

Method for calculating the dollar per stock unit rate in the proposed new formula for setting rents for Crown pastoral leases

Report to LINZ

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Authorship

This report has two distinct halves. The first half, covering chapters 1 and 2, provides a record of officials' deliberations, in collaboration with an expert review group, in devising the rent formula proposal and testing its implementation on the available data. This half of the report is drawn in part from the writings of officials in this process. The second half, covering chapters 3 and 4, provides a review undertaken at NZIER to test some of the assumptions and methods made by the officials and the expert panel. It was written by Peter Clough at NZIER, who was a member of the expert panel, and peer reviewed at NZIER by John Yeabsley, who was not. This review process was intended to retain a measure of distance from the officials' proceedings and to make some alternative suggestions, some of which are incorporated into the officials' proposals and some of which are not. Compilation and editing of the whole report was by Peter Clough.

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Focus of this report

This report reviews officials' proposals for a key component in the proposed formula for setting rents on Crown Pastoral Leases. This proposed procedure has been devised by Land Information New Zealand, assisted by a panel of experts from within industry and academia.

There are 231 pastoral leases covering 1.6M ha, mostly in the South Island High Country. The Crown Pastoral Lease was established as a distinct form of tenure by the Land Act 1948, and the leases have 33 year terms, rights to perpetual renewal, and rents are reviewed every 11 years.

Rents were initially set at a standard rate per sheep, but in the 1970s this was changed to a formula based on 2% or 2.25% of the value of land excluding improvements (LEI). But establishing LEI has become increasingly difficult, given improvements made by leaseholders and external influences on the land market (such as values of some properties reflecting large amenity values).

In 2009 Cabinet decided that lessees of Crown Land should be charged a rent based on the earning capacity of the land. The new formula to calculate rents is contained in the Crown Pastoral Land (Rent for Pastoral Leases) Amendment Bill 262-1 introduced on 9 December 2010.

The proposed system of earnings-related rents would:

- Assess the stock carrying capacity of the lease
- Apply a rent per stock unit on the basis of earnings potential of similar properties.

Essentially the formula is

$$\text{RENT} = (\text{BASE} + ((\text{CURRENT} - \text{BASE}) \times 0.15)) \times \text{RATE}$$

Where

BASE is the base carrying capacity of the leased property calculated in accordance with Regulations and Rules made under the proposed new legislation. BASE is intended to be an easily calculated proxy for the carrying capacity of the leased property in an unimproved state

CURRENT is current carrying capacity of the lease (after the effect of improvements is taken into account)

RATE is a dollar per stock unit rate

So the formula uses BASE as an easily calculated proxy for unimproved carrying capacity and a share of the value in having the lease as a "platform for development", which enables leaseholders to invest in grazing improvements and capture the benefits. That platform for development is represented by the 0.15 rate on the productive capacity attributable to increased carrying capacity (CURRENT – BASE).

This report examines the method officials propose for calculating RATE. This method would be set out in Regulations made under the proposed s23N of the Crown Pastoral Land Act 1998.

The method officials propose for the regulations which would specify the method for calculating RATE is

Requirement in Bill (s23N)	Proposed method to go in Regulations
Data series	Beef and Lamb New Zealand Sheep and Beef Farm Survey Class 1 South Island High Country
A measure of net farm revenues	5 year rolling average of EBITR (earnings before interest, tax and rent) with prior years adjusted to real dollars in the base year by the Beef and and Lamb New Zealand "input prices paid" series used as the index of farm costs
Rate as a proportion of the net farm revenue measure referred to, corresponding to the long-term average share of EBITR spent on rent and servicing mortgage debt	0.33
Floor	\$2.50/stock unit inflated by index of farm costs
Index of farm costs	Beef and Lamb New Zealand "input prices paid" series

The proposed method was developed by officials and an expert group consisting of

Rob Davison (Chief Economist Beef and Lamb New Zealand)

Stuart Ford (the AgriBusiness Group)

Jonathan Wallis (representing the High country Accord)

Peter Clough (New Zealand Institute of Economic Research)

This report records how the group arrived at the proposed method for calculating RATE and reviews and assesses that method.

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1. Introduction

The purpose of this report is to review for Land Information New Zealand (LINZ) the proposed method for calculating the dollar per stock unit rate in the proposed formula for setting rents for Crown pastoral leases.

1.1 Background

In 1948 the Land Act created the Crown Pastoral Lease as a distinct form of tenure as a means of encouraging use and development of Crown lands, mostly in the South Island high country. The leases were issued for 33 years with a right of renewal in perpetuity for the leaseholders, but their use of the land was restricted to occupancy of the properties for purposes of grazing sheep and cattle or other animals. It thus created an enduring right to use the property but failed to foresee changes in future potentials and uses.

Rents for these leases were initially set at a flat rate per sheep but in the 1970s this was changed to a formula based on 2% or 2.25% of the value of land excluding improvements (VLEI), to give more incentive to leaseholders to improve their properties through top-dressing and re-pasturing and capture the benefit for so doing.

However, a gradual and long term decline in profitability of high country pastoral farming, combined with growing interest in the 1980s and 1990s with purchasing high country land more for its amenity characteristics than its farming potential, led to a widening gulf between the observable valuations of high country land and their apparent returns for pastoral production. Determining unimproved land value became more difficult when all the observable market values were for properties with varying degrees of improvement from run-holders' investments. The valuation process became increasingly reliant on the assessments of professional valuers experienced in dealing with such properties, raising concerns about the consistency of the approaches used for inferring unimproved values from the limited observable data.

Valuations of leases increasingly included the amenity characteristics of properties, but leaseholders could not capitalise on these due to the restrictions of their leases. This came to a head in court over rents for the Minaret Station, in which the Land Valuation Tribunal held that intrinsic amenity values should not count in calculating rent, and that the rent should relate to the uses of the lease for pastoral farming.

Cabinet, on 27 July 2009, decided that "lessees of Crown pastoral land will be charged rent on the basis of the earning capacity of the property".

Policy on the new system was developed through

- a report by officials in March 2010 for the Minister of Agriculture, The Minister of Conservation and the Minister of Land Information
- a peer review of the officials report by an expert peer review Group in March 2010

- a policy paper approved by Cabinet on 3 August 2010
- decisions by the Minister of Agriculture, The Minister of Conservation and the Minister of Land Information on final policy matters made in November 2010.

The papers referred to above are available on the LINZ website at <http://www.linz.govt.nz/crown-property/pastoral-land-tenure-review/high-country-policy-update/crown-pastoral-lease-rent/index.aspx>

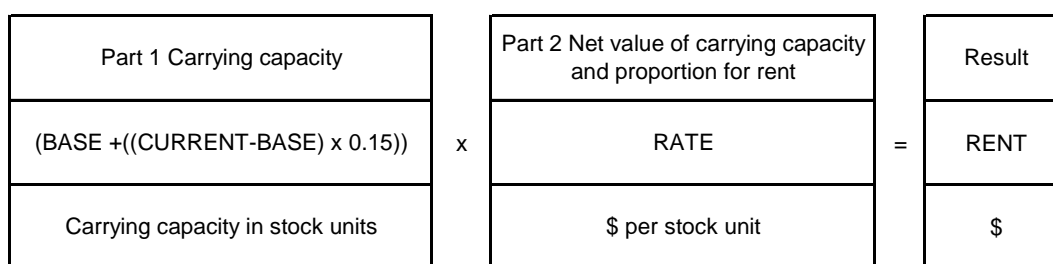
1.2 The proposed method for calculating RATE and the results

LINZ proposes shifting from the current valuation based system to one which focuses on the capacity of pastoral leases to produce outputs from pastoral farming.

The earning capacity based system would set rents by

- assessing the productive capacity of a lease as a pastoral farming operation (in part 1 of the formula)
- using statistical data about farm revenues and how much revenue farmers are paying to use land with the same productive capacity (part 2 of the formula)

This is illustrated in the diagram below.



Using the process recommended by the panel the RATE in part 2 of the formula would produce the following \$/per stock unit rates for the years 2002 to 2009, as summarised below. These are 5 year rolling averages of values in real terms (i.e. a real value as it would have been calculated in the last year of each 5 year period).

2001-02	4.16
2002-03	4.55
2003-04	4.95
2004-05	5.14
2005-06	4.50
2006-07	4.39
2007-08	4.26
2008-09	4.70

This report examines the rationale for the method of calculating RATE as well as the assumptions and calculations used to reach the figures above.

2. Proceedings of the expert group

2.1 Components of the proposed method for calculating the dollar rate per stock unit

This section of the report describes how officials and the experts group arrived at the five main components of the method for calculating the dollar per stock unit rate.

- the data series
- the measure of net farm revenues
- the proportion of the net farm revenue measure that corresponds to the long-term average spent on rent and servicing mortgage debt
- the floor
- the index of farm costs

2.2 The data series

The proposal is to use the Beef and Lamb New Zealand (B+LNZ) Sheep and Beef Farm Survey Class 1 South Island High Country.¹ Stuart Ford of the Agribusiness Group has reported to the panel on the suitability of this and other data sources in a report, “Data series to be used in rental rate formula”.

The Beef and Lamb New Zealand sample in Class 1 has ranged from 16 to 27 farms over the past 10 years; Class 2 has ranged from 29 to 41 farms over the same period. In an average year these results would cover approximately 20 Class 1 and 40 Class 2. Data are available in electronic form on a broadly consistent basis back to the late 1960s.

The Data series excludes properties with a significant income from non pastoral farming activities. The series is compiled using techniques that use consistent definitions of the component parts rather than relying on the tax, accounting or other definitions that respondents might use for other purposes

Consideration was given to using MAF’s Farm Monitoring Survey, which has approximately 20 farms in its high country subset. This originally had a focus on merino but in 2006/07 there was a noticeable change in farm composition with a change in provider so continuity is an issue.

There is also a merino high country farm class in the farm profitability data provided by Ibbotson Cooney, an Alexandra-based firm of accountants, and the Merino Monitoring Group, but these are more restricted than the B+L NZ data.

If the B+LNZ data series ceased to be maintained a synthetic measure could be constructed from other data series (including those examined by Stuart Ford), but

¹ This survey, which contains data collected over more than 40 years, was formerly known as the Meat and Wool New Zealand Economic Service (MWES) survey.

these combined would probably not be as good at representing high country farming operations.

2.3 The measure of net farm revenues

The panel's preferred indicator to represent the residual surplus from pastoral production is earnings before interest, tax and rent (EBITR) calculated on a per stock unit basis. This is derived from the survey's Farm Profit before Tax, to which are added back interest and rental payments (all on a per stock unit basis).

The basis for this thinking was that EBIT is a well known and widely used net revenue measure. The panel, after considering advice from Rob Davison, chief economist at Beef & Lamb New Zealand, decided to use EBITR. The addition of "R" (which is rent) is intended to remove that expense from a net revenue measure whose purpose is to provide a figure available to pay rent. It would not be appropriate to base an earnings-capacity rent on a net income measure from which some rent payment had already been deducted.

The Group decided to leave depreciation in the net revenue measure because depreciation is a genuine business expense, representing the wearing out of capital equipment.

The Panel also proposed:

- Smoothing the variation over time on the basis of a 5 year rolling average
- Using the Beef and Lamb New Zealand "input prices paid" series to put the prior 4 years on the same real dollar terms as the first year of the 5 year rolling average
- Using a standard stock unit common to all parts of the formula.

2.3.1 Smoothing

The panel looked at several matters in developing the proposal on smoothing

- Historically there has been a cycle of around 5-6 years in the EBITR per stock unit, or around 12-15 years in the running average in the same series
- An 11 year rolling average was not favoured as it might coincide with the rental review period and lead to leases being successively reviewed at exceptionally high or low parts in the return cycle (given the apparent 12-15 year periodicity)
- A 7 year rolling average was not significantly different from the 5 year average
- A 5 year smoothing was considered to dampen major fluctuations while having least distortion on market fluctuations.

There is a tension here between wanting the indicator to reflect earnings (and hence market variation) but not to be unfettered, as this could lead to rents being set at a point in the cycle that was disadvantageous to either the leaseholder or the Crown. Some smoothing is needed for the indicator to give an appropriate signal as to the long term trend in returns without being obscured by the noise of short term variation.

An optional rent setting basis, in which leaseholders could choose from one or other return period according to their expectations, was not favoured by the panel as it would introduce too much uncertainty and complication into the process

2.3.2 Constant Dollars

The panel considered that the EBITR series had to be converted to constant dollars so that it produced rents appropriate at the time of any rent review. The panel considered that the Beef and Lamb New Zealand “input prices paid” series was an appropriate deflator. The index is based on Statistics New Zealand data but adjusted for actual farming operations. The series is described in more detail in Appendix A.

2.3.3 Standard stock units

The standard stock unit used by B+LNZ to estimate its survey returns differs from the current best practice stock unit used by academics. The rent formula retains the B+LNZ stock units as it depends on running averages from the historical data, but if other components are introduced that use a different formulation of stock units it will be necessary to adjust data to a common definition of stock unit.

2.3 The net farm revenue measure and long-term land costs

The panel considered very carefully what proportion of smoothed EBITR to use to calculate rent. The panel considered that there was no normative principle that determines what proportion of net farm incomes should be devoted to paying for land.

In the absence of a normative principle the panel decided to base the selection on empirical evidence of what farmers actually have been paying for land, through a synthetic measure compiled from the Beef and Lamb New Zealand survey data. The synthetic measure that combines rent and term debt drawn from the Beef and Lamb New Zealand data. The term debt measure was constructed from opening and closing equity and excludes transient overdraft debt but includes longer term liabilities.

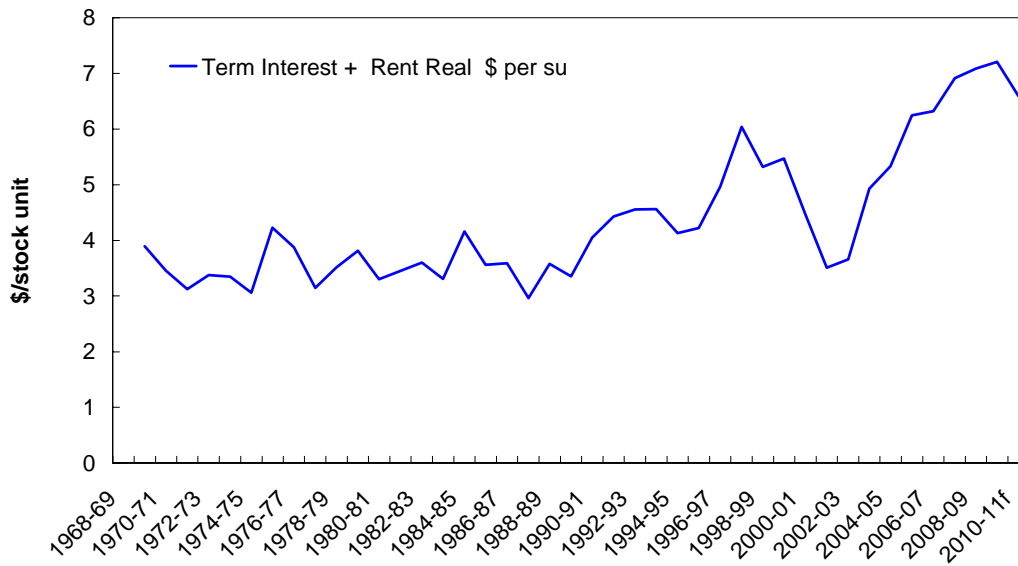
Term debt is assumed to represent the interest on purchases of pastoral leases and interest on purchases of freehold property in the High Country. Rent is assumed to be largely for pastoral leases, which are found on roughly half the properties in the B+LNZ survey.

The panel decided to look at a series of rent + term debt figures smoothed with a 5 year rolling average so that the rent + term debt series could be compared with the similarly smoothed EBITR series.

The long term average of rent plus term debt in real terms was 33% of EBITR over the whole data series, but that proportion has increased recently to a level of 48% in the past five years (Figure 1 and Table 1 below).

Figure 1 Rent and term interest

Real 2004-05 \$



Source: NZIER from Beef+Lamb New Zealand Economic Service data

Table 1 EBITR and Real Term Interest plus Rent

	EBITR Real per SU 5 Yr Roll Av.	Real Term Int + Rent 5 Yr Roll Av.	Interest + Rent as % EBITR	EBITR Real per SU 7 Yr Roll Av.	Real Term Int + Rent 7 Yr Roll Av.	Interest + Rent as % EBITR
2004-05	15.61	4.67	30%	13.41	4.79	36%
2005-06	15.58	5.26	34%	14.26	5.06	35%
2006-07	13.02	6.26	48%	14.73	5.51	37%
2007-08	12.36	6.84	55%	14.01	6.05	43%
2008-09	10.93	7.51	69%	11.69	6.79	58%
2009-10p	11.21	7.61	68%	11.74	7.01	60%
5 yr Av.	13.12	6.36	48%	13.31	5.87	44%
42 yr Av.	14.04	4.68	33%	13.95	4.63	33%

Source: NZIER

The panel considered the factors that might be contributing to changes in EBITR. As the rolling averages in Table 1 show, there has been no real uptick in EBITR per stock unit in recent years, in contrast to rent and term debt that have generally risen. Rather, average EBITR has generally declined since 2004-5 with a single upward blip in 2008-09. As this is EBITR from grazing, annual variations are caused by changes in commodity prices, exchange rates or improvements in farm productivity or efficiency. There was significant dip in the New Zealand dollar against its trade weighted index of other currencies over 12 months ending Sept 2009 which would have boosted returns to exports in the last year of the B+LNZ series.

The panel discussed whether it would be possible to isolate such contributory influences and remove those that were irrelevant to rents for pastoral farming, but concluded that there was no reliable way of doing so. The panel therefore considered the best practicable method was to use the long term average of rent + debt servicing as a proportion of EBITR, on the basis that the long term average reflects the long term relationship between net earnings and land costs and smoothes out what may be temporary effects in the annual percentages. The panel proposed to use the 42 year average rounded arbitrarily to 33% for ease of calculation.

2.4 The floor

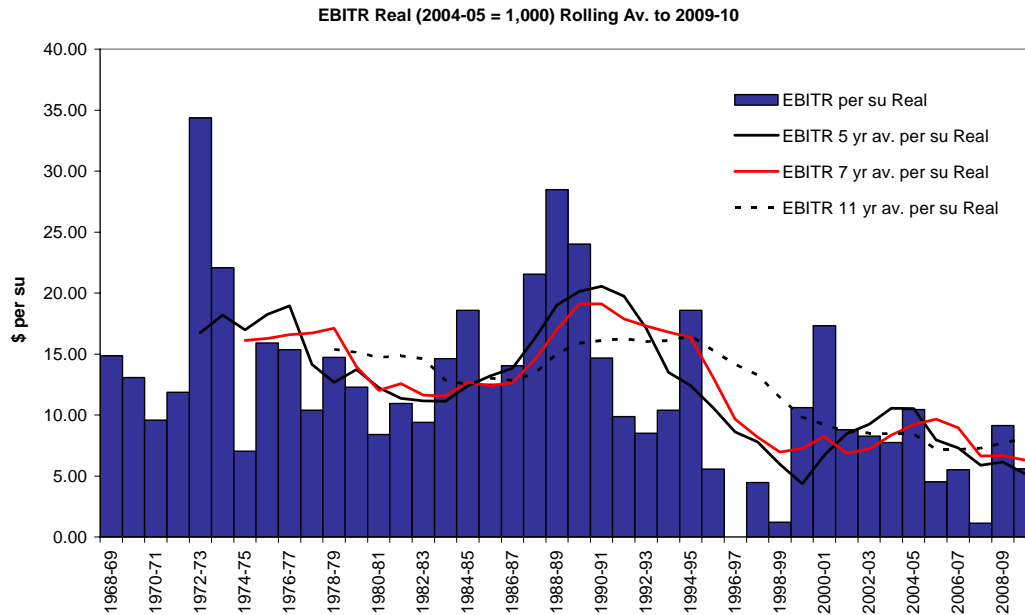
The panel considered EBITR is unlikely to fall to zero, and if it did for a sustained period it would reflect serious economic upheavals elsewhere, but it sought to set a floor value to eliminate the risk of short term falls in EBITR driving rent to zero.

A floor also recognises the practical reality that pastoral leases have a minimum value and must attract a minimum rent.

The proposed approach is to identify the residual value of a high country property when EBITR is zero – i.e. what farmers would be prepared to pay when EBITR is zero on the expectation at that time of improved future earnings – and to do this by creating an adjusted EBITR above the minimum value.

The minimum year is 1996/97, when the real value of EBITR per stock unit was at its lowest at \$5.06. By assuming this year to have zero EBITR and lowering all future years by the same \$5.06, the panel created an artificial forward profile of real EBITR after the notional zero EBITR year. This forward profile ranges from \$1.14 to \$17.33 in real terms. This technique is illustrated in Figure 2 below.

Figure 2 Average EBITR series above minimum value



Source: NZIER from Beef and Lamb NZ data

The present values of these forward values for 5, 7, 11, 12 and 13 years after 1996/97 are presented in Table 2 below, calculated at 3%, 5% and 7% discount rates. The present value across these periods ranges from \$33.39 to \$78.25 and when annualised, the range narrows to between \$7.35 and \$8.34. The annualised values do not exhibit a smooth declining succession between the 11 year and 13 year periods because of the impact of individual year results, in particular a relatively high return in year 12 (2008/09) between two years of relatively poor return.

Table 2 Forward value above floor level

No. of yrs	NPV	NPV	NPV	NPV	NPV
From	5	7	11	12	13
To	1996-97	1996-97	1996-97	1996-97	1996-97
	2001-02	2003-04	2007-08	2008-09	2009-10
Disc rate					
3%	\$38.18	\$51.40	\$68.04	\$74.45	\$78.25
5%	\$35.67	\$47.35	\$61.38	\$66.47	\$69.43
7%	\$33.39	\$43.72	\$55.61	\$59.67	\$61.98
Disc rate					
3%	\$8.34	\$8.25	\$7.35	\$7.48	\$7.36
5%	\$8.24	\$8.18	\$7.39	\$7.50	\$7.39
7%	\$8.14	\$8.11	\$7.42	\$7.51	\$7.42

Source: NZIER

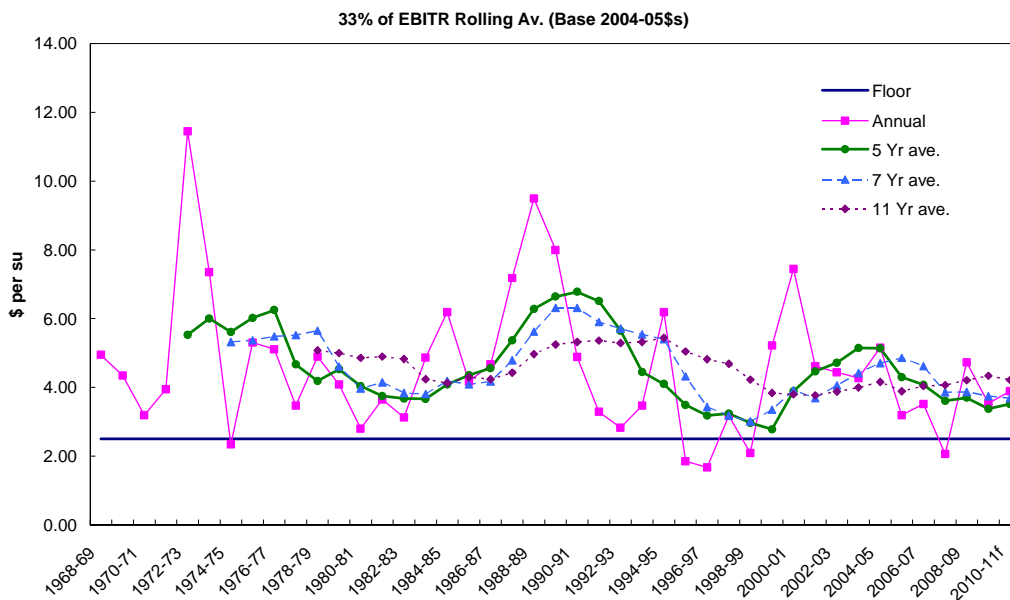
For illustrative purposes, the average of these annualised values for the 5, 7 and 11 year periods is \$7.94 per stock unit. The panel proposals would base the floor at 33% of the annualised value, in line with the rate of EBITR outlined above. On the above

figures this would place the floor in the range of \$2.43 to \$2.75 per stock unit, with the mean at \$2.62. If this mean were the floor, the actual above-minimum forward value would have been below it in 2 out of the 12 years after 1996/97.

The panel's recommendation is to round the floor down to \$2.50 per stock unit. The past trends in EBITR with a \$2.50 floor are illustrated in Figure 3 below. This shows that a rent based on annual EBITR in the past would have exhibited significant variation, and created risks for both lessees and the Crown of rent revision dates falling at the extremes of the range and locking them into an advantageous or disadvantageous rental until the next revision. Had a floor been set at \$2.50 in real terms over this period, a rental based on annual EBITR would have fallen below it on 5 years and necessitated the floor being used.

The rolling averages flatten out the variation to varying degree, with the flattening increasing the longer the period of the average. A rental based on a 5 year average over this period would have come close to the \$2.50 floor on one year (1999-2000) but never dipped below it. Rentals based on 7 year and 11 year averages would not have approached the floor so closely, and would also have reduced some of the "peaks" in rental relative to the 5 year average. The 7 year average is closer to the 5 year than the 11 year average, which in some periods like 1996-97 to 1999-2000 diverges noticeably from the shorter averages and would have resulted in rents being set high against current market returns in those years.

Figure 3 Comparison of series against the \$2.50 floor



Source: NZIER, from B+LNZ data and workings

The panel recognised that given the rationale for the floor it would be logical to recalculate the floor every year using the notional NPV method explained above.

However, as the method for calculating RATE was already complex and difficult to explain, the panel considered that a pragmatic and simpler way to update the floor was to adjust it annually by the Beef and Lamb New Zealand “Input prices paid” series, the same index as the panel proposed for the smoothing process.

3. Review and assessment

The proposed rent setting approach is consistent with the view that the economic value of land is the residual surplus of activities that take place on it after accounting for the opportunity cost of all other factor inputs. While in principle this surplus should be capitalised into the value of land, in the case of Crown Pastoral Leases this is difficult to determine through a valuation approach, because observed valuations bundle together the effects of improvements as well as unimproved land, and attempts to unbundle these components depend on a degree of subjectivity that may vary between different valuation practitioners.

The proposed new approach is to set a rent based on a value per stock unit from observed survey results for the same class of farm, and apply that to BASE as a proxy for the carrying capacity of land in an unimproved state. This approach might be perceived to be simply shifting the point of subjectivity from valuers to the assessors of unimproved land carrying capacity. However, the uncertainty around assessments of BASE should be less than that around unimproved land value, because the proposed legislation provides rules and guidelines for assessing BASE and the assessment will involve objective allowance for elements like climate and terrain. By contrast land value is more susceptible to short term changes in product price expectations as well as some influence of non-pastoral values.

In devising a practical, workable formula the panel has had to fix elements in the formula by making assumptions. Questions arising from this are, are these assumptions reasonable, are there better alternatives, and what are the implications for sustainability of the formula? Specific assumptions that bear further examination are:

- The reliability of the chosen net revenue measure, EBITR
- The choice of smoothing by a 5 year rolling average of EBITR
- The choice of the proportion of 0.33 smoothed EBITR as the proportion that should be payable as rent
- Setting the rental floor.

3.1 The reliability of the chosen net revenue measure EBITR

As indicated in Stuart Ford's initial analysis, the B+LNZ survey provides the longest and richest source of data on the performance of South Island high country farms. The most practical alternative to it would be a composite measure created from other data sources, whose future duration is just as open to question as that of the B+LNZ survey. In that sense the B+LNZ EBITR is the most reliable data series for inferring long term performance, but does that make it a reliable indicator of the return per stock unit obtainable from these lands?

Given a long term decline in farm profits then rents should also be going down. But farm profits could be going down for a number of reasons other than that of declining prospects for grazing operations: the ageing of the current generation of leaseholders, the difficulties of securing successors in the emerging generation, tax considerations and options for non-farm income that leaseholders have as they get older could all combine to result in farms being worked less effectively and with lower profit than might be. This is not to say that these factors exist to a significant degree. But pegging the rent to an EBITR that is in long term decline could be exposing the Crown to a diminishing revenue stream, to a greater extent than to an alternative formulation that, for instance, pegged rent to a measure of gross revenue per stock unit.

This is simply saying that profit measures reflect multiple influences on both the revenue and cost sides, so there is a risk in pegging rent calculation to profit-measures. If, for instance, high country farming becomes so unprofitable that farms become operated as lifestyle blocks on a grand scale, survey-linked EBITR could decline further. This is one reason for supporting a floor in the rental formulation.

It is also worth noting that the proposed legislation involves an objective measure of CURRENT carrying capacity, so that present carrying capacity will be judged not solely on actual carrying capacity but on what an efficient farmer would produce.

3.2 The choice of smoothing by a 5 year rolling average of EBITR

The rental panel chose the 5 year rolling average over the 7 or 11 year rolling average EBITR calculation largely because it wanted to retain some market influence in rent setting, the 11 year average appeared too smooth and there was little apparent difference between the 5 or 7 year rolling average series. However, an effect of choosing the 5 year average is to place a heavy emphasis on recent fluctuations and effectively to lose the information contained in the longer time series in the B+LNZ survey.

Variations in the EBITR series are shown in Table 3 below. The annual EBITR figures show high degree of variance which is successively reduced the longer the time-span of the rolling average. The series of annual EBITR in excess of the minimum value of \$5.06 has the same characteristics as the unadjusted annual series, apart from a lower mean (\$8.69 compared to \$13.75).

Table 3 Distributions of EBITR series

	Annual	11 yr av.	7 yr av.	5 yr av.	Over Min
Average	\$13.75	\$12.38	\$12.33	\$12.34	\$8.69
Maximum	\$34.37	\$16.48	\$19.13	\$20.56	\$29.31
Minimum	\$5.06	\$7.17	\$6.30	\$4.37	\$0.00
Range	\$29.31	\$9.30	\$12.83	\$16.18	\$29.31
Std Dev	6.3	3.2	4.1	4.6	6.3
Variance	39.4	10.6	16.7	21.4	39.4
N	42	32	36	38	42

Source: NZIER

Figure 3 in section 2 above plots what the rent would have been over the past 32 years had it been set at 33% of the different rolling averages of EBITR (without removal of the minimum value of \$5.06). The average rent across the period for these different bases ranges from \$4.54/su for the 11 year average, to \$4.57/su for the 5 year average. Although there is little difference in the means, the figure shows that the annual value has considerably more variability than the various rolling averages. A corollary of this is that when using annual figures or shorter rolling averages, a floor is more likely to be activated than when using a rolling average over a longer period. So although the panel has chosen a 5 year rolling average on the grounds that it allows closer reflection of market fluctuation, it is also likely to result in more frequent suppression of market influence with the greater use of the floor.

The expert panel recommended setting the floor at the rounded level of \$2.50 in real terms, a little below the \$2.62 estimated as 33% of the mean of annualised values in Table 2 above. A floor set at the \$2.50 level would have exceeded a rent set at 33% of annual EBITR value twice in the past 12 years or 5 times over the past 42 years. If rent were based on 33% of the 5 year average it would have come close to (but not hit) the floor twice in the past 12 years. Rents based on the 7 year and 11 year averages have stayed clear of the floor more consistently over the period for which data exist.

The long term data suggest that if rents were based on annual EBITR figures there would be a 12% chance of rent falling below this floor in any one year. As none of the 5 year, 7 year nor 11 year rolling averages have fallen below this floor over the period of the EBITR series, the chance of that happening cannot be calculated but it is a lot closer to zero than for rent based on annual figures. The chance of rent falling below a floor set at \$2.80 would be 14% for rent based on annual figures and 3% for rent based on the 5 year average, but still incalculable for the 7 and 11 year averages. This means it is more likely that the floor will be activated with a five year rolling average than with a 7 or 11 year rolling average, and as the floor acts to suppress market variation, it is arguable whether the 5 year rolling average allows more market influence than the longer averages.

3.3 The choice of the proportion of smoothed EBITR payable as rent

The panel set the rental rate at 33% of EBITR as this is close to the long term rate of payments on rent and long term interest as a share of EBITR (32%). Long term interest was argued to be indicative of farmers' willingness to invest in property, but as some of it could be incurred for assets other than land, this would be at the upper end of farmers' willingness to pay for property. If this measure is indicative of farmers' current willingness to pay for property, it implicitly includes both the grazing value of unimproved land and its value as a "platform for development".

As some of the term debt may be for purchase of non-land capital items, this might be considered an exaggerated indicator of farmers' willingness to pay to acquire land. That could be examined by seeking empirical evidence for assessing how much debt there is for non-capital items and whether this is substantial enough to affect the use of term debt as an indicator of willingness to pay for grazing property. However, farmers also bear the opportunity cost of capital they invested in the original investment in acquiring the lease, and as this is not included in rent plus term debt that figure will understate actual cost to some extent. As rent plus term debt is clearly a proxy indicator its "precision" is less important than that it be seen to be understandable and fair and not place undue burden on particular types of leaseholder.

The rate of 33% is a pragmatic, readily calculable share of EBITR with empirical justification. A rate based on a shorter, more recent calculation of rent plus term interest payments would be higher (Table 1), but also would be subject to the influence of shorter term fluctuations in financial markets. As farmers will be paying this rate out of annual returns that fluctuate widely, they may consider the slow-to-change longer term rate preferable to one based on a more volatile short term series.

3.4 Setting the rental floor

There is no economic justification for a rent floor other than the owner of land wanting to secure some cash flow from rent even when profitability trends to zero. It provides the landowner some protection from tenants manipulating their profits to lower the rent, and it need not be detrimental as long as it is set at a level that appears reasonable to both parties and tenants have incentive to gain from profits they make.

The floor in the proposed system is \$2.50 per stock unit, which is similar to 33% of the annualised present value of real EBITR above its minimal value over the 12 years since it occurred in 1995/96. The justification for this is that the present value is the maximum value that a leaseholder could be willing to pay to secure the lease in 1995/96 when EBITR fell to its minimum value. The floor is set at approximately 33% of this amount. These settings are essentially arbitrary but this is unavoidable.

This calculation method benefits from hindsight. In 1995/96 leaseholders did not know with certainty what the forward EBITR would be, so the value they would place

on the lease in future – the amount they could be willing to pay – would be hedged by their own assessments of prospects for their farm operations. The proposed approach allows for this by choosing a floor somewhat lower than the present value of forward EBITR above the minimum value.

The method could be problematic, however, in future years. If EBITR goes below the \$5.06 in real terms achieved in 1995/96, the logic of the approach would require recalibrating to a new minimum value. However, at that point there would be no forward values to calculate a present value. If the new minimum value were simply substituted for the \$5.06 in the current calculation, paradoxically the present value would rise contrary to the reality of a falling EBITR. If the floor value were calculated off the full 42 years of EBITR above minimum value instead of 12 years, it would also be higher, as would be expected given long term decline in EBITR values.

So for this approach to be sustainable it requires a clear and defensible process for adjusting the floor through time in a way that dampens the effect of one-off aberrations in EBITR but is nevertheless consistent with the long term prospects for high country grazing enterprises.

This could be achieved by revising the floor periodically and tying it to a moving NPV calculation over a fixed number of recent years, so that it would reflect movements in recent EBITR. The period over which to make a rolling PV calculation is essentially an arbitrary choice, but in light of the high annual variability in EBITR discussed in section 3.2 above, a medium term period in excess of 5 years would be desirable to dampen that variability. The current estimate over 12 years of EBITR results since the minimum is coincidentally reasonable.

In the event the panel decided to set the floor at \$2.50 and adjust it annually using the B+LNZ Farm costs index. This approach would be a pragmatic means of updating that can be more readily applied and understood by those in the field than the alternatives of recalibrating against future expected annual results.

4. Conclusions

The proposed approach appears to be a reasonable and pragmatic way of implementing earning-capacity related rents for South Island High Country Pastoral Leases. It broadly meets the theoretical requirements for extracting a rent from use of a natural resource (land), and the detailed implementation on the limited data available has made reasonable, if arbitrary, decisions to operationalise the approach.

One recommendation from this review would be to look at basing the rent on a longer rolling average of EBITR than the 5 years proposed to reduce the likelihood of the floor being used.

Appendix A Definition of the Beef and Lamb New Zealand “Input Prices Paid” series proposed as a deflator

The text below is extracted from Beef and Lamb New Zealand’s description of their Farm Input Prices Paid compilation carried out in May each year.

<i>Not farm expenditure</i>	The on-farm inflation rate is related to changes in the prices paid for farm inputs and not to changes in the level of total farm expenditure.
	Total farm expenditure varies from year to year according to the volume of inputs used and the prices of these inputs.
<i>Isolate the price changes</i>	In this analysis <u>the objective is to isolate the input price changes</u> for the various expenditure categories. An overall price change (or inflation rate) is then derived by weighting the individual category price changes according to their proportion of total farm expenditure. These proportions are based on a three-year moving average.
<i>GST excluded</i>	GST is excluded from the farm input price change calculations as this tax is recovered from farm expenditure.
<i>Publication notes</i>	<p>This publication relies heavily on Statistics New Zealand (SNZ) Sheep and Beef Farm Expenses Price Index data. The March quarter data are published by SNZ in May and are mid-February prices. The SNZ data are published online at www.stats.govt.nz and are provided under the category “Producers Price Index” (PPI) as downloadable tables.</p> <p>Beef + Lamb New Zealand Economic Service Sheep and Beef Farm input prices differ from the SNZ data in four areas:</p> <ol style="list-style-type: none"> 1) Interest charges are calculated independently to take account of both overdraft and mortgage interest rates including fixed term interest and are weighted using Beef + Lamb New Zealand’s Sheep and Beef Farm Survey data. 2) Depreciation is included to measure the price changes for capital replacement. This item correctly lines up the input prices paid index with the on-farm expenditure reported by the Beef + Lamb New Zealand Economic Service Sheep and Beef Farm Survey. 3) The Fertiliser, Lime and Seeds category has been calculated independently by the Beef + Lamb New Zealand Economic Service. 4) A three-year moving average of on-farm expenditure from the Sheep and Beef Farm Survey is used to weight individual categories to the single overall percentage price movement for the year.