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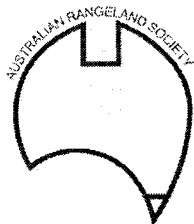
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# A PROCESS FOR DEVELOPING BIOPHYSICAL SCENARIOS FOR ANALYSING GRAZING MANAGEMENT OPTIONS AND THEIR IMPACT ON WHOLE ENTERPRISE PROFITABILITY

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Grazing management is essentially about manipulating the biological and physical components of grazing lands ecosystems so that we can optimise livestock production while looking after the land. In the livestock business, forage plants are like the basic materials and livestock products are the saleable commodities. Thus, for any given property the challenge is to manage the grazing to best meet plant and animal needs in the context of the producer's overall goals.

A grazing strategy should be based on opportunities to improve land condition, evenness of grazing, diet quality and profitability. Using the Breedcow and Dynama Herd Budgeting Software Program (Holmes, 2002), we assessed the financial affordability and profitability of various management options for a typical property of the Dalrymple Shire.

The procedure requires an inventory and analysis of property resources to identify management options for improvement. Management options may include wet season spelling, addition of water points and fences, sowing of legumes, and rotational grazing strategies. Long-term carrying capacity is calculated to represent the biophysical impact of the management option on the grazing enterprise. To achieve this, we used the GRASP grass production model (McKeon et al., 1990), so that the affects of land types, land condition and tree cover on forage growth can be accounted for when calculating carrying capacity. The impact of grazing pressure from water point location is also calculated.

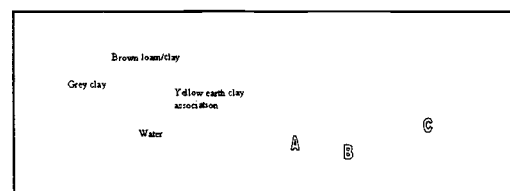
The biophysical responses of the management option, from the start of the change, to a point 10 or 20 years hence, are estimated and their effect on numbers carried and animal productivity calculated. These responses include changes in land condition, animal productivity, forage growth and forage quality. These management options, or "change" scenarios are then compared with a current, "do nothing" situation.

Using Breedcow and Dynama, a simple analysis is performed using stable state herd comparisons to define consequences at the end of change process. If the change scenario gross margins are favourable, the process is elaborated by analysing the biophysical and productivity changes over time. Differences are shown as annual cash deficits and surpluses, and are compared using investment analysis processes. The rate of return on funds (internal rate of return), the accumulated profit from the investment brought back to current dollar value (net present value) and peak deficit are calculated.

Options assessed for a 4329-hectare breeder paddock that has only one water and is in moderate to poor condition are:

1. Additional 2 waters to improve grazing distribution (25% utilisation)
2. Rotational wet season spelling system (maintaining 25% utilisation)
3. Rotational wet season spelling system (25% utilisation until year 5 [after each paddock had been spelled once] then 35% utilisation thereafter)

**Figure 1.** Breeder paddock land types, condition classes and one kilometre distance from water zones



## Assumptions of Options

**Option 1. Additional two waters:** Herd build up is by breeding up and takes 4 years for the herd to build up to the new safe cc. Two waters required at \$12,000 each.

**Option 2. Rotational wet season spelling (25% utilisation):** The breeder paddock is divided into 4 sections with roughly the same carrying capacities. Each paddock is spelled every four years. When a section is spelled the cattle are moved into the 3 remaining sections. The condition of each paddock is improved from wet season spelling. Herd build up is by breeding up and takes 8 years for the herd to build up to the new safe cc. Three waters required at a cost of \$12,000 each and fencing is \$2600/km.

**Option 3. Rotational wet season spelling system (25% utilisation until year 5 then 35% utilisation):** the assumptions of Option 3 are the same as Option2 except, after each paddock has been wet season spelled once we increase the utilisation rate to 35% of pasture growth.

## Financial analysis of options for Breeder paddock

		Current situation	Option 1: add 2 new waters to Breeder paddock	Option 2: rotational spelling system 25% utilisation Breeder paddock	Option 3: rotational spelling system 35% utilisation from year 5 Breeder paddock
paddock safe carrying capacity		212 AE	307 AE	399 AE	560 AE
herd size		3000 AE	3095 AE	3187 AE	3348 AE
Gross margin		\$419,240/ herd or \$139.75/AE	\$432,516/ herd or \$139.75 AE	\$445,373/ herd or \$139.75/ AE	\$467,872/ herd or \$139.75/ AE
Profitability:					
Net Present Value			\$23,462	\$24,463	\$52,733
Internal Rate of Return			18.38%	13.90%	16.75%
Affordability:	year				
Cash flow over time (cash improvement on current	2002		\$0	\$0	\$0
	2003		-\$43,424	-\$86,731	-\$86,731
	2004		-\$718	-\$30,335	-\$30,335
	2005		-\$323	-\$1,638	-\$1,638
	2006		\$4,310	\$14,098	\$14,098
	2007		\$6,819	\$14,527	-\$29,385
	2008		\$13,712	\$20,025	\$23,485
	2009		\$13,712	\$21,086	\$25,070
	2010		\$13,712	\$23,586	\$33,893
	2011		\$13,712	\$25,819	\$39,746
asset improvement			\$75,346	\$162,608	\$266,405
Cost of option			\$24,000	\$70,000	\$70,000
Area of paddock			4329	4329	4329
Cost per unit area			\$5.54	\$16.17	\$16.17

Table 1. Cost-benefit of management options for Breeder paddock

The results of these management options apply specifically to this case study property and will be different for every property due to its herd structure and management practices. Modelling of the Breeder paddock has showed that the financial profitability and affordability of management options can be systematically compared using the Breedcow and Dynama software program. It has also displayed that improvements in grazing distribution and land condition are not only good for the health and sustainability of the paddock, but can be financially attractive too. There are many different grazing system designs available; we are not advocating one or another; we are simply showing that the cost-benefits of options can be assessed in a consistent way. This is a fictional case study. Each property business requires individual analysis, as every enterprise is different and will not yield the same results.

## References:

Holmes, W.E. (2002). Breedcow and Dynama Herd Budgeting Software Package, Version 5.03 for Windows 95, 98, Me, NT and 2000. Training Series QE99002, QDPI, Townsville.

McKeon, G. M., Day, K.A., Howden, S. M., Mott, J.J., Orr, D.M., Scattini, W.J., and Weston, E.J. (1990). Management of pastoral production in northern Australian savannas. *Journal of Biogeography* 15, 15-19.