SECTION C: LAND USE

8. Agriculture

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Determination of land use by physical features

The physical features of the study area determine the agricultural land use in the following way:

(1) Approximately half the land is too steep to allow access by wheeled tractors. Furthermore, the topsoil in the very steep country tends to be shallow (less than 10 cm).
(2) Soil structure, particularly on the most common geological type (sedimentary), is poor, even on the lower slopes. The most frequent problem is a tendency for the soil to be waterlogged during the growing season and to dry out rapidly at the end of the season. Ploughing of these soils often brings numerous small rocks to the surface.

Within the study area large parcels of land are forested with the principle agricultural pursuits on the non-forested areas concerned with beef, sheep and seed production (Figure 8.1).

On almost 95% of the area farmed, the factors above effectively limit plant production to pastures and oats, rather than wheat and barley or horticulture. Thus, over 90% of the value of agriculture production is contributed by the grazing industries, sheep and beef cattle as shown in Table 8.1.

Table 8.1 Value of production from the agricultural industries of the study area

Farming Practice	Dollars (millions)	Percentage contribution
Sheep	25.9	46
Beef Cattle	21.0	37
Pasture Seeds	4.4	8
Dairy Cattle	1.0	2
Vegetables	1.0	2
Vines	0.5	1
Wheat & Barley	0.3	<1
Miscellaneous	2.0	4
Total	56.1	100

In contrast to the soils on the hills and slopes, soils on the flats and terraces of the Goulburn River and its tributaries have better physical characteristics. Most alluvial soils are still used to grow pasture, some being irrigated from the Goulburn River. Those few horticultural enterprises which do exist in the study area are also situated on the alluvial soils.

The pasture seed industry, though small in terms of its percentage contribution to the value of agricultural production in the area is a local notable industry, over half Victoria's pasture seed is produced around Mansfield and Alexandra.

Within the grazing industries, there is variation in the location of the specific animal enterprises according to the physiography and rainfall of the study area. Wool production from Merino sheep tends to be concentrated in the drier, western localities near Seymour and Pyalong; whereas prime lamb production from crossbred ewes and beef production are more frequent in the cooler, moister localities in the east such as Yea and Alexandra. Furthermore, the steeper country tends to be stocked more frequently by handy animals requiring less husbandry, such as Merino wethers, whereas breeding females and their young progeny tend to be kept on the more accessible, lower country.

Stocking rate also varies between land units. While the average stocking rate for the whole area is in the vicinity of 7 dry sheep equivalents (D.S.E) per hectare of pasture, it may vary from 3 D.S.E/ha on the hill tops to 12 D.S.E/ha on the flats, or higher with irrigation.

Approximately one third of the land in the study area carries forest with little agricultural use, particularly in the elevated areas to the south and east. A handful of graziers at Merrijig, east of Mansfield, have grazing leases on the neighbouring alpine country, where their cattle graze during summer.

Soil fertility

Next to moisture, the single most important determinant of growth rates of plants is the level of available nitrogen in the soil. As returns from grazing enterprises are not sufficient to justify the cost of artificial nitrogen fertiliser, legumes have been introduced into virtually all pastures within the study area to supply nitrogen.

All soils in the area acutely deficient in phosphorus in their virgin state. Although the native vegetation is adapted to this condition, the introduced species, particularly the legumes, are not. Hence, superphosphate has been applied at varying frequencies to nearly all cleared land that is accessible to ground spreading. Limited areas of the very steep country have been fertilised by aeroplane. Though most of the phosphorus in superphosphate is used by plants or bound up by the soil in an unavailable state during the growth season, it has some residual value. Local fertiliser experiments and soil testing have shown that about 15% of paddocks accessible to ground spreading have reached the stage where superphosphate no longer produces extra growth. A further 15% still have near virgin phosphorus level and the remaining 70% are intermediate between these extremes.

Deficiency of the trace molybdenum is also very common being almost universal in the virgin state on soils of sedimentary origin. One dressing of molybdenised superphosphate is generally enough to satisfy plant requirements for molybdenum for five years. Despite this a substantial proportion of cleared land has never received molybdenum and substantial areas would probably not have received it more than once. Molybdenum deficiency also occurs on granitic, basaltic and alluvial soils, but the occurrence is thought to be less common and the degree of deficiency less acute. On soil derived from granite, it is important to avoid excessive supply of molybdenum as this may induce copper deficiency in grazing livestock (though not in the pasture).

Reserves of potassium in virgin soils are usually adequate for pasture growth, but only just. As potash is removed in animal and plant products (particularly hay) there are now many soils with low potassium levels.

Deficiencies of other elements essential for plant growth have not been detected despite considerable research. Deficiencies of various other elements have been detected in animals grazing pasture on soils derived from granite. Of these, selenium deficiency in years of good clover growth is the most important, but deficiencies of iodine, copper and cobalt also occur occasionally. Grass tetany, a metabolic disease of cattle and sheep in which an imbalance of magnesium is involved, has been common throughout the area in some years of poor clover growth.

Soils of the study area are strongly acid. When pH is measured in distilled water, about 10% of soils lie in the range of 4.5-4.9, and a further 80% in the range of 5.0-5.5. While the actual acidity itself is not generally harmful to plant growth, the acid conditions release aluminium and manganese in the soil, which may be toxic at high levels to sensitive species such as lucerne. This condition may be overcome in the surface soil by incorporation of lime prior to sowing. Current research is still defining the degree of acidity which soils have to reach before the more tolerant species, such as sub-clover, become affected. Rhizobia (bacteria producing nitrogen in nodules on the roots of legumes) are also sensitive to acid conditions. While superphosphate is often the only fertiliser applied to established pastures, the fertiliser used when sowing clover has traditionally been 50:50 super and lime for protection of the Rhizobia during establishment.

Pasture species and establishment

While perennial clover (White Clover) will persist in the wetter pockets of the study area, such as Marysville and Kinglake, annual clover (Subterranean Clover) is the most productive legume as a whole. Perennial Ryegrass will persist in the south and east, but generally has insufficient drought resistance to do well in the north and west. Phalaris and Cocksfoot are therefore the preferred perennial grass species for most of the area. At present, about 90% of the cleared land carries basically annual pasture.

About half the cleared land has never been ploughed. On this land, Subterranean Clover has been encouraged only by application of superphosphate and molybdenum, with some distribution of clover seed.

Pastures shown, or just encouraged by fertiliser, on virgin country were initially clover dominant. However, as the level of fertility has built up over the years, nitrophilous, annual, non-legume species such as Erodium (Corkscrew) and Cape Weed have taken over. This sequence applies particularly to sheep camps on the top of hills, where fertility has been transferred through deposition of dung and urine. These areas are usually bare during the summer, making them prone to erosion.

Techniques by which perennial grass may be successfully be established on fertile areas do not exist, and include direct drilling and aerial seeding. However, economics limits their attractiveness to farmers in many situations.

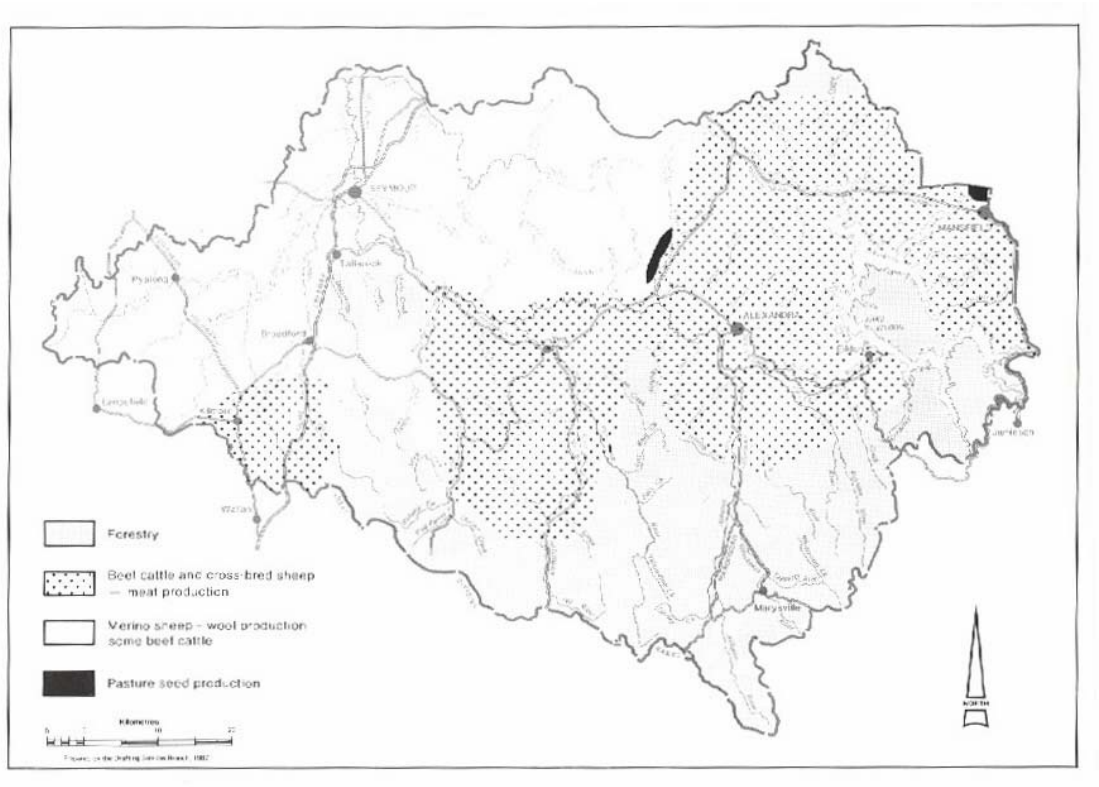

Figure 8.1 Land Use in the middle reaches of the Goulburn River catchment.

Number of size and holdings

While some properties consist of more than 4,000 ha, a great many more small holdings exist. The study area contains approximately 1,630 holdings earning more than $2,500 p.a. of gross income from agriculture. The numbers of holdings in various size ranges are shown in Table 8.2, based upon Shire figures within the study area.

Table 8.2 Number of holdings in various size ranges.

Size range (ha)	Number of holdings
5 – 40	2,332
40 – 200	1,061
200 – 5,000	1,469
TOTAL	4,862

Note: 80% of the land is held by the 30% of land holders who own more than 200 ha.

Future of agriculture in the study area

The steepness of most of the terrain and the stony, poorly drained nature of the soils will probably continue to limit the areas agriculture, largely to production of wool and red meat from grazing animals. The only obvious, major trend is further sub-division of commercial properties into smaller holdings for the purpose of recreational farming. The increased number of inexperienced land holders will make the servicing of agriculture more difficult, especially in respect of policing regulations on animal welfare and control of the vermin and noxious weeds. This applies particularly to some absentee owners.