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Factsheet

A Guide TO BETTER pastures



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BARCLAYS

A GUIDE TO BETTER PASTURES

At the present time the weakest link in the chain of production for livestock producers is their pastures. Too much dependence has been placed on commercial feeds with the view that the pastures will supply the roughage. This is wrong since high quality pastures can produce at least 60 per cent if not more of the nutrient requirements of dairy cows and over 90 per cent of those of mature beef cattle and sheep.

CARDI's work in Antigua has shown that high yields of tropical pastures can be achieved if better grasses are introduced in association with legumes and sound pasture management is practised.

PASTURE ESTABLISHMENT

To establish pastures successfully it is necessary to provide favourable conditions for seeds or vegetative cuttings to root and grow and to eliminate unwanted weeds.

Favourable conditions for establishment mean adequate moisture in the soil and sufficient aeration. Rolling the seed bed after planting is wise since it improves the soil-seed contact necessary for optimum germination. Survival of newly germinated seedlings depends to a large extent on the absence of weeds (other plants) which compete for light, water and nutrients. This survival can be ensured by spraying with suitable herbicides at the correct time.

LAND PREPARATION

In new pasture establishment the land must be thoroughly prepared before planting. If possible it is best to do this in the early part of the dry season. Plough the field and allow the clods to 'fall'. Once the large clods have broken down then run a disc harrow and rotavator through the field. This provides a good tilth and breaks up the organic matter into smaller pieces thus enhancing the quality of the planting medium.



PLANTING METHODS

Tropical pastures are established either from seeds or from cuttings. While most grasses are established from cuttings, all legumes are seeded.

Vegetative planting

Different types of vegetative material are used in establishing various types of grasses.

(i) Root division

Guinea grass (*Panicum maximum*) and bambatsi (*Panicum coloratum*) pastures can be established by dividing up clumps and planting in the new location. Spacings of 60cm x 60cm (2ft x 2ft) between rows and within rows is recommended. This is a sure method of establishment but in most instances the cost is very high and thus economical only in small stands.



(ii) Runners (stolons)

This is probably the most widely used method of pasture establishment. After a good tilth has been achieved the field should be furrowed with furrows no more than 1m (3ft) apart. The depth of the furrows should not exceed 10cm (4in). The runners should be placed in the furrows and covered by hand or mechanically using a light harrow or rotavator followed by a Cambridge roller.

This method of establishment is more costly, but the pasture is invariably ready for grazing or cutting sooner than the following method.

If planting material is plentiful then there is no necessity to furrow the field; spread the runners on the surface of the field and run a disc harrow or rotavator over the planting material. Both pieces of equipment will cover the material with soil. It is advisable to roll with a Cambridge roller after planting. Giant african stargrass (*Cynodon* spp.), coastal bermuda grass coastcross 1 (*Cynodon* spp.) and pangola (*Digitaria decumbens*) are all planted from stolons.

(iii) Stem cuttings

Elephant (Napier) grass (*Pennisetum purpureum*) is mostly planted from stem cuttings, using either short or long setts. Short setts of 2 to 3 eyes may be planted at a spacing of 60cm x 6cm (2ft x 2.5in). Long setts should be planted in furrows 1m (3ft) apart and covered by hand or by harrow.

Seeding

Some grasses such as guinea grass (*Panicum maximum*), and the legumes 'siratiro' (*Macroptilium atropurpureum*) 'glycine' (*Neonotonia wightii*) and 'leucaena' (*Leucaena leucocephala*) can be established from seed.

In cases where legumes are to be introduced into existing grass pastures, minimum cultivation will often be all that is necessary, if some set back is given to the grass such as strip or spot spraying, with a herbicide like Gramoxone (R). After spraying, the soil should be cultivated with a harrow or rotavator and the seed sown.

Sowing the seed

Drilling seed is better than broadcasting on prepared seed beds since the seed is placed at the right depth in the soil and is in close proximity to the fertiliser which has either been ploughed in prior to seed planting or placed in bands adjacent to the seed.

Most small seeded grasses and legumes are sown at a depth of 1.3cm (0.5in). Larger seeded legumes (siratiro and glycine) and sorghum/sudan grass hybrids can be sown deeper 3.5 to 7cm (1.25 to 2in). After planting, a light roller (Cambridge type) is used to make contact between the seeds and soil particles. Rolling both seed and vegetative cuttings should only be done if the surface soil is dry, otherwise the roller will tend to pick up mud and seed or cuttings.

Where the land has not been well prepared then the seed has to be broadcast. When broadcasting seed a higher rate of seeding should be used than when drilling. After broadcasting it is useful to run over the field with a light roller or a chain harrow. One of the most successful ways of broadcasting seed is to use a fertilizer spreader.

Seeding rate

Selection of the sowing rate is determined by many factors. Forage agronomists and seed companies have developed recommendations which should be used as a guideline. For example guinea grass is recommended to be sown at a rate of 2.0 to 7.0 kg per ha (2.0 to 7.0 lb per ac). However, seed quality, degree of seed bed preparation, moisture availability, extent of weed problems, and the amount of grazing planned in the early life of the pasture will determine which rate should be used.

On poorer soils it is advisable to use a low grass seed rate and a high legume seed rate, as this allows the legume to establish early dominance and optimum soil fertility building.

Time to plant

As every farmer knows the best time to plant grass cuttings or grass/legume seeds is shortly after the first rains in the rainy season have fallen. However, the earlier in the season the pasture is planted the sooner can the forage be cut or grazed.



MANAGING IMPROVED PASTURES

Managing pastures improves with experience. The best managers are not necessarily the most experienced but they are those who by observation and experience attempt to ensure the welfare of both the animals and the plants in the pasture. There is skill in knowing when to sacrifice pasture for the sake of the animals and when to tolerate immediate adverse effects on livestock for later gains from the pasture. Having said all this it should be noted that good pasture management is equally as important as selecting the right species and sowing and/or planting and fertilizing them correctly.

Remember that improved pastures will have a greater carrying capacity than poorer pastures, but there will still be a seasonal growth pattern in the new pasture like that in the old. In new pastures there will be times in the rainy season when there will be more forage than the animals can eat, and this is the time for conservation. This is the time to make up the deficit of the dry season when the total feed available is inadequate or its nutritive value is too low to support adequate maintenance levels of the animals.

The following are the main objectives in pasture management: Opportune first grazing time, efficient use, sward vigour and desirable species.

First grazing

Pastures planted early in the rainy season should not be grazed until the grasses and legumes have developed a strong root system and are well established. This prevents young plants from being pulled up and the soil becoming compacted and 'foot holed' (pugged) by the animals grazing the pastures. The greater the care taken during preparation and establishment, the earlier may the new pasture be grazed.

Both the Ministry of Agriculture and CARDI recommend that grazing be deferred for at least 5 months after germination or when the forage has reached a height of 45 to 60 cm (18 to 24 in). The livestock should only be in this pasture for a short period and should be removed once they have cropped the forage back to a height of 20 to 30cm (8 to 12 in). This practice is commonly referred to as the "hoof and tooth" treatment.



Efficient use

What does the most efficient use of pasture mean? It means carrying as many animals as possible while producing as much milk or meat as possible. As stocking rate increases the output per animal decreases. The critical factor in pasture utilization is the production per unit area; that is the output per animal multiplied by the number of stock carried. The maximum production per unit area is obtained at the point where the loss of production per animal by increasing the stocking rate is still just compensated by the increased number of animals. This is a point which can only be determined by long experience since there is no scientific formula to enable the farmer to determine the maximum production per unit area.

It is imperative that stocking rates be kept below the number where sward damage or weed infiltration and soil erosion occur. Furthermore, high stocking rates make pastures more susceptible to stress in drought periods. Consequently supplemental feeding with hay, silage or purchased concentrate is necessary to meet the animals' nutrient requirements.

One important factor in grazing pastures is to group the animals and put them through the pasture in a set sequence.

Dairy Enterprise

Sequence of grazing

Group

- | | |
|---|---------------------------------|
| 1 | Calves 28 to 120 days of age |
| 2 | Cows in first 90 days lactation |
| 3 | Cows past 90 days lactation |
| 4 | Dry cows and incalf heifers. |

Beef/Sheep Enterprise

Sequence of grazing

Group

- | | |
|---|-----------------------------|
| 1 | Dams with nursing offspring |
| 2 | Weaned calves or lambs |
| 3 | Open cows or ewes |
| 4 | Bred cows or ewes. |

It is important to prevent high quality pasture from getting too rank (old) since feeding value decreases sharply with age. Old leaves are less efficient than new ones in using energy from the sun and flowering stems are lower in feed value than young vegetative growth.

Sward vigour and desirable species

Plant growth is controlled by such external factors as moisture, light and soil nutrients and by its genetic traits such as the ability to grow, the degree of leafiness and root development. Some of the plants' characteristics can be controlled by the grazing and cutting management given. Flowering reduces the rate of new shoot production causing the plants to become stemmy. The only time plants should be allowed to seed out is when the swards need to be thickened. This is where a brush cutter or a swipe would be useful in controlling stemminess.

It is also important for pasture plants to develop a large root system which enables the plants to exploit the soil's moisture and nutrients and also act as reservoir for carbohydrates to promote regrowth after the plants have been checked by drought and cropping.

Pure grass pastures are easier to manage than grass/legume combinations. However, both types of pasture require keen observation to maintain them at maximum productivity.

In all legume-based pastures the legume is the most important component. The legumes are the major source of protein as well as a source of soil nitrogen on which the grass/legume system depends. If the legumes become weak or are selectively over-grazed, the whole pasture becomes nitrogen deficient, resulting in a decrease in food value and causing a reduction in its carrying capacity.

GRAZING CYCLE

A grazing cycle may be defined as the frequency with which a particular area of pasture is grazed, or the length of time between successive grazings. For example, this may be a 6/week cycle or a 50 day cycle. The shorter the grazing cycle, the younger and more nutritious the forage available. Too short a grazing cycle damages the plants. Too long a cycle would lead to old stemmy material of low nutritive value. A grazing cycle of 5 weeks is recommended for pastures of pangola grass, coastal bermuda grass, coastcross 1 and giant african stargrass during the wet season or where adequate irrigation is available. To maintain this, however, adequate levels of fertilizer (nitrogen and potash) must be applied. In grass/legume based pastures with such legumes as siratro, glycine or rabbit vine, (*Teramnus labialis*) the grazing cycle should be extended to 6 to 8 weeks which would allow time for them to regrow.

GRAZING SYSTEMS

The question of grazing systems (continuous, rotational strip or zero grazing) is a very contentious one. With proper management every one of these systems works. Many farmers practice one system and criticize the others while other farmers practice more than one. The important factor is to select the system or systems which best suit both the pasture topography and the livestock enterprise and stick with it. Only trial and error (practical experience) will produce an expert manager.

FERTILIZER PROGRAMME

Pasture plants, like all other plants, grow best when the soil can supply all the required mineral nutrients in adequate amounts. However, the nutrients in most demand are nitrogen (N), phosphorus (P) and potassium (K) and there are therefore called major nutrients.



Nitrogen

This is the best known plant nutrient and is essential for healthy growth and formation of plant proteins. Where there is a nitrogen (N) deficiency plants will stop growing, become weak and turn a yellow colour.

Grasses usually have a high nitrogen requirement because of their rapid growth. Most of this nitrogen is found in the leaves and growing points of the grass in a number of different compounds which collectively are referred to as the crude protein. Unlike grasses, legumes have the ability to "fix" nitrogen from the air through rhizobia in the nodules on their roots and because of this, legumes do not always require nitrogen fertilizer. The crude protein content of legumes is usually higher than that of grasses.

Because grasses cannot "fix" atmospheric nitrogen, this element should be added to the soil either in the form of organic manure, or mineral fertilizers. It is usually applied either as Sulphate of Ammonia or Urea, which contains 21 and 45 per cent N respectively. Most grasses respond to increasing levels of nitrogen fertilizer, with the response being directly proportional to the amount of nitrogen applied up to 2000kg per ha.

Nitrogen fertilizer should only be applied when there is adequate moisture in the soil such as during the rainy season or where irrigation is being used. When applied under dry conditions, the fertilizer is likely to "burn" the grass or be lost in the form of gases (ammonia) especially when the soil is alkaline.

Ideally, pure grass pastures should be fertilized with nitrogen after every 5 week grazing period. The rate of application recommended is 35kg N per ha (35 lb per acre*). This is equivalent to 170kg Sulphate of Ammonia per ha or 75kg Urea per ha.

Where grass is being grown for hay or silage production, it should be cut every 6 to 8 weeks. In such a forage production system pasture grasses require 60 to 75kg N per ha. This is provided by applying 285 to 360kg Sulphate of Ammonia per ha or 130 to 160kg Urea per ha. It is advisable to split the nitrogen into two applications for better utilization by the grass. Half should be applied after cutting and the other half midway (3 to 4 weeks) through the regrowth period. The rates suggested in this factsheet are guidelines based on research carried out at the Ministry of Agriculture. Experience will determine which level is most suitable for a particular pasture since moisture level and stocking rate have a significant effect on the pasture nutrient requirements. However, if good growth is expected from a pure grass pasture, then nitrogen fertilizer is absolutely essential.

*For all practical purposes kg per hectare are equivalent to lb per acre.

Phosphorus

The rates of application of phosphorus (P) also depend on the soil type and on the type of crop. Forage legumes have a higher P requirement than do most grasses. Where corn, sorghum, or sorghum/sudan grass hybrids are grown, the phosphorus requirement will be higher than for other grasses.

In Barbados, research indicates that there are no significant improvements from the application of phosphorus fertilizers hence fertilizers such as 22-0-22 which contain no P may be used. For the other territories in the CARICOM region it is advisable to contact the Ministry of Agriculture for recommendations concerning phosphorus requirements and application rates.

Potassium

Potassium (K) is required by pasture plants to allow them to utilize nitrogen properly. Potassium is also necessary for the development of strong root systems and healthy plants. Both grasses and legumes require adequate levels of potassium.

The levels of potassium fertilizer applied to a forage depends on both the soil type and on the requirements of the forage crop. For pure grass pastures potassium is usually supplied in the form of Muriate of Potash at the rate of 235kg per ha per annum which provides the plants with 110kg K per ha. Grass-legume pastures have a higher K requirement and for such pastures it is recommended that 225kg K per ha (470kg per ha of Muriate of Potash) be applied annually to satisfy the plants' requirements.