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SHORT COMMUNICATION:

Grassland Development Options

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Introduction

Grassland development options are primarily linked to the status, trends and opportunities of markets for livestock and livestock product. Ethiopia's great potential for livestock development is mainly constrained by availability of good quantity and quality of feed resources. It is therefore essential to recognize and accordingly exploit appropriate feed resource development options, among which grassland development is predominant and more feasible in Ethiopia.

Depending on local conditions, grassland development could take any one or a combination of the following strategies:

- increasing quantity of feed;
- increasing quality of feed;
- improving spatial utilization of feed;
- improving seasonal supply or temporal utilization of feed, and
- Minimization of inter-year variation in forage supply.

Grassland development options are mainly governed by the need for livestock production and are essentially coordinated with efforts for livestock development. Drought management, a primary issue of the semi-arid and arid zones, is a good example of this, which could incorporate, for instance, activities for maximizing grazing distribution, sale of stock as soon as drought is foreseen, formation of efficient breeding herds with fewer unproductive animals, use of special purpose pasture, expansion of the area available for grazing, strategic sale of livestock, and use of supplementary feeds.

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Development options

Development interventions include: grazing management, reseeding, fodder crop and shrub cultivation, use of crop residues, supplementary feeding, fertilizer application, weed, pest and disease control, water resources development, use of controlled fire, bush clearing, erosion control and restriction of inappropriate concurrent uses (Alemayehu, 1998.) Common grassland development components are discussed below, and prioritized according to climatic zones in Table 1.

Workable grazing management policies for extensive grazing are difficult to formulate and implement; they have to accommodate both the intra-year seasonal patterns of forage supply and frequently high inter-year variability. Socio-economic constraints often hinder otherwise viable technical options. Management systems are generally based upon various forms of rotational or sequential grazing with inter-grazing resting.

The prerequisite of all grazing management systems is to have sustainable stocking rates over the long term; the actual form of management is secondary to this. In overgrazed areas, optimization of livestock numbers relative to the forage resources must be given priority. Any other form of development is conditional upon livestock numbers being consistent with the forage supply.

Management programmes often recommend the strategic resting of grazing land to facilitate natural seeding of the grasses, thereby enhancing longevity of the stand. Some points to consider in relation to designing grazing management programmes in perennial grasslands are (Sindelar, 1988):

- Reproduction from seed may be relatively infrequent; vegetative reproduction may be more important for the perpetuation of the grasses.
- Grazing management practices directed at facilitating seed production are less important than commonly believed.
- Long-term grassland retirement may not favour grass reproduction from seed in many environments.
- Management practices should encourage vegetative reproduction, with secondary consideration for seeding.

- To improve reproductive efficiency, practices should reduce competition from undesirable plants, improve micro-environments and promote plant vigour.

Grassland improvement options are almost always based upon the advantages of having a high proportion of perennials in the system. Despite widespread disappointing results, the low potential in drier environments for the re-establishment of perennial species is often ignored. In contrast, annuals are vigorous establishers and strong competitors for water and nutrients and therefore warrant greater attention in such environments.

Seeding by over-sowing or direct drilling provides an alternative to complete seedbed preparation where the erosion hazard is high, and the preparation of a complete seedbed is impractical or where the purpose is to modify rather than replace the present stand. Inter-seeding is a compromise between slow natural reseeding and the theoretically quicker establishment expected from complete seedbed preparation.

Intensive pasture development is an option for moist environments or where irrigation is available. It usually involves the complete replacement of native grassland species with so-called "improved" high yielding grasses and legumes. The forages may be introduced after the complete destruction of resident vegetation by cultivation then drilling or over-sowing, or by direct drilling (sod seeding) into an existing sward controlled by grazing or herbicide application. Intensively managed pastures are useful for providing strategic grazing, priority feeding of livestock classes such as young or pregnant stock, or for conservation as hay and silage. They are usually managed on some form of rotational grazing designed to optimize overall productivity by controlling grazing period and intensity, and re-growth between grazings. This option is only viable where soil fertility is high, whether naturally or with added fertilizers, and local pasture and livestock management skills are sufficient to warrant improved livestock production (Alemayehu, 2002; 2004)

Fodder crop production is often considered a key to reducing excessive grazing pressures on grasslands. This usually involves the growing of grasses or legumes to be conserved as hay or silage, and used for special purpose or strategic feeding of livestock. High quality fodder may have a significant impact on the overall livestock production. The successful development of improved forage resources is increasingly related to the

provision of fodder banks or the inclusion of forage legumes in the cropping systems.

Alternatives to fodder crops include the growing of fodder shrubs and trees in special purpose stands, or along fence or boundary lines. Fodder trees and shrubs generally require careful management. In theory, they have potential in semi-arid lands; however, this is not often proven in the context of traditional livestock husbandry. The extent of adoption of the technique has been disappointing, probably because of the labour and management requirements. However, fodder trees and shrubs have a niche, especially if they are multipurpose, contributing to erosion control and fuel wood supply, in addition to fodder.

The use of coarse crop residues for winter or dry season feeding of livestock is long established and widespread. Techniques such as urea treatment, chopping and mixing with high quality forages can improve their intake and dietary quality significantly. Locally produced industrial by-products and processed feeds are often used for special purpose supplementary feeding in some dairy and fattening development areas, including fishmeal, oilseed cake and compound feeds based upon cereals.

The yield response of grassland to chemical fertilizers containing nitrogen or phosphorus is well known. However, the technique is generally considered uneconomic and therefore livestock managers are not inclined to fertilize extensive grazing. In cropping areas, if fertilizer can be afforded, it is applied to crops. Special purpose pasture may be fertilized to overcome strategic forage shortages around doing development area. For example, in some environments, nitrogen may be used to enhance end-of-season production and extend the growing season.

Large predators exert an indirect effect on use of grazing land. Their presence changes the pattern of grassland use, causing some areas to be overused while other areas are underused. They may force a shift in the class of livestock used in the area, such as a shift to cattle on an area primarily suited to sheep grazing. Local made trapping fences and man-made ditches across large tracts of grassland can be used to prevent the spread of pests, predators and diseases between areas.

Availability of drinking water on grazing lands affects levels of utilization and livestock distribution. Risks associated with the provision of watering points include overgrazing of adjacent areas and the assurance of water

supply and water quality. The provision of watering sites to facilitate the expansion of grazing into areas historically ungrazed may increase livestock production in the short term, but be unsustainable in the long term.

Fire is a very old tool for manipulating grazed vegetation. It has been used to control undesirable vegetation, to prepare sites for planting and seeding, to control plant diseases, to reduce the risk of uncontrolled fire, to remove senescent coarse vegetation and allow grazing access, and to improve forage yield and palatability.

It may be necessary to restrict inappropriate concurrent uses because of their negative environmental impact and associated reduction of forage resources. Such uses include the cultivation of marginal land, fuel wood harvesting, charcoal making, and collecting medicinal plants.

Table 1. The suitability of grassland development components according to climatic zones

Development Component	Climatic Zone				
	Per-Humid	Humid	Sub-Humid	Semi-Arid	Arid
Grazing management	Yes	Yes	Yes	Yes	Marginal
Grassland seeding (artificial)	Yes	Yes	Yes		
Intensive pasture development	Yes	Yes	Yes		
Fodder crops	Yes	Yes	Yes	Marginal	
Crop residues	Yes	Yes	Yes	Marginal	
Supplementary feeds	Yes	Yes	Yes	Marginal	
Strategic use of fertilizer on grassland	Yes	Yes	Yes		
Weed, pest and disease control	Yes	Yes	Yes		
Water supply development		Marginal	Yes	Yes	Marginal
Use of fire		Yes	Yes	Marginal	
Restriction of inappropriate uses	Yes	Yes	Yes	Yes	Yes

Source: Alemayehu (1998, 2002, 2004).

The Way Forward

To ensure relevance and sustainability, grassland and fodder crop development options have to be identified within the context of the following key factors:

- ***Purpose of the improvement:*** The purpose of grassland improvement is to improve forage production and secure sustainability of the grassland ecosystem.
- ***Participation of local people***: Local knowledge and traditional practices and customs should be taken as the basis for identifying options for sustainable development.
- ***Degree or extent of research support***: Local studies that demonstrate the validity of a particular development technique usually specify the environmental conditions, i.e. soils, climate, plant species, physiology and ecology. Likelihood of failure of a technique increases as conditions deviate from the research-supported circumstances.
- ***Use of proven methods except on a small- scale trial basis***: Undertake large-scale projects only where practical, effective and economically viable procedures have been unequivocally demonstrated.
- ***Understanding of how and why a practice works:*** Many factors influence the success of a programme, especially the proper application of establishment and management techniques. Consideration must be given as to whether a practice conforms to current vegetation, ecosystem dynamics, economics and managerial skills.
- ***Commitment of persons involved:*** This is required at all levels of the programme, from government officials to field workers and beneficiaries.
- ***A means to measure success:*** From an economic viewpoint, cost-benefit analysis is a popular method of measuring success of a technique. However, objective assessments of plant yield, cover and condition are also required. Conservation practices may not yield economic benefits in the short to medium terms.
- ***Compatibility with ownership:*** Grassland improvements must be compatible with the types and goals of ownership. Goals may be similar on private and communally grazed lands, or goals may differ widely.
- ***Availability of local labour, materials and equipment***.
- ***Extent of changes in management practices***: These may be required for application and maintenance of the development option at maximum benefit.

- ***Expected cost-benefit ratios***: Development options that are judged to offer the greatest returns on investments should be given priority provided they are compatible with socio-economic factors and environmental sustainability. The level of risk of failure should be weighed against the potential returns.
- ***Use of sites with greatest potential***: Where possible, locate development programmes at sites with greatest potential incremental yields and avoid those where the development activity may seriously increase the risk of accelerated erosion. Areas with shallow or infertile soil, low site potential, low rainfall or steep topography often have too low forage production potential to justify expensive treatment.

Grassland development options are inextricably linked to livestock production and are often perceived from the livestock view point. Therefore development options have to expanded and promoted through addressing the above mentioned and discussed development interventions.

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