

# **Fodder trees and fodder shrubs. Socio-economic aspects and government policies.**

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## **INTRODUCTION**

Broadly speaking, animal agriculture can be classified as commercial and non-commercial. The bulk of commercial animal agriculture is based on modern animal production techniques, as seen in poultry, swine, dairy and beef production. These intensive production systems are based on adequate supplies and economic usage of feed to ensure profitable returns to producers. Seldom do trees and shrubs form the major source of the diet for commercially produced animals. Perhaps the one exception is production on rangelands which is predominantly based on trees and shrubs.

Many mixed crop-livestock systems involve supplementing diets with trees and shrubs. Although the final produce may enter the market for sale, these systems are seldom intensive and rarely run on modern commercial lines. Furthermore, the owners are resource-poor smallholders who often operate at the subsistence level. Land ownership amongst these groups is also limited: many are tenants or operate as nomads. The socio-economic profiles of these groups include women farmers, with considerable child labour used for herding, watering and other animal husbandry chores. Cash inputs are limited to the purchase of medicines and feed supplements during periods of hardship. Fodder prices vary with season and so does the form of payment. In many countries like Pakistan, India and Nepal, fodder is exchanged for labour operations. Since livestock serve as a buffer against risk and a form of insurance/convertible stock, small farmers have a great stake in its upkeep.

Besides growing fodder on owned land, landless classes also have access to common lands. Trees and shrubs have a dual role as fuel and

fodder but seldom do trees and shrubs enter the market. On ranges and owned land, trees are picked and shrubs browsed directly, often without any compensation to the landowner. Therefore attaching economic values becomes problematic.

### **TREES AND SHRUBS AND THEIR SOCIO-ECONOMIC SIGNIFICANCE**

The economic significance of trees and shrubs can be determined from the fact that they are hardy and can provide year-round fodder to be used as a supplement in lean periods. With proper management and propagation techniques, this fodder can be a viable feed resource to supplement the income of small and landless farmers. In mixed farming systems, trees and shrubs can have a stabilizing effect on prices as farmers have a longer holding capacity and are not forced into selling animals in periods of drought (Knipscheer *et al.*, 1987). Both trees and shrubs also provide multiple benefits (fuel, wood for furniture and other uses, leaves and shoots for use by animals, etc.). In addition, they also help to stabilize the soil and improve the environment. In harsh environments, particularly those of Africa and parts of Asia, there is considerable scope to encourage the use of trees and shrubs by further educating farmers (Winrock International, 1991).

### **POLICY FRAMEWORK**

Policies to promote the use of trees and shrubs for fodder seldom exist on paper. However forest and range laws do tend to regulate utilization patterns, where they can be implemented at low cost. Little attention is given to analyze how trees and shrubs can be promoted for the benefit of farmers or even how their use can be encouraged on private farms. LDC government policies mostly conform to the norms and customs of the locality. Power and authority often determine the rights of the users. In some cases, policies are announced prior to political events (i.e., elections), to gain support, and their implementation is subsequently ignored, depending on which group benefits or gets hurt in the process. To adequately design a macro policy it is prudent that the analyst clearly understands the system relationships and in particular the interactions

which determine overall performance of the system. A generalized model giving an illustration of such an analysis can be found in Amir and Knipscheer (1987).

A useful way to look at likely policy impacts is to consider three facets of trees and shrubs development:

(a) *Environment*. The technical, socioeconomic and political domain in which tree and shrub growing takes place. Factors influencing productivity, use, distribution etc.

(b) *Behaviour*. This component of the model includes the behavioral assumptions, for example, rules and regulations, forest/range grazing laws, property rights, fencing, pastoral treaties, etc.

(c) *Performance*. This would include the impact of the environment and behaviour on animal productivity, joint products (fuel, fodder and meat), total contribution to fodder, carrying capacity, etc.

It is clear that for policy purposes we must fully understand the environment and behaviour norms of the key players (grazers, animals, marketing functionaries, buyers and sellers). By modifying the environment and behaviour patterns, we can establish the desired performance criteria. Below are some of the important questions that policy makers must ask:

1. What are the desired performance goals from animals fed on different types of trees and shrubs? These would include average weight gains, mortality, carrying capacity and seasonal availability. Technical scientists must provide policy analysts with this information.
2. If we are to realistically change performance we must spell out desired goals that are to be achieved. Once the output level is clear, policy alternatives that either influence the environment or change the behaviour pattern must be spelled out in concrete terms. Hypothetical examples are:
  - i. increase livestock numbers by 30-40% within 2 years and reduce mortality by 50%.
  - ii. increase farmer income by say 40% within 5 years by promoting use of trees and shrubs

- iii. increase on-farm fodder availability by 25% and reduce area under fodder crops by 15%.

The above are examples of explicit targets which should be in the minds of development planners, extension workers and scientists who aim to design plans and programmes. The direct and indirect cost and benefits should also be clearly spelled out. Policy analysts should then proceed to implement programmes where minimum risks are taken during the first phase of the project. National programmes should also receive appropriate consideration when development programmes are launched.

As farmers show willingness to adopt new tree and shrub species for fodder, new components such as mineral supplements and health coverage can also be provided. The main goal should be to get higher productivity with limited expenditure on cash inputs.

A significant factor which limits farmer participation in tree and shrub fodder technologies is the lack of knowledge and unavailability of germplasm suited to local conditions. Similarly, lack of storage techniques also hampers farmers' ability to store leaves and branches in conditions conducive to later use.

Whereas technical information on the nutritive value of most trees and shrubs exists, there is less information on utilization patterns at the farm level. Nor do we have good data which collates farmers' responsiveness to feeding different species. Health implications of various trees and shrubs are also not clear. To develop a long term planning strategy whereby trees and shrubs become an integral part of small and large farming systems, it is important that further information on micro-variables relating to use, labour patterns, prices for various trees and shrubs, animal performance on various fodders at farm level and effects of farmer education be collected.

Policy makers desire more information on likely impacts of alternative land use patterns, watershed benefits and measures of changes in welfare by following a particular course of action, etc. (Pereira, 1989; Simpson, 1988). Macro-economic analysis would benefit from information on border prices of livestock products and different types of feeds. Similarly, if there is cross-regional migration of animals, it would be useful to

know the number of animals that cross the border to indirectly assess the true value of animals raised on trees and shrubs.

### **FREE GOOD PROBLEMS**

The economic problem of trees and shrubs is classified under the 'Free Good' and 'Tragedy of the Commons' cases. Given difficulties in clearly identifying ownership of common lands, excessive and uncontrolled grazing severely depletes rangelands. Even where controls are exercised (e.g., Maslakh range in Baluchistan), it becomes extremely costly to police the area. A simple solution is to encourage the leasing of such lands to farmers who pay a nominal fee and the government provides the needed support to re-green the area. Distributing some form of property rights obviously has its political and institutional implications which have been evaluated separately. Nevertheless, more attention should be given to quantifying the benefits arising out of the use of trees and shrubs under different feeding systems. Costs associated with maintenance of trees and shrubs for environmental improvement, fuel and feed should then be estimated along with the associated benefits.

When considering the role of trees and shrubs in watershed improvement, care must be taken to look at total biomass generation of the system. Where possible, quantification should be carried out to determine the opportunity cost of not growing trees.

### **EDUCATION AND AWARENESS**

Education, technology transfer and creating general awareness amongst the public will be key factors in successful promotion of sustainable trees and shrubs. Little information is available to farmers on the choice of species, care and management, levels of utilization, time of harvest, etc. Free grazing is often practised with little regard to suitability of species or carrying capacity of the land. It has been observed in the Baluchistan province of Pakistan that an NGO working at the grass root level to motivate small farmers can play an important role in educating them. Motivation alone is not sufficient; clearly demonstrated benefits and long term implications for livestock development must be shared with the

farming community. The roles of printed media, radio and television should be further developed to allow a farmer participatory development agenda.

### **ON-FARM TESTING OF SPECIES AND PERFORMANCE**

Socio-economic constraints and opportunities are best studied during on-farm testing of new technologies. It is prudent that researchers directly work with farmers to ensure that trees and shrubs get evaluated under representative conditions. The guidelines for such technology testing have been laid out by Amir and Knipscheer (1989).

Livestock, range management, watershed and forestry projects must clearly recognize the potential of trees and shrubs as a feed resource. Integrated projects which recognize the multiple use of trees and shrubs and facilitate the utilization of these species through increased farmer awareness programmes are more apt to affect the lives of poorer segments of the population. Furthermore evaluation of projects should clearly specify the contribution of trees and shrubs to increasing farm income. Perhaps a key limitation of such analysis is the lack of prices and values of trees and shrubs under range conditions.

### **MARKET STUDIES**

A programme should be launched to study the marketing of trees and shrubs for use as fodder. This would include studies to determine the seasonal fluctuation of prices for different species. This study should be conducted on a regional basis with the objective of determining the price of various trees and shrubs species, marketing channels, utilization patterns, trading arrangements (i.e., cash *vs.* barter), impacts of various regulations on tree and shrub usage, etc. Efforts should be devoted to shadow pricing various species of trees and shrubs in order to estimate the value of this type of fodder *vis a vis* other feed sources. Socio-economic factors entering the production-marketing-consumption chain need to be understood.

### INTERNATIONAL EXPERIENCE

The use of trees and shrubs is common in Asia, Africa and Latin America. Extensive research has been conducted in Indonesia, the Philippines and India to show the merits of feeding *Leucaena* (Ipil-Ipil) to ruminants with encouraging results. Species of *Acacia arabica* and *Dalbergia sissoo* are commonly fed to goats in the Indian sub-continent. Throughout the middle east, farmers graze their animals on shrubs and small trees. Goats relish trees and shrubs more than any other species. Trees are commonly utilized by camels in desert areas. Research in the uplands of Indonesia has clearly demonstrated that trees and shrubs can safely form part of cattle and small ruminant diets, provided mineral supplements are regularly added. Farmers' main apprehensions are the possible toxicity problems which may result in decreased performance or mortality amongst grazed animals.

On-farm implications of the use of different tree and shrub species for fodder need further research. Similarly, utilization patterns when multiple benefits are derived (wood, fodder, shade, etc.) need to be studied to design improved systems. The three-strata forage systems practised in Bali clearly demonstrate the superiority of fodder trees over the traditional grazing system.

### INTER-AGENCY ACTION TO FACILITATE LIVESTOCK PRODUCTION

A major constraint limiting the success of livestock and forestry interventions at the farm level is the lack of inter-agency collaboration. In many countries, departments of livestock and forestry or rangelands belong to different ministries. This limits the success of tree and shrub planting campaigns. Analysts often do not recognize this institutional limitation and build projects with the assumption that there will be coordination amongst various line agencies.

Inter-agency networking is required:

1. to initiate an institutional network to encourage information sharing amongst different countries and agencies,
2. to encourage National Agricultural Research Systems to devote more attention to fully realize the potential of trees and shrubs in their

livestock development strategy,

3. to provide resources for germplasm sharing and intensification programmes,
4. to educate users of trees and shrubs in sound principles of conservation and provide needed back-stopping when incorporating trees and shrubs into feeding systems, and
5. to provide training opportunities directly relevant to on-farm technology design.

### **CONCLUSION**

The paper looks into factors that limit the use of trees and shrubs in feeding systems especially amongst resource poor farmers. It outlined a policy framework whereby environment and behavioral variables can be manipulated to obtain desired changes in the performance of animals. To date, experience in several Asian, African and Latin American countries shows that trees and shrubs can play an important role in fulfilling the dietary requirements of ruminants during drought periods. However more efforts are needed to integrate the existing knowledge base and to promote technologies that facilitate the use of trees and shrubs amongst farming communities.

The multiple benefits of trees and shrubs will facilitate mass adoption, provided inter-agency collaboration can be secured and government policies clearly encourage large scale planting on private and public lands. Careful resource use must be a part of the broader policy guidelines.



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