Offer your animals a 'basket of choices'. [PH]

More about each forage option . . .

This section gives more details about the different ways of growing forages on farms, the benefits of each option and the types of forages that are best suited to each option.

In all of these situations, farmers:

- Like to grow several forage varieties rather than a single variety because they like diversity in their farming system and they like to feed forage mixtures to their animals.
- Will choose varieties that fit with the way they want to grow and use them. For example, they may choose several tussock grass varieties to grow in rows around their fields to provide cut feed.
- Will also choose varieties to provide feed at different times of the year. For example some varieties grow best during the rainy season while other varieties are needed to provide green feed during the dry season.

A Table showing which varieties are best suited to each forage option is provided in the booklet 'Developing forage technologies with smallholder farmers-how to select the best varieties to offer farmers in Southeast Asia'.

Cut-and-carry plots

What are they?	• Cut-and-carry plots are small plots of high-yielding forages which provide easy access to cut feed for animals housed all day or at night. They allow farmers to keep their animals in pens for longer periods and collect more manure.
What problems can they solve?	• General feed shortages. • Dry season feed shortages (tree legumes). • Feeding sick and lactating animals. • Not enough labour for feeding animals (cutting forage in plots near the house takes less time than cutting naturally-occurring grasses far from home). • Declining soil fertility of cropland (through easy collection of manure from pens).
What type of forages are suitable?	• Tall grasses and tree legumes that – are easy to cut, – have fast regrowth, – are persistent under cutting, and – respond to improved fertility (eg. added manure) • Examples are *Pennisetum purpureum* 'Napier' and *Leucaena leucocephala* 'K636'.
What else is there to consider?	• Cut-and-carry systems quickly deplete the soil of nutrients and yields decline rapidly unless manure or fertiliser is applied (see Section 7 'How should forages be managed').

Cutting *Paspalum atratum* 'Terenos' for night feeding of cattle (Makroman, Indonesia). [WS]

Grazed plots of *Brachiaria decumbens* 'Basilisk' under coconuts (North Sulawesi, Indonesia). [WS]

Grazed plots

What are they?	• It is seldom possible for smallholders to improve large areas of natural grassland with planted forages. More commonly, grazed plots are small, fenced areas of grasses or grass-legume mixtures near pens where animals can be grazed occasionally (for example, sick animals or cows with newly-born calves).
What problems can they solve?	• Not enough labour for feeding animals. • General feed shortages.
What type of forages are suitable?	• Short, stoloniferous grasses and legumes which can tolerate heavy grazing and suppress weeds. • Grasses and legumes can be grown in mixtures but need careful grazing management. • Medium-height grasses may be used but these cannot withstand heavy grazing and have to be managed carefully. • For example, *Brachiaria humidicola* 'Yanero' and *Arachis pintoi* 'Itacambira'.
What else is there to consider?	• Grazed plots must be fenced to protect them from wandering animals. • Oversowing legumes into native grassland is sometimes recommended as a way of improving the feed resources. This is rarely successful in communal grazing lands because farmers do not have control over wandering animals which results in overgrazing of legumes.

Living fences

What are they?	• Living fences are lines of trees that mark the boundaries around fields and houses, and along paths.
What problems can they solve?	• Damage to crops from wandering can animals. • Dry season feed shortages (tree legumes are a source of high-protein leaf for dry season supplementation).
What type of forages are suitable?	• Tree legumes, particularly those that can be planted from stems and are tolerant of cutting. • *Pennisetum* species can form a dense living fence to keep chickens out of vegetable gardens. • For example, *Gliricidia sepium* 'Retalhuleu'.
What else is there to consider?	• Tree legumes established from seed grow slowly and need to be protected from wandering animals for at least one year while the living fences are being established. Farmers prefer to use species that can be easily established from stem cuttings, as these do not need as much care. • Tree legumes in living fences give the added benefits of firewood and shade. • Tree legumes will not provide feed in the short term but are long-lived.

Use of *Gliricidia sepium* as a living fence (Sepaku, Indonesia). [WS]

Contour hedgerows of *Pennisetum purpureum* 'Napier' for controlling soil erosion and for feeding to goats (Malitbog, Philippines). [WS]

Contour hedgerows

What are they?	• Hedgerows are forages grown in rows between crops, often along the contour on sloping land. They are also grown along fence lines or between fields.
What problems can they solve?	• Soil erosion. • General feed shortages. • Dry season feed shortages (tree legumes are a source of high-protein leaf for dry season supplementation). • Declining soil fertility of crop land (tree legume leaves can be used as a mulch to improve fertility of surrounding crops).
What type of forages are suitable?	• The most suitable forages for hedgerows are grasses and tree legumes that – do not spread beyond the hedgerow, – form a semi-permeable barrier to slow run-off and erosion, – are long-lived, and – do not compete strongly with adjacent crops. • For example, *Paspalum atratum* 'Terenos' and *Desmodium cinerea* 'Las Delicias'.
What else is there to consider?	• Forages planted in hedgerows must be cut regularly during the cropping season to prevent them competing with the crop. They also need regular maintenance to ensure they are effective barriers against erosion. The extra demand on labour is a reason often given by farmers for not adopting hedgerow technologies. • Effective erosion control requires a semi-permeable barrier and ground cover. Tree legumes on their own do not effectively control erosion but can be made more effective by planting double rows, regular cutting to develop multi stems, planting closely within rows or by placing cut branches along the tree row. • Contour strips of natural vegetation are effective alternatives for controlling erosion but provide little feed.

Improved fallows

What are they?	• Improved fallows are legumes grown in crop land that is left uncropped for one or more seasons.
What problems can they solve?	• Declining soil fertility of crop land. • Weeds in cropping systems. • General feed shortages. • They can also be used to produce legume leaf meal which is used as a feed supplement for animals such as chickens and pigs.
What type of forages are suitable?	• Legumes which – are vigorous enough to suppress weeds, and – are easy to manage in the following crop. • For example, *Stylosanthes guianensis* 'Stylo 184'.
What else is there to consider?	• Areas sown with improved legumes need protection from wandering animals. • Improved fallows can make subsequent cultivation easier by keeping the soil covered and 'soft'. • Legumes for improved fallows can be established by sowing into the previous crop, when the crop is well established and has just been weeded. However, if sown too early the legume may compete with the crop and reduce yields. • An unusual type of fallow in Indonesia is based on *Leucaena leucocephala* as a naturally regenerating tree legume in upland farming systems. Trees are cut at ground level before planting upland crops. The regrowth of the trees is used for feeding animals and the wood is used for cooking or sold for cash. After the cropping phase, the trees are allowed to regrow to form a thicket.

Stylosanthes guianensis 'Stylo 184' grown after maize to control weeds, improve soil fertility and to collect seed (Cagayan de Oro, Philippines). [WS]

Stylosanthes guianensis 'Stylo 184' grown under cassava to control weeds, improve soil fertility and provide feed for goats (Makroman, Indonesia). [WS]

Cover crops in annual crops

What are they?	• Cover crops in annual crops are legumes grown under crops such as maize. They are cut frequently during the cropping phase. After harvesting they provide a ground cover until the next crop.
What problems can they solve?	• Weeds in annual crops. • Declining soil fertility of crop land. • Soil erosion. • General feed shortages (the legumes can be used as a source of high-quality cut feed).
What type of forages are suitable?	• Legumes that: – are vigorous, – can withstand frequent cutting, and – are easy to manage to minimise competition with the crop. • For example *Centrosema pubescens* 'Barinas' and *Stylosanthes guianensis* 'Stylo 184'.
What else is there to consider?	• To prevent the legumes competing too strongly with the crop, they need to be cut regularly. This requires some labour input, but it may be less than is needed to remove the usual weeds that occur in the crop. Farmers can use the cut forage as a source of high-quality feed for their animals.

Cover crops under trees

What are they?	• Cover crops under trees are legumes grown under tree crops such as fruit trees and coconuts.
What problems can they solve?	• Weeds under trees. • Declining soil fertility. • General feed shortages (the legumes can be used as a source of high-quality cut feed).
What type of forages are suitable?	• Legumes that: – are vigorous, – are persistent and long-lived, and – have a spreading growth habit. • For example *Arachis pintoi* 'Itacambira' and *Centrosema macrocarpum* 'Ucayali'.
What else is there to consider?	• The legumes need to be managed to minimise competition when the trees are young. • Grazing may cause damage to young trees.

Arachis pintoi 'Amarillo' grown in a pepper plantation (pepper climbing on *Gliricidia sepium*) to control weeds and provide feed for goats (North Cotabatu, Philippines). [WS]

Arachis pintoi 'Itacambira' grown along roadsides to control soil erosion and provide feed for animals (Malitbog, Philippines). [WS]

Ground covers for erosion control

What are they?	• Ground covers for erosion control are legumes and grasses grown on sloping land.
What problems can they solve?	• Soil erosion (both prevention of erosion and rehabilitation of degraded land). • Ground covers can provide some additional feed for animals and improve soil fertility.
What type of forages are suitable?	• Short, stoloniferous grasses and legumes. • For example, *Brachiaria humidicola* 'Yanero' and *Arachis pintoi* 'Itacambira'.
What else is there to consider?	• Although ground cover species tolerate heavy grazing, they need to be protected from wandering animals during establishment.