TAGASASTE (TREE LUCERNE) : CHAMAECYTISUS PALMENSIS

A BROWSE SHRUB WHICH WILL INCREASE PRODUCTION FROM GRAZING ANIMALS

L.C. SNOOK*

SUMMARY

Tagasaste is a hardy, free-seeding browse shrub which thrives on a wide variety of soil types in areas with prolonged dry summers. It can produce heavy yields of palatable, non-toxic, protein-rich greenfeed over many years. In Western Australia long-term investigations are showing that if Tagasaste is planted as a fodder crop and correctly fertilized, the stock-carrying capacity of pasture land can be markedly increased, problems associated with stock maintenance during periods of feed shortage can be minimized, erosion and soil degeneration can be arrested, and a stable system of livestock production can be evolved.

The Problem

In Australia, the two most serious sources of loss in livestock production result from the falls in bodyweight which occur in grazing animals during the recurrent dry seasons, and the steady decline in carrying capacity which results from the erosion of topsoil and the associated fall in growth of pasture, These losses are just as serious, perhaps more so, in districts receiving generous winter rains because even in the so-called "safe areas" stock owners have to cope with dry seasons which can last for five to seven months. During these "annual droughts" grazing animals are restricted to intakes of dry mature herbage on which losses in bodyweight are inevitable, and there is always the likelihood that overgrazing will expose the soil to erosion by wind and/or water. In the pioneering era such losses did not occur, or were of minor significance, because initially most of the grazing lands in Australia carried edible perennials which provided "topfeed" during the dry periods and protected the soils. Even if these topfeeds were sparse and relatively unpalatable, they provided essential nutrients which enabled grazing animals to make much more efficient use of the dry, mature roughage which otherwise became the sole source of feed. Unfortunately, the edible indigenous perennials were unable to withstand the intense grazing pressures to which they were subjected and in most areas these have been replaced by annuals or useless perennials. Attempts have been made to preserve or restore the valuable topfeeds but the results have rarely been encouraging because most of the palatable native species lack the capacity to give high yields, or to respond quickly after grazing or cutting. This means there is a need to introduce a replacement for the original topfeeds. A productive, easily-established, self-perpetuating browse shrub is required which will provide an assured reservoir of nutritious greenfeed and confer all the benefits commonly expected from trees.

The Cure

Tagasaste, a leguminous tree-shrub, has all the requirements to serve as a replacement for the topfeeds which have been lost. This free-seeding perennial was introduced by early settlers from the Canary Islands and is now naturalized throughout southern Australia and New Zealand. It is non-toxic, thornless, and readily eaten by all classes of livestock. Generations of farmers have been aware of its good qualities, but surprisingly no attempt has been made to plant the shrub extensively, even where it has shown sufficient vigour to invade virgin bushland and spread along country roads, In Western Australia, determined efforts are now being made to demonstrate that Tagasaste can be grown with profit under a wide

* "A-Alla", Margaret River, Western Australia.

range of conditions where it promises to become a major source of greenfeed for grazing animals. The first requirement has been to show that this shrub could produce a sufficient bulk of edible fodder to justify consideration. Data collected between 1949 and 1960 indicated that Tagasaste could each year produce more edible fodder than any other crop a farmer could grow without irrigation (Snook 1952, 1961). Mature trees growing on coastal sand at Nedlands, near Perth, where the annual rainfall of 875 mm falls mainly during seven winter months, were harvested annually and fed to sheep so that the proportion of edible material could be determined. The mean annual yield per tree was 16 kg of edible dry matter which contained 21 to 24 per cent crude protein and 18 to 25 per cent crude fibre. If trees are planted in rows 5 m apart, with 2.5 m between each tree, a little in excess of 700 trees can be grown on one hectare. Where the yields obtained at Nedlands can be duplicated, this means that plantations of mature Tagasaste trees can be expected to produce annually around 11 tonnes of edible dry matter per hectare. This dry matter can be fed to livestock in the form of attractive, palatable greenfeed. This is a very encouraging level of production, so it is unfortunate that plantations of Tagasaste were not established on Research Stations in districts with lower rainfalls, so that annual productivity could have been measured under more difficult conditions. Fortunately, farmers planted test plots and report that growth and survival have been good.

Experience in Western Australia

During recent years there has been a renewed interest in the growth of Tagasaste as a fodder crop, and plantings have been made over a wide range of country. Detailed studies are now being made on trees planted in 1979 at "A-Alla", Margaret River. This is a private farm in an area with an average annual rainfall of 1200 mm but here also most of the rain falls during seven winter months, so that grazing animals can be restricted to dry feed for four months during summer. The test trees were established by planting small seedlings in rows on uncultivated stony ground which a few years previously had been cleared, sown with pasture "after the burn", and thereafter topdressed annually with superphosphate at 200 kg/ha. During the first two years the shrubs were subjected to occasional grazings to promote a bushy habit of growth, and in April 1982 the regrowth was harvested manually so that the foliage could be fed to sheep and cattle. Stock have since been excluded so that regrowth over twelve months was available for harvest in April 1983. Long-handled pruning shears were used for this work and the material cut from representative trees was weighed, sampled and then fed to sheep. The detailed analytical data were not available when this paper was prepared but it is hoped that the results can be discussed at the Conference. Trees in their fourth year yielded a mean of 55 kg of fresh green material which, when fed to sheep, was readily eaten so that only the main leaders remained. It seems that this greenfeed contained about 9 kg of edible dry matter with 22 per cent of crude protein. This means that one hectare planted with similar trees would, in the fourth year after planting, yield something in excess of six tonnes of edible dry matter. In addition, in 1982 there was an excellent growth of pasture among the trees and it is expected that an equally good growth will be obtained this year. It has not been possible to graze this pasture, but metre squares growing under the larger trees were harvested on 29 October, 1982. These cuts indicated that this pasture in which sub-clover was dominant would have yielded 4.6 tonnes of dry matter containing 13 per cent crude protein. So, all in all, this uncultivated stony slope is already highly productive – theoretically, it would now support more than 20 breeding ewes per hectare throughout the year. In 1984, it is planned to enclose one hectare of these trees so that it can be stocked to maximum capacity with weaner lambs which will be used to graze the pasture and trim the Tagasaste as high as can be reached. As the need arises, the upper branches will be systematically lopped to provide supplementary feed. In this way it is hoped to measure carrying capacity over a period of years. The opinion is often expressed that if

sheep are left in stands of Tagasaste they will kill the trees by stripping off the bark, but experience already gained indicates that this habit develops only when the sheep are left until they are unduly hungry, or when they are sufficiently mineral-deficient to develop depraved appetites. During recent years large quantities of freshly-cut Tagasaste have been fed to sheep and cattle on dry feed without any evidence of bark being eaten from the sappy leaders. It should soon be possible to obtain evidence in practical grazing trials on this important matter.

Value for Dairy Cows

Perhaps the most important lesson being learnt from the trials at "A-Alla" is that Tagasaste promises to become an important source of fodder for dairy cows. Even in the favoured high rainfall areas paddock feed becomes scarce in late summer and autumn, so that dairy farmers who have to maintain a whole milk quota incur considerable expense in the conservation and purchase of supplementary feeding stuffs. Tagasaste foliage is relished by cattle and should be the ideal supplement for milking cows on dry feed. A dairy farmer at nearby Cowaramup has already demonstrated that a dairy herd will harvest the regrowth from thickets of Tagasaste very efficiently, and that the shrubs quickly recover if the cows are removed as soon as the readily accessible, most nutritious foliage, has been consumed. This experience suggests that where plantations of Tagasaste are established it should be a simple matter to use electric fences to regularly strip-graze successive rows. Even if the foliage has to be harvested by hand, so that it can be rationed to the cows, this would require much less work than is needed for the conservation, storage, and feeding out of hay, or for the growth of summer feed crops. In the future, when large areas have been planted with Tagasaste, hedge-cutting machinery will be modified so that the regrowth can be harvested quickly and efficiently.

Climatic Limitations

Most of the information reported in this paper has been obtained in districts in south-west Australia with generous winter rains. There is ample evidence, however, that Tagasaste can be readily established, and will remain productive, over a long period of years in areas with annual rainfalls of 300 mm and even less. Several examples are known where trees planted 30 years ago are still productive despite exposure to large flocks of sheep. At Kulin, in the far eastern Wheatbelt of W.A., Tagasaste was established by direct seeding from one run of a drill on lines which were deep-ripped to facilitate the penetration of water and roots. This success was achieved in a year when only 100 mm of rain was received in the growing season (Cook 1980). Tagasaste can be very deep-rooted and is well equipped to withstand prolonged dry periods. Yields of greenstuff will be reduced when water is limited, but the plants are so hardy that production is likely to be much better than one would expect. It is probable, also, that cultivars will be selected, or bred, which will be adapted for productive growth in areas with low rainfalls. The extent to which Tagasaste can be grown successfully in the subtropics is not known. Vigorous stands can be seen at Northampton in W.A. at 27° latitude, and the shrub is known in northern N.S.W. In the tropics there are many edible tree shrubs, particularly among Sesbania spp. and Desmodium spp., some of which should be suitable for use in the manner being recommended for Tagasaste. It seems that this concept is of world-wide application and could become of major importance in the development of stable, progressively improving systems of land use.

Correct Fertilizers Essential

Wherever Tagasaste is grown the basic requirement is adequate fertilizer. The claim is sometimes made that the shrubs cannot be grown as a long-term fodder crop because they die within a few years. In most cases these early deaths occur

simply because some essential plant nutrient is lacking. The need for the regular application of the correct fertilizer is now being illustrated at "A-Alla" where four years ago seedlings were planted in virgin bushland. Most have received standard applications of fertilizer but several have received none. For two years all the transplants grew well and those receiving fertilizer continue to thrive. In contrast, the unfertilized trees now have thin, scraggy foliage and are beginning to show evidence of die-back. Most Australian soils are deficient in one or more essential plant nutrients so it is illogical to expect continued high production from any crop without the regular application of the requisite fertilizer. It seems safe to assume that Tagasaste will require the fertilizer which is recommended for the growth of legumes on each specific soil type.

Special Benefits

It is pertinent to draw attention to the special benefits to be gained from the feeding of leguminous supplements to grazing animals. Many experiments, such as those conducted by Morris (1958) with beef cattle in Queensland, have shown that comparatively small supplements of leguminous forage will greatly improve the efficiency with which grazing animals can utilize mature dry grass. It is reasonable to expect that even limited quantities of fresh, green Tagasaste will be equally effective in arresting the weight losses which occur in Australian livestock during each summer. If so, it could be profitable to grow small plantations in select areas to provide a highly nutritious supplement for special purposes. Of course, where Tagasaste can be grown in sufficient quantities to constitute a major component of the diet, production will be enhanced to a much greater degree.

Careful Planning Essential

The good qualities of Tagasaste are very apparent and were recognized soon after its introduction to Australia. This poses the question: If Tagasaste can be grown with profit in large plantations, why was it not so used by our grandparents? Perhaps the main reason for its non-use is the high palatability which leads to quick destruction from over-grazing and the depredations of rabbits. Farmers were not made to realize that the shrub is capable of extremely high production, hence there was no apparent justification for the erection of expensive fences to protect plantations, nor was there any assured information about methods of establishment and utilization. It has now been shown that Tagasaste will over a long period of years produce remarkably high yields of edible material, and dependable methods of establishment are now being developed. Valuable practical information should soon become available from paddock trials now under way. Perhaps the most important essentials for success in large scale plantings will be careful planning and thorough execution. Certainly the current indications are that Tagasaste could become a major source of readily-produced, trouble-free feed for all classes of livestock. In addition, the shrubs will bestow all the benefits expected from the presence of dense stands of attractive trees.

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