

NOTE ON THE CULTIVATION AND MANAGEMENT OF
GRASSLAND AT THE HOSUR LIVESTOCK RESEARCH
STATION: MADRAS PRESIDENCY

BY

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The Livestock Research Station, Hosur is situated on an elevation of 3,000 feet above mean sea level with good climatic conditions all the year round. The locality has an average annual rainfall of 25 inches most of which is received during the North East monsoon. The place is also favoured by the South West Monsoon for sowings.

The total acreage of the farm is 1633.35 acres out of which 800 acres are reserved for hay each year. The pastures reserved for hay are usually closed for cattle from July to December but are open for grazing during the remaining months. If the rains fail in August and grass becomes dry, cattle are allowed to graze paddock after paddock in quick succession till the break of the North East monsoon.

Grazing. Efforts are taken to see that grazing is alternated in the cropping scheme each year so as to give the land rest at least once in every two or three years. Rainfall plays considerable importance in the management of grassland here, but the success or otherwise of the management depends not so much on the total amount of rain received, as on its distribution through the year. During periods of prolonged drought, the paddocks that are ordinarily closed for cattle are opened for grazing.

The bulk of the area is covered with Spear grass (*Andropogon contortus*) but some special pastures are under Rhodes grass (*Chloris gayana*) and Kolukkattai grass (*Pennisetum cenchroides*). Spear grass thrives well on all kinds of soils in this tract, does not require much moisture, grows erect with fairly good leafy growth, resists drought conditions more than any other grass and provides some grazing even in bad seasons. It responds to the slightest shower and grows quickly. It makes very good hay just before flowering and is also suitable for making ensilage when made under proper care and supervision. The grass is so slender that for silage making it ought to be cut between 6 and 7 a.m. when

the dew is on, raked and carted immediately to the silo pit. No time should be allowed for the grass to dry inside, otherwise poor quality silage is produced. Rhodes grass, an introduced variety, is suited for low lying heavy soils. It has got a profuse leafy growth, grows 3 to 4 feet high and makes very good hay and ensilage. This grass seldom thrives on elevated lands and much less when the land gets dry. Remount Officers have stated that this is not a good grass for horses as it causes skin trouble. *Kolukkattai* grass was introduced two or three years ago on this farm and so far it has done well. It is a succulent variety with plenty of leaf and yields heavily. It makes good hay and ensilage. The grass was introduced as a substitute for Spear grass, as the latter has the disqualification of developing awns which are very disagreeable from a feeding point of view as they penetrate the mucous membrane of the mouth, causing ulcers and abscesses. It is a promising variety and attempts are being made each year to put more area under this grass. About 100 acres have established themselves up to the present.

There are also various other grasses that appear in the pastures, the important of these are given below :

Andropogon annulatus and *Andropogon caricosus*. These thrive well in low lying paddocks and are being encouraged wherever possible by sowing seed.

Andropogon pertusus is a perennial slender grass which is able to resist drought conditions. One peculiarity about it is that it thrives well in paddocks where cattle constantly graze.

Digitaria sanguinalis var. *ciliaris* and *Digitaria sanguinalis* var. *extensum*, are also good grasses that grow as a mixture with spear grass. The seeds are collected and sown to improve the pasture.

The following are the important operations carried out on the grassland at Hosur.

Manuring. Manuring usually begins about March and continues up to May. The correct system of manuring grassland would be to apply partially fermented, slow acting manures, the idea being that the root system of indigenous grasses being perennial do not require the readily assimilated plant food which is necessary for a cultivated crop of short duration. The manure that is applied to the grassland is intended to last for at least three or four years, whereas for a cultivated crop which remains on the land for a short duration, it is necessary to apply a readily available manure.

Manuring improves grassland considerably. It not only improves the outturn but also the quality of grass. It increases the light coloured, coarse foliage grass to a rich, dark, succulent one. Farm yard manure, at 20 cartloads per acre is usually carted and spread immediately on the grassland. The manure should not remain in heaps as the grass under them becomes burnt and this would leave a number of circular bare patches all over the land. A chain harrow is passed soon after application, as it breaks down the big lumps of manure and in a way incorporates it with the soil. It is very essential that the farm yard manure should be thoroughly spread, otherwise the pastures might become tufted and coarse in some places. Although the correct system would be to apply 'raw manure' to the grassland, the system usually followed on this farm is to apply a year-old rotted farm yard manure which not only spreads easily and evenly, but also ensures the destruction of weed seeds. Another difficulty is that in dry weather 'raw manure' falling in large lumps would kill the grass under it.

It is also necessary that grassland should receive occasional dressings of lime, as this helps to improve the quality of the grasses and the texture of the soil. Slaked lime is used at the rate of 3 cwts per acre and is spread about June—July. A dressing of bonemeal and superphosphate in the proportion of 3:1 is also applied on a still wet day. If spread on a windy day some of the bone dust and super will be blown away.

Ant hills. Ant hills come up in the grassland after the summer rains. These used to be dug out and the queen ants killed. This is a costly item of work. A new method introduced is to pump cyanide dust into the holes and block up all openings and this kills off most of the ants. Ant hills are not allowed to grow; as soon as a mound is seen, the dust is pumped in and this has been found sufficiently effective. If they are neglected, they become a source of great damage to mowing machines and injury to cattle, besides becoming a safe abode for snakes.

It is observed that the nests are numerous and deep in paddocks which have soft deep soil whereas they are not many in paddocks which are gravelly underneath. One reason that contributes to the increase of ant hills in the grassland is that when the droppings of cattle are left in lumps the white ants breed below them and eventually form nests; Chain harrows are passed over the land which has been grazed the day before in order to break up the clods and aerate the soil. This also produces an even distribution of the droppings which results in more uniform growth. Another

advantage is that they no longer serve as breeding grounds for pests.

Gatta bunding. Gatta bunding is a method by which the land is divided into plots by means of earthen bunds. They are made by ploughing with a deep plough such as the Sabul Plough and forming ridges. When doing this, the natural direction of the water course and the slope of the land are taken into consideration. Bunding conserves moisture, stops soil erosion and prevents the manure from being washed away. The plots are big on level land and small on steep land.

Cultivation. The importance of harrowing cannot be too greatly emphasised for grasslands. Even under ordinary conditions, it is quite essential that harrows should be used on grassland at least once in a season. It is beneficial in the way that it prevents tufty and coarse herbage.

From May onwards every rain should be taken advantage of and grubbers or cultivators should be used which tear up the soil up to 1 to 2 inches and at the same time care should be taken to see that they are passed along the contours. This operation is very important as the grubbers break open the hard surface soil, disturb the root system and allow the rain water to soak well in the soil giving a stimulus for the grass to develop fresh roots and tillers. It also creates more room for the young grass to grow.

Legumes. The grasslands at Hosur are unfortunately devoid of any pasture legumes and attempts are being made to introduce *Phaseolus semi-erectus* and other legumes. *P. semi-erectus* which was sown in 1927 has just come up and at present it is not known if this will make a good mixture. Clovers were introduced this year but they all perished due to the prolonged drought.

Another operation connected with grass cultivation is to keep the land clean of weeds. It is the experience in this farm that every endeavour has to be made to concentrate all available labour for weeding the pastures soon after the summer showers and July rains as it is found that the seeds germinate then; if they are thoroughly cleaned, there will be less difficulty later on. If it is found that the whole area cannot be weeded before the seeds develop, scythes are used to cut the weeds before seeding takes place.

The grass growing season is August, September and October. The heaviest yields are produced if the rains are received during these months, as seen from the statement below.

YEAR	RAINFALL INCHES	YIELD PER ACRE LBS.
1924-25	30.30	1546
1925-26	29.37	1024
1926-27	15.60	717
1927-28	33.81	1781
1928-29	27.98	726

Late rains, however much, result in poor yields, the grasses flowering and seeding when about a foot high. If the rains are heavy during the growing season, the yield is also heavy; otherwise the crop is poor.

Harvest. The outturn and quality of the hay largely depend on the judgment exercised regarding the correct time of cutting the grass which is a matter that can only be gained by practical experience. It is a matter of great importance, that all grasses, whether for consumption in the green state, for silage or for hay, should be cut before they seed. There is no difficulty in the case of green grass and silage as their utilisation does not depend on the weather, but in the case of hay every precaution must be taken in selecting the time for cutting, as nothing does more harm to hay than rain.

From a financial point of view it is economical to cut grass in its green stage as all animals thrive well on green feed. In places where it is not possible to secure green feed always, recourse must be had either for making silage or hay.

Hay and its preparation. Grass becomes hay when it is dried, cured and partially fermented in stacks. We cannot correctly class any dry grass as hay when it has not undergone the process of curing or fermentation. Good hay must be free from dirt, must have an agreeable sweet smell, possess a light greenish colour, and be pliable and soft to touch.

The best time for cutting grass for hay would be when it is in shot blade or just before or at the time of flowering. It is only at this stage that the grass is succulent, tender, green and highly nutritious. At Hosur the cutting of grass for hay usually commences about the latter part of October and early November. At this time of the year the days are generally cloudy with occasional showers. All available labour should be concentrated

and the work of cutting, raking and cocking pushed on in order to cover the maximum area. Every endeavour should be made to make hay as quickly as possible.

Cutting. It is preferable to cut the grass when it is dry, otherwise the machines will clog. Howard and MacCormic mowing machines are used on this farm and each machine covers 4 to 5 acres per day horse driven; bullocks do 3 to 4 acres per day.

It is necessary that the machines should be handled by skilled men who know the working and mechanism of the machine. Each driver should provide himself with an oil-can filled with lubricating oil and a spanner. The bearings should be oiled very often and all nuts carefully examined, and should be tightened if they are found to be loose. Machines should not be left out in the rain. A boy usually goes in front of the machine to guide the mower as there may be obstructions such as stones and ant hills which damage the knives. The mowing knives should be kept sharp, it is better to have trained men kept on the spot sharpening knives. To save time and labour it is also important to see that the machines are driven straight, otherwise, strips of uncut grass are left behind.

Hay treading. The tedder is worked when hay is to be made quickly, without much handling. It is driven by a horse and the draught becomes fairly heavy when a thick layer of grass has to be tossed. This admits air and sun into the grass and dries it quickly and at the same time it produces a uniform curing. This prevents the top portion of the grass from being exposed too long to sun and at the same time exposes the bottom layer of grass to sun and air. Hay can be tossed by forks instead of tedders but it should not be knocked about too much as it damages the hay and loss incurs. Sometimes it has become possible to make hay in one day, i.e., the morning cut grass will be tossed, raked and cocked in the same evening. Horse drawn tedders do 7 to 8 acres and those drawn by bullocks 5 to 7 acres per day.

Hay Rake. This is another labour saving machine used for collecting hay before cocking. Horse drawn rakes about 10 feet wide will rake about 12 acres per day and bullock drawn ones 8 acres.

Cocking. The next process after raking is cocking. The cocks should be high and shaped conically to assist rain water to run off quickly. The hay remains in cocks for about a week or until such time as it becomes convenient to stack it. Hay which has been exposed to heavy rains after being cut has no aroma, is

dark, and does not weigh as much as good hay. A lot of the goodness is washed out of it. If the hay in cock becomes wet through rains it should be exposed to sun immediately and recocked although the quality of hay is affected. Before stacking, the cocks at random are to be examined thoroughly by inserting the hand into them. If there is too much heat which means the presence of excess moisture, the hay should be spread, exposed to the sun and recocked.

Stacking. Stacking is essential not only from the point of storage for hay by itself, but it affords the dry grass to be converted into hay after sweating. The site should be on dry raised ground and centrally situated to the area in which the grass is cut, as this saves a lot of labour, time and expenditure. There is no necessity to have a platform constructed for the stack, as the damage, if any, is not so heavy as to justify any expenditure on this item. The hay is stacked on the ground itself, and built up to about 10 feet with the aid of hay forks; after this an elevator to raise the hay is necessary.

The hay elevator is a simple, labour saving machine, which, when working, has an endless chain with spikes, rotating round an inclined plane, it has gear arrangement connected to a shaft pole, to which a pair of bullocks is yoked and driven round in a circle. The hay is forked into the hay receptacle, which is at the bottom of the inclined plane and on the rotating movement of the endless chain, the hay is lifted with the aid of the spikes and dropped on the top of the stack. The stack can be built up to the desired height of 20 to 22 feet or so. It is essential to feed the elevator constantly by drawing the cocks from the field. Depending on the lead, it will be necessary to have 10 pairs to pull the cocks to the stack and 10 men for stacking—4 men to feed the elevator, 2 pickets and 4 men for stacking.

In stacking, the grass should be laid layer on layer, the sides and ends should be kept fairly well out until the stack is of the desired height. Care should be taken not to increase the overlapping on the sides and ends too much. The middle must be kept well filled at the same time. An hour before finishing the day's work, it is advisable, to put plenty of hay in the middle of the stack so that if it rains, too much water does not soak into the stack. When the stack is of the desired height (18 to 20 feet) topping should be started. This is done by manœuvring each successive layer as it is laid, until the ridge is reached. That is, the top is sloped off to either side like the roof of the house. The

slope should be steep enough to carry off rain water quickly. All the stacks should not be made in one place. On account of the risk of fire it is far better to put them in different places. The stackers should be trained men. Stacking is an art by itself requiring considerable experience and skill. No damage to stacks has been recorded at Hosur through white ants or rats and there are plenty of both on the farm. The size of the base of the stack has to depend on the quantity of grass to be cut; a rectangular shape is preferable. If one has plenty of grass to convert into hay it is a mistake to make small stacks, as there is much more loss from dryage through the sun and warm winds and outer surface damage by exposure, in small stacks. The larger the stack, the less the loss. Whilst making the stack and after its completion, it is advisable to rake down the sides and pull out the loose hay so as to make the stack look well. A trench about six inches deep and a foot wide can be dug round the bottom of the stack to prevent water getting under the stack. If the stack is built in a field, it is a good thing to put a heap of sand right round it so that if the grass catches fire, the stack is protected to a certain extent.

Thatching. If the stack has to stand out in the rains for a year or so, thatching is necessary. Good straw or rough tank grass can be used for this purpose.

Measurement of stacks. The contents of a stack can be ascertained fairly accurately by measurement. Measure the length and breadth of the stack at the base, the middle and round the eaves, take the average by dividing by three, multiply the average length by average breadth and by height from base to the eaves. For the upper portion, measure length of ridge and the eaves, take the average length and the width at the eaves, next measure the height from eaves to ridge, divide by two and multiply all three together. Add together the totals of the upper and lower portions for the cubical contents of the stack.

The weight depends on the various factors such as the quality and fineness of the hay, the amount of pressure according to the height of the stack and the length of time the stack has stood on the ground. At Hosur it is found that Spear grass does not compress as compactly as fine grasses. Stacks after they are made begin to sink and the density increases, so the weight per cubic foot of a stack, one week old, will be much less than the weight of a cubic foot of hay from a stack three months old. We have found that a cubic foot of spear grass hay, which has been stacked for two months weighs about 4 lbs.

Cutting Stacks. Hay can easily be cut in trusses with the use of a hay knife. A cooly starts on the ridge, rakes off about $1\frac{1}{2}$ yards of thatch and commences to cut downwards, trusses about a yard wide and he continues this width to the ground and when this is all cut and carted, he takes another width of a yard and cuts down to the ground again so that if rains come, not much hay is exposed.

Aftermath. This is the name given to the grass, after the grass has been cut for hay and carted away. Cattle can be turned on to graze this a week or so after the hay has been carted. It gives a good grazing for another month or so.

Comb for Spear grass. This is a simple implement and is very useful in haymaking if the grass is chiefly spear grass. It collects the spears from the grass and its efficiency increases as the awns become mature. In most cases its efficiency is about 80 to 90 per cent. It consists of an iron comb with teeth about 6 inches long attached to a rectangular iron frame work with two small wheels and a seat for the driver. The comb is 7 feet long with iron teeth, having an inter-space of $\frac{1}{4}$ to $\frac{1}{2}$ inch. The framework has an arrangement to adjust the height at which the comb should pass, which depends on the growth of the grass and also another arrangement to adjust the angle at which the comb should work. This is easily drawn by a pair of bullocks and is able to comb on an average 8 to 10 acres per day depending on the level of the ground. If the grass is thick, the awns choke the comb and they have to be removed very often, otherwise the teeth will be bent. The awns should be removed from the comb at regular intervals and immediately removed from the field lest they become mixed up with the hay.