
Introduction

The FAO Expert Consultation on Legume Trees and Other Fodder Trees as Protein Sources for Livestock was held at the Malaysian Agricultural Research and Development Institute (MARDI) in Kuala Lumpur, Malaysia, from 14 to 18 October 1991.

BACKGROUND

Fodder trees and fodder shrubs have always played a significant role in feeding domestic animals. In fact, trees and shrubs are increasingly recognized as important components of animal feeding, particularly as suppliers of protein and especially in harsh environmental conditions. In such situations, the available grazing is not generally sufficient to meet the maintenance requirements of animals, at least for part of the year. This occurs, for example, in some mountainous regions and in the dry tropics where the grazing is also sometimes very degraded. Thus, in extensive animal production systems in the dry areas of Africa, it is generally estimated that ligneous materials contribute up to 90% of rangeland production and account for 40-50% of the total available feed. Such figures illustrate the existing and urgent need not only for better knowledge but also for better use of such potential, particularly in the present context of environmental degradation which is affecting our planet.

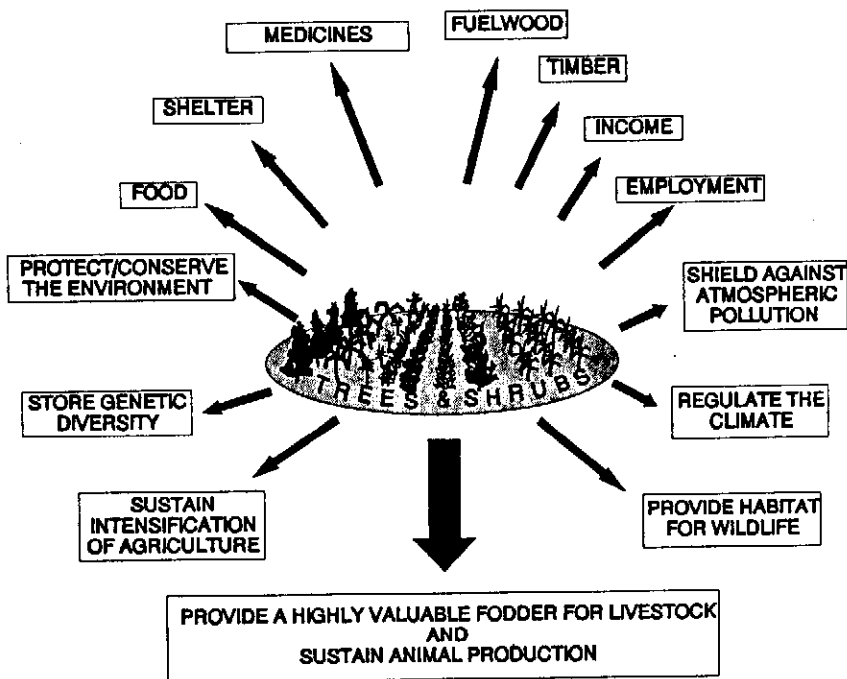
On the other hand, in the humid tropics of Latin America, the Caribbean, South-east Asia and Africa, fodders from trees and shrubs - especially from leguminous species - are beginning to be utilized more widely as dietary nitrogen supplements for ruminants. In this respect, there is now a significant move to look for new sources of protein from trees and shrubs. However, given the increasing demand for forage and the extensive availability of low quality basal feed materials which

require protein supplementation, high protein fodders from leguminous trees and shrubs could have a much more significant role in animal feeding systems throughout the developing world. In this respect, there is a need for more research to develop technically viable solutions. These solutions must also be economically and socially acceptable; they must preserve natural resources and protect the environment. In other words, the challenge is the sustainable development of fodder trees and shrubs.

Broadly speaking, it seems that collaborative efforts among scientists must be particularly directed towards integrated patterns of use by ruminants and non-ruminants and towards the establishment and development of innovative feeding systems, both intensive and extensive, using high protein fodders from promising species of trees and shrubs. In this respect, some research themes of major importance are: productivity, feeding behaviour of animals, real nutritive value, ecological adaptation and natural regeneration ability. The objectives are to improve the availability of feed resources for livestock throughout the year and to provide an adequate strategic feed supplementation to animals over critical periods.

It must also be kept in mind that, apart from their potential role in animal feeding, trees and shrubs are valuable sources of fuelwood, shelter, timber, herbal medicines and food for people and have been since the first civilizations of hunter-gatherers. Later on, humans also learnt that trees and shrubs could help to maintain soil fertility and to control erosion. We now know that our planet cannot hope to survive very long without a drastic global policy to control the use of natural resources. Undoubtedly, trees and shrubs, whether or not they provide fodder for animals, do offer a partial but adequate response to desertification problems, to environmental degradation and to changes in climate, problems which have begun to be observed with some anxiety in the last few years. This is irrespective of their role as a source of income and employment, as a means to sustain the intensification of agriculture, to maintain biodiversity and to enable livestock to be kept as essential sources of meat, milk, fibre or draught power for the rural poor.

FIGURE 1. The different roles of trees and shrubs.



PURPOSE

The proposed objectives of this interdisciplinary Expert Consultation on **Fodder trees and fodder shrubs as protein sources for livestock** were:

- a global review of the utilization of these species in the developing countries;
- a review of promising species already utilized by farmers and breeders in the field or investigated by scientists in different countries and agro-climatic zones (basic and applied research);
- a short up-to-date list of species with a likely future;
- a synthesis, related to the main fodder trees and shrubs, either effectively utilized today in animal feeding or with a likely future, looking at the current state of knowledge, particularly with respect to:
 - their geographical and ecological distribution;
 - their main botanical characteristics;
 - their main agronomic characteristics, particularly including quantity and quality of fodder, pods and seed production, as well as timber, fuelwood or, if appropriate, parts of plants used in human nutrition;
 - their main nutritional characteristics for ruminants and non-ruminants: palatability, voluntary intake, chemical composition, mineral and amino-acid composition, apparent digestibility, feeding value, toxic or anti-nutritional factors, etc.
- the main results of feeding trials using fodder shrubs and fodder trees as parts of rations for meat or milk production;
- investigations of conservation techniques and/or simple technological ways to enhance their utilization (silages, meals, seed soaking, etc.)
- reports on how, in practice, farmers and breeders cultivate and utilize such ligneous materials in extensive and intensive feeding systems.
- an analysis of the main results of animal feeding systems developed all over the world utilizing fodder trees and fodder shrubs, also taking into account socio-economic parameters;
- practical recommendations at the present stage of knowledge, in order to develop the cultivation and utilization of fodder shrubs and fodder trees, particularly in harsh environmental conditions as a means of improving animal feeding in developing countries and of matching

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- livestock production systems to available and potential feed resources;
 - an identification of the main research fields for the future.

In conclusion, in a situation where feeds remain the major constraint for livestock development and the major component of the cost of animal production, FAO, as an advisory and executive agency of the UN system, considers this Expert Consultation on fodder trees as a key event towards coordinated efforts all over the world to promote fodder trees and fodder shrubs as a means of improving livestock feeding and also of moving towards sustainable agriculture.

OPENING SESSION AND INTRODUCTORY STATEMENT

The first address at the opening ceremony was delivered by Mr. Carl Erik Wiberg, Regional Representative of the United Nations Development Programme (UNDP). First of all, he expressed his great pleasure to be at MARDI for the opening of the Consultation and declared how impressed he was with MARDI's successes and achievements in hosting and undertaking local and regional research programmes, many of which are under UNDP or FAO sponsorship.

In his speech, he reminded the participants of the fact that, although UNDP had no direct involvement in the Consultation, the subject matter was not without interest to UNDP. UNDP is currently financing a number of projects and assisting many institutions in the region in developing and applying new technologies and techniques in animal production and health. Collectively, the outcome of these efforts and the attendant Expert Consultations will, according to Mr. Wiberg, have a far-reaching effect on research and development policies and practices as well as on the farming community and farm-level practices.

Mr. Wiberg then took the opportunity to stress the main roles of UNDP and specialized agencies of the UN system in building up national capabilities, in technical cooperation matters and in facilitating technical cooperation among developing countries. He insisted on the imperative necessity to establish as perfectly as possible a true understanding of the real purpose of the particular assistance, between developing countries

and the donor or development aid agency concerned, in order to help adopt the appropriate technologies and make the right choices in imported and domestic technologies. From this point of view, he stressed the fact that the UN system has a role to play in the enhancing of interactions between developing countries towards harmonization and standardization of new technologies and their application.

Mr. Pierre-Luc Pugliese, FAO technical Officer in charge of the Consultation and on behalf of the Director General of FAO, welcomed the participants and thanked the Director General of MARDI and his staff for so generously welcoming the Consultation and for the active participation in the preparation of the meeting. He also thanked Mr. Carl Erik Wiberg for the highly appreciated help given by his bureaux in Kuala Lumpur.

He then explained that the Consultation fell within the overall framework of meetings organized by the Animal Production and Health Division of FAO in the last ten years, to review the possible feed resources present in the developing world and to promote a better utilization of these local feed resources in such countries. He also pointed out that, as a major output of this Consultation, FAO was expecting practical recommendations on the cultivation and use of fodder trees and shrubs as a means of improving animal feeding in developing countries and of matching available feed resources to sustainable livestock production, particularly under harsh environmental conditions.

Yang Berbahagia, Dató Dr. Hj. Mohd. Yusof Hashim, Director General of MARDI, gave the opening speech and welcomed all the participants. He pointed out the prediction that self-sufficiency in meat would drop by 33 per cent in South East Asia and South Pacific, unless the forage production is doubled by the year 2000 and this was a grave concern to all animal production specialists dealing with the problem in the region. Similarly, the question of seasonality in the availability of feed resources as well as the poor quality of roughages is a problem which also besets all livestock-producing countries, whether in the *cerrados* of South

America, in the savannas of Africa or even in some areas of the wet tropics.

The Director General of MARDI also emphasized the fact that, particularly in arid and semi-arid regions, trees and shrubs significantly contribute to the daily diet of animals. As they are less affected by the adverse environmental conditions such as dry seasons, compared to grasses, trees and shrubs can become important sources of feed during these adverse periods. Furthermore, leguminous tree crops can serve as protein banks to improve the quality of feed resources and recycle nitrogen into the soil.

He also stressed the fact that, amongst the 300 species of trees and shrubs documented as being useful as animal fodder, only a few species have been studied and really utilized. The over-dependence on *Leucaena* is a remarkable example of this and the corresponding danger which has been brought to light by the severe psyllid attacks on *Leucaena*. However, given the time spent and the continual efforts made in the past, MARDI hopes to contribute towards the development of an acid-tolerant as well as possibly a psyllid-tolerant *Leucaena*. Given the diversity of fodder trees and fodder shrubs, the Director General of MARDI urged the need to recommend promising species, both in terms of plant productivity and nutritive value, for specific agro-ecological environments and animal production systems. Improved agronomic practices, harvesting and processing aspects should also be given greater consideration. The Director General of MARDI also urged that a network, including research institutions, be set up to screen and evaluate the potential of trees and shrubs in the major agro-ecological environments. In this way, the benefits can be reaped by other countries with similar climatic characteristics, taking into account socio-economic parameters in each country. In this respect, the small size of landholdings in a number of countries in Asia, the nomadic pastoralism methods of animal production in Africa and the ranching operations in countries with bigger landholdings should be considered.

To conclude, the Director General reiterated that he was very pleased to personally welcome the participants and to see MARDI hosting such

a strategic meeting. He ended his address by declaring the meeting open and wishing the participants a very successful deliberation.

Prior to the first session, Mr. P.L. Pugliese, technical secretary of the Expert Consultation, reminded the participants of the exact subject matter of the Consultation and drew their attention on the fact that it so happened the selected theme for FAO World Food Day 1991, to be celebrated right in the middle of the Consultation, was "Trees for Life" and that, clearly, one linked with the other.

He also pointed out that the subject of the Consultation would only cover a small part of the huge role trees have in everyday life for millions of people around the world who depend on trees to help meet their basic requirements for food, shelter or fuel. They also have universal roles as sources of income and employment, as a means to reverse environmental degradation, to sustain intensification of agriculture and grazing systems, to maintain biodiversity and to avoid catastrophic changes in climate. However, from the animal production point of view, the speaker emphasized the fact that trees play an essential role for some 30 to 40 million pastoralists in the world, who herd some 4000 million cattle, goats and sheep. Trees and shrubs, in fact, provide them with valuable fodder and, in some cases, allow grazing in areas where animals might not otherwise survive. Where land is intensively cultivated and space for grazing is very scarce, fodder trees and shrubs enable livestock to be kept on reduced areas of land. For both the pastoralist and the farmer, tree-planting programmes can meet the growing problem of providing a secure supply of nutritious fodder for livestock, distribute the workload - and income - more evenly throughout the year and help to sustain the intensification of grazing systems.

The conclusions and recommendations from this meeting would help to elaborate the continuation of FAO's policy on this subject and to set up development projects related to the integrated utilization of fodder trees all over the world.