Appendix K: Stuart Ford's Report on the Analysis of Effects on the Market Economy in the Application

Opinion on Application HRE 05002

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Please Read

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1 Background

The Animal Health Board (AHB) and Department of Conservation (DoC) have applied to the Environmental Risk Management Authority (ERMA) for a reassessment of 1080 under the Hazardous Substances and New Organisms Act 1996 (HSNO).

The AgriBusiness Group has been asked to provide an expert opinion on the sections of the application relating to the validity of the "with" and "without" scenarios and the identification and classification of economic risks, costs and benefits associated with the presence and absence of use of 1080.

This opinion is based on evaluation of the elements of the application relevant to the use of 1080 for purposes of the primary industries values. The dominant primary industry use is for possum eradication as part of the national Bovine Tuberculosis (Tb) control and eradication strategy. Professor Ross Cullen is providing an opinion on the elements of the application relevant to the use of 1080 for purposes of conservation values.

This opinion is based on a review of selected sections of the application being:

- Executive Summary
- Context of Pest Control Scenarios
- Section 4.1 Identification of Risks, Costs and Benefits
- Section 4.1A Effects on the Market Economy
- Section 4.2 Significant Risks Costs and Benefits.

Some of the reference material cited in these sections was also available.

2 Scenarios

The driving rationale for the use of 1080 is that it is an essential element in the pest control strategy of the AHB which is designed to control and eradicate Tb through the elimination of Tb in wild animal populations. This will control or eliminate reinfection of farmed animals through transmission across the boundary between wild and domestic animals. Possums are the main maintenance hosts in wild populations with the disease being present in foci of the possum population.

Current knowledge and practice indicates that if these foci can be controlled at low densities in remote areas then it is possible to eradicate Tb from these populations. In order to do so the application states that control must be able to achieve;

- uniform reduction of the population
- to low density levels
- over large areas (>10,000ha)
- within a short time period and then maintained at this level for a minimum of five consecutive years.

Aerial application is stated as the preferred method of achieving these four conditions because of practical and cost considerations of wide spread wild population control.

The sections of the application reviewed do not reference or prove the rationale behind these conditions on successful control. At F5 – P34 the statement is made that *"there is about a 90% probability of eradicating Tb from the possum population*" under these conditions coupled with the rider that there is no immigration of infected possums. This is important as acceptance of the need for wide scale possum population control is an important plank in the scenario considerations.

2.1 Future Outcomes

A "combined alternative" option to 1080 is discussed and evaluated as being the "most likely" based on cost, efficiency and effectiveness grounds. There appears to be little discussion around the full range of alternatives and the process by which the most likely alternative was developed. The application would be strengthened by some understanding of the relative superiority of the proposed alternative in terms of cost, efficiency and effectiveness with the other alternatives considered. This could be provided by more numeric detail on the degree of superiority.

The AHB objective of achieving "official freedom" (annual period prevalence (APP) of Tb to be less than 0.2% for three consecutive years) from Tb is set as the prime target in the scenario analysis. There is little discussion around the desirability of this outcome compared to alternative outcomes. Presumably the AHB has set the target based on a cost / benefit analysis and risk assessment of achieving that outcome. The application would be strengthened by the inclusion of that analysis in order to be able to gauge the relatively desirability, significance or importance of that outcome compared with alternatives. This would be particularly valuable when the without scenario is not able to achieve that outcome and therefore achieves an alternative future.

The application creates some numerical confusion around numbers of infected herds and figures reported as APP. Section E2 (P19) – Outcomes for Tb Control reports numerical APP targets in the with and without scenarios. The Glossary indicates that the calculation of APP is based on the opening number of herds in any year plus the new infections during that year. The APP does not deduct herds declared free from infection during the year. Therefore if there is a high turnover of newly infected properties and cleared properties in any year then APP status is more difficult to achieve. The report suggests that the APP calculated figure could be up to twice the number of actually infected herds at any one point of time.

There is no discussion around the potential impacts of trend changes in the other parameters of the formula. Presumably if national herd numbers increase without an increased prevalence of infection then a % target is easier to meet but if predictions are for herd numbers to decrease then mathematically the APP target becomes more difficult to achieve.

Much of the discussion and description on the comparison of the future outcomes in terms of success in achieving official freedom status is based on epidemiological modelling of disease prevalence in the futures. The modelling appears to report very precise outcomes both at a national and regional level.

There is no apparent discussion on the robustness and reliability of this epidemiological modelling. There is no discussion or information provided about the risk or sensitivity parameters of the modelling carried out. When considering the degree of precision of the prediction that the current 190 infected herds nationally will be reduced to 59 by 2015 and the precise predictions of regional movements it would appear that either there is a high degree of confidence in the model or that there may have been more value in reporting some ranges of outcomes with confidence levels around them.

When it is considered that achievement of the APP target (75,000 x 0.2% = <150 herds) requires there to be approximately half that amount (<75 herds) of infected herds at any one time then achievement of the target becomes very difficult. Some discussion around the perceived ability to realistically achieve this target would be of value in the assessment.

The difficulty of achieving official freedom would be better understood if the application clearly stated the relationship between the modelling results of actual infected herds and the APP. This is demonstrated in Figure 3, P34 but not discussed. It would appear that the level of turnover of infected herds will be an important determinant in achieving APP targets yet this is not discussed in the control scenarios section of the application. The case for the value of the proposed use of 1080 could be strengthened if it is able to be shown to be more effective in reducing infected herd turnover than the alternatives.

The with and without scenarios list the core assumptions that have been used in developing and testing them. In both scenarios the first assumption given is that funding for vector control is *"unlikely to increase to any significant extent"*. The scenarios are then developed within funding restraints at about existing funding levels. This assumption brings into question the cost / benefit of vector control operations. Presumably if the cost /benefit of investment in vector control was strongly positive then further funding should not be a restraint.

Again this brings into question the value of the overall objective of the control programme. The AHB Pest Management Strategy(May 2001) indicates that a cost benefit analysis carried out in 1995 showed that farm production and non trade benefits had been effectively achieved by the previous strategy and that any likely future benefits in these two areas were outweighed by the costs of the programme. Therefore the benefit of the programme was only made positive by avoidance of trade risk benefits. This would indicate that the industry wide value and desirability of the investment in vector control, and therefore the positive benefits from 1080 use hinges entirely on the trade benefits.

The assumption that further funding would not be available has meant that the two scenarios are not able to be modelled with the same end result. The extra costs involved in achieving official freedom without 1080 are presumably greater than the restrained funding available.

This means that the scenario comparison "with – without" is made up of three basic elements;

- The trade costs of failure to achieve the "official freedom" target,
- increased long term expenditure on vector control and
- increased costs on farm as a result of a higher incidence of Tb infection.

The fundamental difference between the scenarios is that with 1080 control programmes can be targeted at remote possum populations which are foci for the spread of Tb to farmed animals whereas without 1080 control programmes will be focussed on creating buffer zones between the wild populations and farmed animals. The former has the potential to eradicate Tb while the latter can only try to contain the incidence of Tb to low levels.

2.2 Identification of Risks Costs and Benefits

The methodology of the identification of risks, costs and benefits is explained as being largely qualitative but informed by quantitative data where available. The Market Economy sections of the assessment matrices have magnitude values set as ranges of dollar benefits or degree of impact. There is no rationale given for the choice of the magnitude values chosen for each assessment value.

The magnitude values are further impacted by inclusion of other considerations of things such as the place of impact (national or regional) and response costs. The assessment scales all appear to be somewhat arbitrary and give the opportunity for a high degree of potential for confusion as to the assessment of magnitude. However the assessment then goes on to group magnitude classes into four broad bands and therefore tends to blur the boundaries created by the apparent distinctions between assessment classes.

Because the market economy assessments are informed by quantitative values there is potential for the outcomes of the analysis to be strongly influenced by the choice of impact category grouping. For example the choice of whether to assess an individual cost item on its own or to group it with other cost items may impact on it exceeding the value of the magnitude class assessment. This may mean for example that if all impacts on farm costs were considered as one group they may exceed the threshold to achieve significance but if assessed individually none of them would achieve the status of significance and therefore would not gain further consideration.

No overall framework of total costs and benefits has been provided in order to weigh up the overall relative merits of the benefits of the with scenario.

3 Effects on Market Economy

Section 4.1 A contains the registers of effects on the market economy under the following impact headings;

- Effects on farming
- Effects on forestry
- Effects on the domestic economy
- Effects on export markets
- Effects on tourism
- Effects on ecosystem services

The register appears to be comprehensive and does not miss any obvious impacts. While there could be debate over some of the assumptions used in order to create the quantitative assessments to determine magnitude none of these are sufficient to influence the overall level of benefit characterisation attributed to them in the application.

In Section 4.2 A - Effects on Market Economy those impacts that have been categorised as having a level of benefit of E (Great benefit at a regional or local level or moderate benefits at a national level; may justify cost or risk to realise) or F (Extreme benefits at a national and local level; warrants cost or risk to realise) are discussed and assessed in further detail. These benefits are those that are considered to be significant.

M-B4 Removal or relaxation of restrictions on livestock movements.

The identification of the benefits to the with scenario of this impact is the reduction of associated costs incurred in the without scenario. The discussion seems to focus on costs to infected herds only and does not consider that the establishment of movement control areas may impose costs on non infected herds if management or farming systems changes may be required for herds that are constrained in their ability to freely move stock off the property. These costs are not included in the assessment which may have had the impact of increasing the values calculated.

The assessment of the benefits appears to be based on some relatively crude assumptions of magnitude values and calculation methodology.

A single reported case of estimated costs of $200,000 for a property is used as the upper boundary of likely costs however there is no verification that this single example is in any way valuable as an assumption to use across the industry. It could well be that this is a large property in extreme circumstances in order to have incurred such high costs. A lower boundary of $30,000 has been used but again there is no detail provided as to how this has been calculated or reference to the estimation exercise included in the application. Therefore there is no ability to determine the degree of confidence that can be attributed to the assessment assumptions.

It may well be that average costs are much closer to $30,000 per farm than $200,000.

This is significant because of the wide range of possible values used per farm and the resultant impact on the magnitude assessment. If there was confidence that the impact value was less then $55,555 per farm then the total impact would be less than the $100 m and the magnitude would be assessed as moderate and therefore would not have been considered as justifying risks or costs to achieve.

The method of dealing with impacts over time may have an impact on the assessment values calculated as well. The assessment indicates that the assessment is over the 10 year time scale modelled to achieve the reduction in infected herds. However the calculation assumes that the level of benefits achieved in year 10 (238 herds without and 59 herds with) occur in each of the intervening years. Presumably infected herd reduction or increase will be on a scale over time. In the without scenario they would increase on an annual basis from the present 190 to 238 during the period. In the with scenario they would decrease from the present 190 down to 59 over the period. Profiling the change over time on an annual basis may well have achieved a different result.

The assessment has not calculated the ongoing impacts of achieving lower infected herd numbers past the 10 year timeframe.

A more informative assessment may have been to have modelled each of the with and without scenarios over the 10 year period separately and then forecast these levels out for a longer period and calculated a Net Present Value of each scenario. The magnitude of impact would then have been the NPV difference between the two.

We would agree that the impact is highly likely but would consider that the magnitude is unlikely to be major.

M-B5 Reduced competition from grazing from pests.

The identification of the benefits from reduced grazing of pests is based on a Statistics NZ 1994 calculation that possums consume $12m worth of pasture per year and an assessment by Hackwell and Bertram in 1999 that rabbits cause damage at $50m / year within a range of $10 to $100m. Neither of these references was able to be accessed in order to verify the assumptions used.

The Statistics NZ estimated is based on possums in the bush /pasture margin which is not necessarily the control zone in which 1080 is used or required.

We would have concerns at the use of Hackwell and Bertram because of the timing of the report in 1999. It is not possible to determine whether the analysis reports the impacts pre or post the introduction of RHD (1997) and its large impact on reducing rabbit populations. It would be doubtful whether the reported assumption of rabbits displacing 2 million sheep would be an accurate assumption post RHD. This is a core assumption in the assessment of the magnitude of impacts.

There is discussion around the need for 1080 as a control method of rabbits as they increase in numbers as susceptibility to RHD decreases. Our understanding of rabbit population dynamics at present would indicate that population recovery is likely to be slow and geographically sporadic. Therefore we would assume that alternative control techniques are likely to be sufficient to keep rabbit populations below significant impact levels without

the need for wide scale control programmes for quite some time. We would suspect that wide scale 1080 use will only be required where farmers fail to adequately enact other control techniques and populations are able to recover to infestation levels over long time periods. Therefore we would question the assessment that the greater benefit of the with 1080 scenario is very likely. This may well be the case in the long term but only in the absence of the use of other control techniques. We do not believe that widespread reliance will be likely within the 10 year time frame projected. To partly allow for this the assessment attributes only 10% of the total rabbit control impact to 1080. We would suspect that this may be the case in 10 years time but not over the intervening period.

The assessment of magnitude updates the estimate of 2 million sheep displaced at a cost of $55 per sheep to achieve a value of rabbit control of $110m /yr. We have previously discussed our doubts about the validity of the 2 m figure. The use of the $55 value is based on the price of a sheep in the 2005/06 season. In order to calculate the true cost of the displacement of 2 m sheep it is the net return from farming the sheep (the gross margin) that should be considered not their capital value.

Reference to the latest MAF Farm Monitoring Merino model, which represents farming systems in the high country where rabbits are prevalent shows that the gross margin for a merino sheep is approximately $32.31 per sheep. Using the gross margin value the impact is $64.6 m not $110m as reported in the calculation.

The comments on the need to calculate a more robust and full NPV impact with and without 1080 made in the previous benefit are also valid in this benefit.

Given the doubt and uncertainty over the validity of the major assumptions used in the assessment we would consider that the likelihood of improved productivity that would result from the use of 1080 for pest control within the next 10 years would neither be considered to be very likely or major and therefore may not justify the high significance rating given in the assessment.

M-B7 Reduced cost to agricultural sector and government associated with vector control.

This impact is difficult to review as the core assumptions are not made explicit in the assessment.

The rating of extremely likely that vector control cost will reduce in the future determines its classification as E yet no justification for this is given. In order for an extremely likely rating to be given there should be no doubt as to the robustness of the assumption. Low incidence levels of Tb do not necessarily mean that vector control programmes can reduce. It may be necessary to continue a high level of vector control expenditure in order to maintain that low incidence level.

The cost savings are based on AHB budget predictions that indicate a low end moderate magnitude of assessment. Again, provision of annual reductions would make it easier to analyse the total impact over a 10 year period. Just reporting the reduction in year 10 as $12 m does not indicate the likely scaling of reductions during the period and that the total fits within the $50m to $100m assessment bracket. For the savings to fit within that bracket there will have to be significantly reduced vector control programmes and expenditure from quite early in the 10 year period.

M-B10 Decreased likelihood of loss of markets due to market perceptions of New Zealand's Tb status.

Justification for the assessment of this impact as E is scant.

Previous impacts related to formal market access restrictions have been assessed as unlikely and the discussion points to a more benign attitude to Tb status in trade with a change of concentration from national status to the status of health and safety provisions around the product. Presumably this change in the trading environment reflects consumer opinions or preferences to some degree. Therefore we would have expected this impact to be assessed at about the same level.

Risk perception references are from the 1980's and the Fitzgerald reference relates to the New Zealand perceptions of the risk to trade not market perceptions. None of these references provide strong justification for the rating given

The 2001 Review of the Pest Management Strategy considered trade risks coming from three areas;

- Enhanced food safety requirements forcing NZ to either reduce infection incidence or demonstrate that export product doesn't come from risk areas.
- Targeted trade measures
- Consumer panic against potentially Tb infected dairy and meat.

It is the third category that this impact represents. The analysis indicated that the probability of a trade shock was likely to be 2 % and that a consumer driven trade loss may be even higher, but highly unpredictable. This assessment of probability would not appear to support a very likely rating on this impact.

The 2001 review pointed out that loss of trade in a market had the impact of the loss of the revenue from that market minus the return from the lowest returning market that the product could be sent to. Therefore the loss is the marginal return between the lost market and the actual disposal market. The review went on to calculate that the complete loss of the USA and EU markets and diversion of dairy and meat product to the lowest return markets (Mexico and Russia) in 1998 volumes and prices would have a net cost of $789m per year.

It would seem that a consumer panic shock to export that was of the magnitude of $100 to $500m would have to be significant in size of impact on high value markets. As the size of the shock increase to this level of impact we would have to assume that the probability of its occurrence would reduce.

Therefore it is doubtful that a combined assessment of both very likely and of a major magnitude are a credible combination. The application could be strengthened by more detail on the rationale for the assessment values assigned to this impact benefit in order to justify its significance.

Summary

Review of the four significant benefits identified would indicate that the assumptions and methodologies used are not sufficiently robust for us to have confidence that the impacts justify the E and F ratings given to them. In some cases the likelihood assessments are poorly proven in others the magnitude assessments are based on poor assumption choice and calculation methodology.

Therefore we have doubt that they should be considered as significant under the assessment framework adopted in the application and may not justify or warrant costs or risks in order to be realised.

However more rigorous assessment techniques over a longer time scale of analysis may prove that some of the magnitude ratings are achieved.