RUMEN MICROBES DRIVE PRODUCTION IN THE W.A. SHRUBLANDS

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The design of grazing management strategies for sustainable livestock production in the shrublands of the Australian rangelands requires that microbes in the rumen of grazing livestock be supplied with an appropriate balance of specific nutrients (SCA 1990). This communication explores how this approach, in concert with principles of rangeland management (Freudenberger *et al.* 1999), can be used to develop grazing management strategies for livestock in the shrublands of W.A. to improve both animal production and range condition.

Unlike most native pasture systems, the shrublands of the Australian rangelands may provide ruminants with a dietary intake adequate in rumen degradable nitrogen (RDN) but low in digestible organic matter (DOM) (Franklin-McEvoy 2005). This applies particularly in dry seasons when there is little growth of annual species and/or perennial grasses to provide green leaf material and mature DOM (Freudenberger *et al.* 1999). Local pastoralists claim that the carrying capacity of the shrublands has declined considerably since the 1930s. We contend that this decline may have been due to the animals' demands to satisfy the needs of their rumen microbes for DOM. The constant supply of RDN and intake of salt from the chenopod shrubs would drive ruminants to select feedstuffs low in salt and high in DOM. This would be exacerbated if the animals consume saline ground water (SCA 1990). Without sufficient DOM to meet the requirements of rumen microbes, any surplus RDN, along with the salt, has to be excreted, adding an energy cost to the grazing animal which is already experiencing an energy deficit from a low intake of DOM. Consequently, there will be heavy grazing pressure on sources of DOM and particularly perennial grasses. This can lead to the death of these species, especially in dry seasons (Hodgkinson 1995). Suppression of these species and the associated reduction of patch-scale heterogeneity can also contribute to a decline in rainfall-use efficiency (Holm *et al.* 2003). In the W.A. shrublands, remnant populations of perennial grass species are commonly found only within shrub canopies and under fallen branches where they are protected from heavy grazing.

Two of us, RM and KM of Barnong Station, Yalgoo W.A., are using these concepts to guide grazing management decisions in an effort to build the capacity of the shrublands for sustainable livestock production (Mitchell *et al.* 2005). A mob of 3-5,000 Merino ewes is rotated around 20 paddocks over 110,000 ha, according to the Grazing for Profit™ management principles (McCosker 2000). The 2 management objectives are: first, to provide breeding ewes with a dietary intake to achieve the body condition score (BCS) profile recommended by the Lifetime Wool (LW) project to lift flock productivity (Oldham *et al.* 2005); and second, to manage the grazing pressure and resting regime to encourage the spread of species most capable of providing DOM during the critical months, April to October, when the demands of the breeding ewe are greatest.

The complexity and heterogeneity of the shrublands compared to improved pastures of southern Australia demands alternative approaches to the LW project in developing decision-support principles for pastoralists. A continuous improvement model is to be used, where for each paddock, records are kept of the current BCS, the targeted BCS for the period ahead, assessment of food on offer with photographs of the departure and arrival paddocks, and measurements made of the utilisation and occurrence of key perennial shrubs and grasses. Over a number of production cycles, practical guidelines will be developed to assist producers make informed management decisions. The objective is to develop decision-support tools to assist pastoralists continually improve livestock production and the condition of the shrublands, irrespective of whether they are using continuous or rotation grazing methods.

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