

## SECTION 5

# The Effects on Livestock Production

### 5.1. Background

The major climatic, edaphic and present social and agricultural characteristics of the study area have been described in Section 1. With regard to animal production, the area can be divided roughly into four enterprise zones, which closely follow the agroclimatic potential zonation depicted in *Figure 1.3* (Jaetzold and Schmidt, 1983; Pratt *et al.* 1966; Sombroek *et al.* 1982). For each of the four different enterprise zones, the sample sites in *Figure 1.3* will be considered in relation to the climatic scenarios selected in Section 2.

For this analysis relating to livestock production, agroclimatic zone I, which is primarily forest reserve, was not included. *Agroclimatic zone II* is of only limited extent within the study area, located on the southeastern slopes of Mt. Kenya, between 1600 and 2000 m altitude. This area includes some of the best coffee-growing conditions in the country, so that great emphasis is placed on arable cropping, particularly with coffee, for cash generation. Farm size is generally small, between 1 and 6 ha. The most commonly found livestock enterprise is dairying, with an average of 3.9 livestock units per holding, on about 1 ha of grazing/forage (Jaetzold and Schmidt, 1983; Nkanata, 1985). The animals are typically Ayrshire or Friesian grade animals, that is, animals that have been derived from the original Zebu stock, improved by cross-breeding with exotic animals. Government policy has been to encourage this upgrading process by providing a heavily subsidized artificial insemination service, one insemination costing the farmer *ca.* US\$0.10. Increasingly, as farm sizes are reduced through subdivision, the animals are kept on a more or less zero-grazing or stall-feeding system based on Napier grass (*Pennisetum purpureum*) as the main forage source. Kerugoya is the chosen sample site for this agroclimatic zone.

*Agroclimatic zone III* is represented mainly in the areas of between 1500 and 1800 m altitude, with an annual average rainfall of over 900 mm. As in agroclimatic zone II, the pressure on land is very high and farm size is typically between 2 and 5 ha. The cropping pattern and livestock systems are similar to

those of zone II, but the somewhat lower average annual rainfall, together with greater variability of rainfall amount and seasonal distribution, result in greater climate-related risks for the farmers in zone III. Embu is the chosen sample site for this agroclimatic zone.

*Agroclimatic zone IV* represents the marginal areas situated between the traditional cropping (wetter) zones and the drier zones that have not been considered suitable for crop production in the past. The pressure on land in this zone is generally not quite so high as in the wetter zone III, so farm size is somewhat larger, between 4 and 12 ha, although the pressure is increasing as the higher potential areas fill up. The holdings in this zone typically have up to a maximum of 3 ha of arable crops, normally maize intercropped with a legume, such as pigeon peas or beans. This upper limit of 3 ha appears to be the maximum area that can reasonably be prepared, planted and weeded using presently available animal- or hand-powered cultivation resources within the short growing season. No appreciable opportunities exist at present for cash cropping, due to the lack of a crop suited to the rather variable rainfall. Low crop yields, or even crop failures, are common as the effects of poor distribution and low total rainfall are confounded with the use of cropping technologies originating in, and more suited to, the wetter agroclimatic zones. Cattle are kept for subsistence production of milk and for draught power for arable cropping. The cattle are predominantly local Zebu type, the number of grade-type animals being limited not only by lack of suitable breeding stock and absence of artificial insemination services in the area, but also by farmers' recognition of the greater general hardiness of the local stock in the prevailing conditions. Small stock are common, both hair sheep and goats, owing not only to their ability to obtain their dietary requirements even in dry conditions, but also to their convenient role as a cash-producing resource (Pollard, 1981; Rukandema *et al.*, 1981). Although cattle also have some role as a source of realizable cash, the usually much greater value of the cow means that sale of cattle are restricted, as much as possible, to major occasions, such as marriages. The role of livestock in this zone is particularly important as the generally low, variable yields from the arable cropping result in little opportunity for generating income from the crop enterprise. The sample site chosen for this zone is Katumani, 10 km south of Machakos Town, due to the availability of relevant field data.

*Agroclimatic zone V* covers the greater part of the study area. The low, highly variable rainfall has precluded successful arable cropping to any significant level so that livestock production has been, and is likely to remain, the most important type of land-use. The traditional land-use system in this area was nomadic pastoralism. A combination of land pressure from an increasing human and livestock population, together with a desire by the government to encourage better land management through land title registration, now limits mobility as a strategy to reduce the effect of shortages of feed and water (Potter, 1981). Livestock in this zone were traditionally used to supply the subsistence requirements of the pastoralists, with milk being the single most important product. In spite of the central role of milk in the production system in this agroclimatic zone, climatic effects on levels of milk output and also on the breeding