WOODSTOCK: AN INTEGRATED FARM/FORESTRY MANAGEMENT PROJECT

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Abstract

The New Zealand Forest Service and the Department of Lands and Survey are jointly developing a 6705 hectare farm/forest on a block of unoccupied Crown land in Hawke’s Bay. When completed the venture will consist of a combination of grassed paddocks, wide spaced Pinus radiata growing both in grassed and non-grassed areas, and protection plantings. The internal rate of return for this scheme has been calculated at 15% excluding land costs, or 12½% if the land value (at 1974) is included.

BACKGROUND

A large block of unoccupied Crown land, located 64 km northwest of Napier off the Napier-Taupo highway (see Fig. 1), was originally destined, along with neighbouring land development blocks, for farm development by the Department of Lands and Survey. However, a 1969 Land Use Committee report recommended that approximately half the block be developed into farms and that the balance be afforested by the N.Z. Forest Service. Between 1970 and 1973 the two departments carried out developments along these lines, but in 1973 a proposal was put forward for them to develop the entire block jointly.

After close examinations by both departments, the Forest Service and the Department of Lands and Survey put a joint proposal to the Minister of Lands and the Minister of Forests asking (i) for approval to establish Woodstock as an integrated farm/forestry venture and (ii) for acceptance of the scheme in principle for other areas in New Zealand. The proposal was approved and signed on 17 December 1974.

THE CONCEPT

The basic concept of Woodstock, and of other joint farm/forests under development by the two Government depart-

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ments, is that a more efficient use can be made of some lands if they are managed to produce a compatible mixture of products, rather than one alone. This, of course, is not always the case, but there is ample evidence to suggest that in many areas a product mixture is superior to a single product.

The advantages of a multiple-use management system are several: often the combined output of two or more crops can exceed that from one crop. Flexibility is introduced through a product mixture — i.e., the eggs are spread into several baskets rather than one. The number and variety of productive jobs per hectare is increased. And, while managing such a venture is far more difficult than managing either a farm or forest alone, the additional complexities provide interest and challenge.
OBJECTIVES

The primary objective of the Woodstock exercise is to evaluate the feasibility and the management requirements for a large-scale integrated farm/forest unit. While the Forest Research Institute and several private owners have experimented with the farm/forestry concept (see references listed), it has not yet been tested on a large scale in New Zealand.

Secondary objectives are to allow research into silvicultural techniques, farm management practices, grass species and animal breeding and behaviour that are compatible with the concept. Much of this type of work may be carried out by researchers such as the Ministry of Agriculture and Fisheries, Ministry of Works and Development, Department of Scientific and Industrial Research, and other interested bodies.

DESCRIPTION

The soils on the block are Taupo-Tokoroa and Taupo-Wairakei yellow-brown pumice, varying in depth from several centimetres to many metres. The vegetative cover consists of two major types — kanuka, under which both native and English grasses grow, and bracken. Patches of scrub-hardwoods are scattered through the damper gully heads and other areas missed by repeated fires that have swept the area. In the 1969 Land Use Committee report, the block was said to be primarily classes IV and VI land with relatively little VII and VIII. Approximately half the area is able to be disced.

The annual rainfall is estimated to average 1300 to 1500 mm. Site index is estimated to exceed 30 m at age 20; and the carrying capacity, based upon neighbouring recently developed blocks, is estimated at 10 stock units per hectare.

MODEL

The Forest Service and Lands and Survey Department developed a computer model to evaluate the economic potential of an integrated scheme for Woodstock. The model contained projected costs and returns over a 50-year period from the block’s management programme. Prices used for both forest and farm incomes were based upon local sales in mid-1974. These were considered conservative as livestock prices were down, and domestic (rather than export) log prices were used.

The model projected an internal rate of return of 15% excluding land costs, or 12½% including the (then) current market value of the land at $650 000.
WOODSTOCK PROJECT

DEVELOPMENT PROGRAMME

Before the joint venture started, the Forest Service had already planted 750 ha, predominantly in radiata pine. That area will be incorporated into the farm/forest as the trees receive their silvicultural treatments.

The 6705 ha farm/forest will be divided into four basic land categories. The first (of approximately 585 ha) is that area which, for water and soil conservation purposes, cannot be developed for commercial afforestation or for farming. It will be fenced out and planted with protection plantings.

Another 2166 ha is programmed for normal pasture development. This will generally cover the easiest discable land in a wide belt which runs the length of the farm/forest, nearly down the middle. This belt of paddocks is to serve three purposes. First, it will facilitate easy stock movement and access from one end of the block to the other. Secondly, this area will provide a source of high quality pasture on to which the livestock will be periodically rotated from the forested areas. The third purpose is to provide a sufficient large food supply that, in the event that the calculations of feed available under the trees prove optimistic, a surplus will be available to fall back upon.

The third land category is 3340 hectares of early pruned and thinned radiata pine planted into established pasture. This area consists of two strips of land running parallel to the pasture belt, one above and one below.

Finally, another 614 hectares is programmed for planting in radiata pine. Because the topography prohibits efficient mechanical pasture development, it will not first be grassed. However, this area will provide rough run-off grazing and, after a number of years’ use by farm animals, will probably develop a marginal grass sward under the early pruned and thinned trees.

The distribution of land among the three production-oriented categories above is expected to change as experience in the farm/forest concept is gained. Improved grass strains, possible changes in breeds of livestock used, improved silvicultural techniques, and numerous other factors can all change the initial distribution.

DEVELOPMENT PROGRAMME

In order for the development and early management of Woodstock to proceed smoothly, the responsibilities of the two Government departments were established at the outset. The Forest Service is to road each year’s preparation area to normal Forest Service standards; and to clear, burn and prepare each area as it normally would for tree planting. Lands
and Survey Department will then construct any additional tracks required for land development, and will fence, oversow and topdress each year's programme. It will also control all livestock used for pasture development and maintenance. Each department obtains the buildings, equipment, etc., necessary to carry out its respective operations on the farm/forest. Basically the Forest Service is responsible for all forest-related operations, while Lands and Survey Department controls all farm works. Where there is overlap, each department contributes a share based upon its proportionate use of the facility.

Once the Forest Service has prepared each year's programmed area, one of several things will take place. If the area is to be planted in trees without prior grass development, then it will be planted in radiata pine at approximately 1250 stems per hectare. Those areas scheduled for pasture development will be taken by Lands and Survey Department and will be fenced, cultivated, seeded and fertilised. The areas destined for the tree/grass mixture will initially be given five years to develop in grass before overplanting with trees; but experience in the area will eventually determine the length of time required for this stage of the operation. Once the livestock is removed from the pastures scheduled for tree planting, a paraquat/simazine mixture will be applied, in lines on the easier country and in spots on the steeper slopes, prior to planting. The Forest Service intends to experiment with planting spacings in order to increase grass production and cut down on silvicultural costs. One spacing that shows promise is a one-metre spacing along rows 7 metres apart.

After the terminal leaders of the trees have grown out of the reach of sheep, the stocking rate of these will be increased to the pre-planting level. Earlier grazing by a reduced number of animals will also be investigated. Cattle will be re-introduced into the tree planted areas again when the terminal leaders are out of reach. It has been agreed by both departments that, whenever a conflict between livestock and trees arises, the decision must favour the trees.

The trees will be thinned from 1250 to 500 stems per hectare at age 4 (or possibly earlier) from 500 to 300 stems per hectare at age 6, and then to the final stocking of 200 stems per hectare at age 7. All stems will be pruned to a minimum height of 6 metres to facilitate grazing and to improve timber quality.

The grazing intensity will peak early in the 20-year rotation of the stand: it is expected to stay at 80% of an open paddock over the first five years of grazing and then decrease over the remainder of the rotation. The model assumed that the grazing available under the tree canopy over the 20-year period
will be approximately 55% of that available under open conditions. The figure at this time, however, is a point of conjecture and will be confirmed or modified based upon experience gained. The stock capacity of the fully operational scheme is estimated at 46,000 stock units.

Grazing will continue until clearfelling, after which the clearfelled paddocks will be re-established in grass over a 3½-year period and then planted again to re-start the cycle.

The present timetable calls for all development roading and scrub clearing to be completed by 1984. The last planting of the first rotation should take place in 1986 and the first clearfellings start in 1989-90. Clearfelling of the first rotation should finish in 2006. Thus it becomes apparent that this is a long-term scheme, and conclusive results will not be available in the near future.

Approaches have already been made by other interested groups wishing to carry out research on a variety of aspects of the farm/forestry concept. Such approaches are welcomed and will be considered provided they do not interfere with the management aspects of the scheme.

During the first three years of the scheme, development is under the joint supervision of the officer-in-charge, Esk State Forest, and the farm manager of the neighbouring farm development block. Shortly a full-time farm manager will be appointed to supervise the farming aspects. He will be followed two years later by a forest ranger who will supervise the forest operations. Several years later a single scheme co-ordinator will be appointed to oversee both the farming and forestry aspects.

The farm staff will be increased as the developed area increases and will live on the block, as will the farm manager, the forest ranger and eventually the scheme co-ordinator. Forest staff will be drawn from nearby Esk State Forest, but will not live on Woodstock.

DISCUSSION

A number of problems undoubtedly lie ahead. One already encountered is the difficulty in obtaining the large numbers of livestock required to properly develop and maintain an annual pasture establishment programme of nearly 600 ha. At the moment, animals are being brought in from neighbouring Lands and Survey farm development blocks.

Another problem might be weed control in the paddocks containing young trees. Many of these areas will be too steep for easy vehicular access and thus livestock must be used for weed control. However, until the trees reach a sufficient
size to permit mob stocking, weed control could prove difficult.

Yet another problem could result if a regular and smooth supply of finance is not provided by Government. The present situation calls for Forest Service to pay for its works, and for Lands and Survey Department to finance its portion of the programme. Both programmes are so tightly interwoven that a cut-back in finance for one department will hold back developments by the other.

However, the long-term benefits of the scheme are readily apparent. Though it remains to be proven, the assumption is that the total social, economic and environmental benefits from this joint venture are greater than would be obtained had either farming or forestry been the sole development on the Woodstock area. The integrated scheme will provide a larger number and greater variety of productive jobs per hectare than would either farming or forestry alone. The grazing beneath the trees will reduce the fire hazard, while the trees shelter the livestock in both summer and winter. The earlier income from grazing will help to offset the long wait for forest returns. By integrating the two forms of resource management, fuller utilisation of the land area will be obtained.

REFERENCES