Farmers' success with tropical grasses: Crop-pasture rotations in mixed farming in East Africa

By JOSEPH G. BOONMAN. Published by Department of Rural and Urban Development, Netherlands Ministry of Foreign Affairs.

This 95-page booklet is a shorter version of his 360-page volume — *East Africa's Grasses and Fodders: Their ecology and husbandry*, published in 1993. No intended readership is mentioned, other than the statement that this shorter work would be more accessible.

The focus is clearly eastern Africa, and specifically Kenya, where the author worked from 1966–1979 on secondment from the Netherlands Government.

The introduction will be off-putting to most Australian pasture workers and readers of *Tropical Grasslands*. He refers to the 'legume myth' and the unsound concept of legumes in the grass and grazing environment. This theme is repeated throughout and reaches a crescendo in Chapter 10 — Conclusions.

The driving theme in the Introduction is that N resources need to be mobilised for sustained productivity. The grass ley is seen as the key to this via organic matter build up — a modification of the shifting cultivation by indigenous peoples. The other theme is that farmers, themselves, are the ones who have taken the lead in both the development of suitable grasses and the husbandry practices to go with them. In addition, they were actively involved in the establishment of the Kenya Seed Company in Kitale, Kenya, which markets some 400 t of tropical grass seed annually. In contrast, pasture scientists tend to get criticised.

Chapter 2 briefly describes the eco-climatic zones of E. Africa and traces the history of increasing human and animal populations with the inevitable over-cropping, over-grazing and consequent soil erosion and loss of soil fertility. In a very short space, he dismisses the value of animal manure, leguminous green manures, and legumes in general, in halting the decline in soil fertility. He even implicates stylo in being toxic to subsequent crops. In the light of these earlier failures, he expresses astonishment at new projects which attempt to solve the problems by the same means.

The grass ley is the replacement of the natural fallow. He makes the interesting point that sown grass, which can be killed readily by cultivation, is a major factor in increased crop yields by controlling weed grasses, such as couch, which often invade natural fallows.

Subsequent chapters deal with aspects of the grass-ley concept — what grasses do to the soil, choice of species, husbandry of sown grasses, fodder grasses (elephant grass), a chapter of 5 pages of legumes and one on sorghum and oats as fodder catch or break crops. It was surprising not to find a mention of Mpwapwa rhodes, from which our popular cv. Callide is derived, or any mention that cv. Boma is very low in Na.

Scattered through the chapters are 10 *boxes* on the theme of genetic resources. These contributions are variable in value with some interesting observations in Box (iii) on A.V. Bogdan's work — 'remarkable for the absence of laboratory or yield assessments' — and for the fact that testing was done at only one site — Kitale! Messages in other boxes extol the virtues of early heading; briefly outline cost-effective strategies with pastures; describe the 'Banagrass' fiasco, where people rushed to buy a supposed pearl millet × Napier grass hybrid which was no different from Napier grass; and compare the +ve and −ve aspects of tropical legumes. One negative aspect is that most are low in digestibility and some are extra low! The last box describes the work of the Kenya Seed Company.

The booklet contains erroneous statements, too numerous to discuss in this review.

There are always problems in transferring a technology from one country to another. This is especially so with tropical legumes. When CIAT commenced legume work using material selected in Australia, they failed, mainly because the soils were more acid and the pests and diseases different. In Africa, cool nights and heavy grazing pressure limited the potential of the same Australian cultivars in the cropping zones above 1000 m. This does not negate the basic principles but emphasises the need to evaluate collections in the new environment rather than accept existing cultivars.

It is one thing to have experienced legume failures but quite another to state that the concept is unsound (page 1). This is especially so when he applauds lucerne, and reluctantly states that *Desmodium uncinatum* was a good cover crop and associate with elephant grass (and remained productive for many years) — page 72. His six basic principles on why the legume technology was ill-conceived (page 71) can hardly be described as principles — rather they are ill-founded statements — *e.g.*, that N-fixation is an inefficient biological system, and that grass companion yields are often depressed in association with legumes. Not all legumes are low in digestibility — even his own Figure 4.4 shows this. The points of high digestibility for the grasses in the figure are at one week old! Not all legumes succumb to heavy grazing — *e.g.*, *S. hamata, S. scabra, Cassia rotundifolia, Aeschynomene* spp., *Desmodium ovalifolium, D. heterophyllum* and *Arachis* spp.

His contention that grasses invariably improve both C and N in the topsoil over the duration of the ley phase is debatable. No-one would doubt that a ley break is better than continuous cropping in terms of soil structure, reduction of pests and diseases etc. To be satisfied with this and not to seek higher productivity from the ley phase, and subsequent crops, by reducing the N limitation to both through use of legumes is not very helpful. When I went to Kenya in the 1950s, the big questions were: why do grass leys decline in production over time?; and why is there so little yield increase in following wheat crops? The answer to both questions was lack of available N. The reason why so little benefit was seen in earlier experiments in Kenya, where plus and minus legume were compared, was the short duration of the trials. In the first year, no response, followed by increasing response in subsequent years — in fact, the legume prevented the run-down in yields over time. Shrub legumes are also dismissed with a measure of contempt (page 73).

Although it is stated (page 24) that the ultimate value of a cultivated herbage plant must be considered in terms of animal production, there is very little coverage of this topic, and no mention of the higher intake characteristics of legumes *vs* grasses. For the bred varieties of rhodes grass, no shred of evidence is presented to show their superiority over other strains in terms of animal production. I thought immediately of the work of Christian and Shaw (1952) which showed no difference in steer gains between two contrasting strains of rhodes grass with or without lucerne. However, animal production was far higher on the grass-legume pastures. The evidence of superiority for the selected rhodes grass material based on the digestibility data is most suspect. The data were obtained from flowering shoots *at the time when the late-flowering variety was flowering*. It would have been vegetative for two months prior to this when no comparisons were made. One could be excused for feeling that it was seed production, not quality, that was the main thrust for the new rhodes grass cultivars.

In summary, this is a biased, unscholarly work, which will antagonise or mislead, rather than help the readership of *Tropical Grasslands*.

Dr R.J. Jones
CSIRO Tropical Agriculture