINS WHAT SILAGE IS AND WHAT IT NEEDS TO MAKE SILAGE



(poster: R001TAP, 1988)

The chart (Figure 1) demonstrates the need for a well timed and organized training activity on small scale silage making, during which all steps from silo construction to silage feeding are shown. Trainee extension workers work together and learn together with the farmer during a field day on a smallholding.

Prior to the introduction of silage making, farmers are taught the basic requirements for the production of quality silage (chopping, quick filling, compacting, sealing). Chopping by hand can be employed for handling smaller quantities of forage to produce sample silage. Well cleaned, 44-gallon oil drums furnished with a plastic jacket may be used as silos. In connection with the Team's work at DDTUs linked to agricultural colleges, concrete sewage pipes (height 1 m, diameter 1 m) have been used as silos.

With a sufficient number of experimental silos, the impact of various processing practices of forages on the quality of silage can be demonstrated (e.g. unchopped = insufficient compaction = continued respiration of plant matter = suppression of lactic acid producing bacteria). The proper closing (sealing) of the silo immediately after completing the fill is demonstrated.

Silos need to be identified with regard to the plant matter ensiled, its quantity and the treatment applied. Brief descriptions, on boards of the silo wall, also make it easier to explain new developments and practices to the visitor to the demonstration site.

The circular silo erected from bamboo poles (height 1.80 m, diameter 2 m) can be filled to contain around 2 tons of forage. A compaction of 300 - 350 kg/m³ by treading is only possible if the forage is chopped.

Trainee extension workers and farmers are made acquainted with the criteria for the wanted fermentation. On the basis of organoleptic tests, they produce a quality score. The decisive test is the animal's intake. Silage of good quality has been produced from sugar cane tops in an experimental silo. Tops were chopped, well compacted and 4% molasses added.

Forage planning and the use of crop residues and industrial by-products

The eager extension worker may wish to do something immediately about forage preservation in his working area. But has he looked carefully into the requirements and conditions for silage making? Above all, has he looked into the farmers' "feeding calendar" to see if silage is really needed and if there is sufficient surplus of forage to make silage preservation feasible?

Once it has been determined that silage needs to be produced, the quantity of forage required has to be specified and the silo capacity and dimensions be calculated. Trainee extension workers have to be engaged in exercises along these lines. An overestimated forage quantity leads to an only partly filled silo, increasing the surface area for the fodder mass and does often result in inferior silage quality.

Participants of Team-supported training courses are requested to establish an inventory of available feed resources. If there is no surplus of forage crops, field crop residues and industrial by-products can fill the gap. Sugar cane tops have been recognized as a potential feed resource both for being fed fresh and as silage. The vast quantities of sugar cane tops available during the campaign period suggest that they are wasting feed resources by improper feeding practices. Farmers are advised to construct inexpensive feeders (bamboo feeders at DDTU Nakhon Sawan) and to chop cane tops to reduce waste. The Team has encouraged extension workers to make use of pineapple cannery waste as cattle feed. Some years ago, pineapple waste was discarded at dumping places, creating problems of pollution. A number of training activities were conducted to demonstrate silage making from pineapple cannery waste together with paddy straw.

HAYMAKING

"The growing season of grasses coincides with heavy rain. Haymaking is not possible." This statement may justify the common observations made during visits to small and big dairy farms alike in this region that no hay can be found in calf pens. But if so, there is some colourless, stale dry roughage. It deserves to be called straw - but not hay.

Based on hay drying practices experienced earlier in temperate climates, the Team, during training courses for extension workers, attempted to develop a technology of hay curing suitable for the smallholder and applicable during the rains.

The "classical" tripod worked well in Pakistan, (forage crop: *Trifolium alexandrinum*), but was found unsuitable for the conditions to be encountered during haymaking in countries like Thailand Sri Lanka or Indonesia. Layers of wilted forage on tripods become too compacted, thus hindering air circulation and causing the development of moulds.

Satisfactory results were achieved with a drying fence. It is constructed by inserting (4) poles in a particular pattern in holes driven (1.10 m apart) into the ground using crowbars. Then layers of shortly wilted forage are placed on ropes connecting the poles. The forage on fences is covered between rains by mats made from palm leaves.

A drying rack called the "Hurdle" proved to be the most easy to construct and practical means for drying small quantities of hay efficiently during the rains. Hurdles, made from timber or bamboo, can be used in flat as in hilly areas. After a few hours of pre-drying on the ground, encouraged by continuous turning, the forage is packed onto the horizontal runners. For the first or second day the roof may be removed during sunny spells to encourage fast drying. Thereafter, the hood is kept until transfer of the hay to the site of feeding. Permanent shading prevents bleaching (i.e. loss of carotene).

Research workers at the National Dairy Training and Applied Research Institute (NDTARI) in Thailand, supported by the Team, developed an extremely successful drying technique using 1-pole racks ("Heinze") as the basic element. The drying rack consists of poles, a dark plastic sheet in the bottom of the drying rack which collects the sun's rays, and transparent plastic sheeting provides protection for the forage mass from the rain. Smaller drying racks of this kind have been developed and are regularly demonstrated by NDTARI to participants of training courses. The drying process takes 1-3 days and produces a green coloured, aromatic hay.

Together with hay curing practices suitable for the small farmer, baling of hay by "baling box" was introduced, particularly to avoid losses through leaf shattering (fragmentation) during transport.

Hay may be stored in many ways. Since the smallholder is encouraged to produce small quantities of hay for calves as often as possible to avoid spoilage occurring during extended storage periods, only small quantities need to be kept. A combination of a roofed silage pit and a hay drying/ storage platform makes excellent use of limited place on smallholdings (e.g. in Sri Lanka). Hay may also be stored on a well-aired platform established on top of the area, where calves are housed (e.g. DDTU Nikaweratiya, Sri Lanka).

In search of practical, low cost methods for handling, storing and feeding of hay, the Team has utilized the farmer's skills for wickerwork. Hay for a number of calves can be stored in roofed self-feeders which are best placed in exercise yards.

Problems in curing quality hay during the growing season of grasses, which coincides with heavy rain, can be mastered by selecting appropriate drying practices and sticking to a flexible management which makes maximum use of dry and sunny spells. The remaining problem is the storing of hay under conditions characterized by a high humidity.

MAKING BETTER USE OF PADDY STRAW THAN BURNING

Cereal straw of different kind forms the bulk of crop residue available immediately after threshing. Draught animals are often fed entirely on straw without losing body weight. Though low in feed value, straw has to be used extensively on many smallholdings to form a major part of the maintenance ration for dairy animals. But straw is also burned, year by year, after harvest and threshing of grain crops.

The Team has encouraged, through training of extension workers and farmers, to better utilize available straws for cattle feeding, either by ensiling it together with low dry matter industrial by-products (cannery waste) or by ammoniation. For the treatment of cereal straws (mainly paddy), the Team promoted, as a temporary arrangement without investment in permanent structures, the covering of treated straw stacks by plastic sheets (6% urea, 3 weeks of storing, aeration before feeding).

Similar to training activities in silage making, demonstrations to farmers on straw treatment have to include all stages from processing to feeding. Trainee extension workers, at the end of the course, develop their own training aids and conduct a field day at a farm site.

Lately, it is being tried in Pakistan to combine the threshing of cereal crops and the treatment of straw with urea, with the aim of making better use of available manpower at the time of threshing.

UNDERSTANDING FEEDING OF MINERALS

Small-scale block making

The making of mineral blocks was originally introduced as a training activity for extension workers and farmers as a didactic means to make extension workers and farmers aware of the importance of minerals in support of growth, milk production, breeding efficiency and reproductive performance. To talk to farmers about the need of animals for calcium, phosphorus, potassium, etc. remains highly theoretical and is generally beyond his comprehension. The presentation, during a demonstration to farmers, of chemical compounds containing the required elements, the weighing (dosing) of compounds and their mixing according to an explained formula, brings them nearer to understanding the complex nature of this feed ingredient.

In following up on this aspect of training, more efficient presses were developed, which have made it possible to produce mineral blocks in bigger quantities for sale to dairy farmers (e.g. in Thailand). Formulae based on observed mineral imbalances in cattle rations have been developed.