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RESPONSES OF NEW ENGLAND WOOL PRODUCERS TO THE RISKS ASSOCIATED WITH PRODUCING AND MARKETING WOOL[†]

*Roy Murray-Prior¹
Vic Wright²*

Paper presented to the 39th Annual conference of the Australian Agricultural Economics Society, University of Western Australia, Perth, February

¹ Work undertaken while PhD student in Department of Agricultural Economics and Business Management, University of New England, Armidale, NSW, Australia. Current location, Muresk Institute of Agriculture, Curtin University of Technology, Northam, WA.

² Department of Marketing and Management, University of New England, Armidale, NSW, Australia.

[†] This research was supported by a Postgraduate Scholarship from the Wool Research and Development Corporation.

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Abstract

Decisions by New England wool producers were modelled with a technique combining personal construct psychology and hierarchical decision models. Both strategic and tactical approaches were evident in the wool producers' responses to the risks associated with producing and marketing their wool. Strategic responses included avoiding short to medium-term response to price changes, diversification, maintaining equity and selling wool at auction in the same sale each year. Many types of risk were identified by producers that engendered distinctive responses. Simplifying decision rules were apparent that helped producers deal with the physical, information, and processing constraints of their decision-making environment.

1 Introduction

Risk, and its effect on farmer decisions has been an area of considerable interest to Australian agricultural economists. Much of the research in the area has been aimed at improving farmers' management of risk. The research reported in this paper had the objective of describing wool producers' decisions and as part of this assessing their responses to risk.

While risk as it has been applied above and in the title is used in a very general sense of risk and uncertainty, a distinction will be made between the two in the remainder of the paper. Here we define risk as the situation where probabilities are known. Uncertainty (including ambiguity and outcome uncertainty) covers situations where probabilities are unknown or ambiguous and/or where there is uncertainty about the set of outcomes (Bogetoft and Pruzan 1991). However, we recognise that there will be a continuum of decision problems from the pure risk type through to the total uncertainty or ignorance type.

The results reported in this paper come from a study of wool production and marketing decisions made by New England wool producers. Detailed explanations of the objectives of the research and the range of production and marketing decisions modelled can be found in Murray-Prior (1994b) and Murray-Prior and Wright (1994). Models of decisions were developed based on a technique incorporating personal construct psychology and hierarchical decisions models (Murray-Prior 1994a). This approach represents decision problems as decision trees with each decision consisting of a series of criteria arranged in a hierarchical order.

Most of the decisions researched in the study were important decisions in that they had the potential to have a major impact on the profitability and survival of the farm businesses. Many were strategic decisions in that they were long-term high-risk decisions, while others were repetitive decisions in which the responses were influenced by strategic orientations. The decisions were made in a complex bio-economic system with many unknowns and interactions between the components of the system and the different decisions to be made. These interactions were a major part of the problem for the wool producers.

Wool producers perceived many sources of risk and uncertainty and they applied a range of strategic and tactical responses to help overcome these. These responses are documented in the decision tree models of their decisions that provide the supporting evidence for the arguments to be presented.

2 Responses to risks in wool marketing

Two wool marketing decisions were examined: whether to sell wool by auction or private sale; and whether to delay sale by auction beyond the first sale for which the wool would be ready. These decisions were made at least once each year and therefore producers had plenty of opportunity to work out which aspects were important. Decisions about when to sell wool were made in the context of when the wool was shorn, since no-one in the groups interviewed had forward sold their wool in recent times. Most of the merino sheep were shorn between July and December, although crossbreds were sometimes shorn earlier. Shearing times seemed to be selected for

reasons related to stock management and availability of shearers. However, because most wool producers in the region shored during the same season, the major wool sales for their types of wool were held at corresponding times.

Four main groups of aspects influenced the major annual decisions: strategies or beliefs; physical or contextual constraints, price and relative return; and risk. The first and last of these will be the focus of the discussion in this paper. The model of the decision to delay the sale of wool contains each of these groups of aspects (see Figures 1, 2, and 3).

2.1 Sale time for wool

When it came to selecting the time of sale three main beliefs or views were important. These were:

- a) Prices for wool would be higher, on average, at a particular sale or time of the year. For example, many superfine/fine wool producers believed November or February were the best times to sell superfine/fine wool.
- b) It's not possible to predict the wool market so the best strategy is to sell at the same time every year; that way what you lose out on one year you will pick up the next year.
- c) It's not possible to predict the wool market so the best strategy is to sell the wool when it's ready.

For fine/superfine wool producers the first belief was generally based on the view that the designated fine-wool sales held in November and February attracted the most buyers for this type of wool and therefore competition was greatest. Some were attracted to the fine-wool sale in February, because it was the last sale, and they felt over the years this had engendered higher prices than the earlier sales.

Other producers, who did not believe that one sale was better on average than another, believed that the best method of dealing with the problem of not being able to pick the market was to sell at the same time every year. That way, due to the 'law of averages', their prices would even out in the long run. A consequence of this thinking was that when shearing was earlier than normal, they often held their wool to their normal sale.

Occasionally, this even extended to selling at a particular sale time, even though shearing had been shifted forward permanently for management or other reasons.

Producers who held the first belief, often held a related form of the second belief as well. They also believed in selling at the same time every year, because they did not believe they could pick the market on a year to year basis. This belief was subordinate to the first belief, which meant they were unwilling to change from the 'best sale' even when market signals suggested this might be an option.

Those who followed the third view, also believed it was not possible to pick the market, but believed their best option was to sell their wool when it was ready. Since this did not involve trying to pick the market, they believed results would average out in the long run. It had the added advantage that it did not involve any holding costs.

Within the constraints imposed by choice of shearing time, the beliefs presented above explain most of the decisions made about where and when to sell wool. As can be seen in the models of these decisions, very few producers changed from the choice inferred from their beliefs, even in the 91/92 wool selling season when the Reserve Price Scheme was no longer operating.

2.2 Private or auction sale

Most people sold their wool at auction because they believed they would get at least as good a return as selling it privately and because they believed it involved less risk. (Models of this decision can be seen in Figures 3 and 4.) This was due to a couple of factors:

- a) A belief that since the private buyer had to make a profit and would probably be selling through the auction anyway, they might as well get the benefits by selling direct.
- b) A view that auctions provided better competition and therefore the prices were likely to be higher.
- c) For superfine wool, private buyers could not offer the prices offered by the market.

- d) A lack of knowledge of the value of their wool in comparison to the private buyer which might put them at a disadvantage.
- e) The risk of being taken advantage of, or of not being paid, if the wool was sold privately.

These constructs, either on their own, or in combination with the other constructs, contain the reasons why many producers did not think about selling privately. Even when something occurred that made them think about making a change they were also the main reasons producers did not take the matter any further and continued to sell by auction.

2.3 Reasons for strategies

The beliefs can also be construed as strategies adopted by producers to cope with the uncertainty associated with selling wool. Rather than trying to deal directly with the uncertainty associated with selling privately, the strategy of most producers was to sell by auction. Sometimes this was purely because private buyers were not offering competitive prices for superfine wool. Commonly, however, producers were not confident in their ability to obtain a good deal from private sale. Therefore, their strategy was to sell at auction, because this provided the best competition and they did not have the problem of deciding the value of the wool. This was left to the market. For the decisions of timing of wool sales, two main strategies were adopted by those who were not confident in their ability to pick the market: sell at the same time each year, or sell when the wool was ready. Ironically, both were justified by the 'law of averages'.

Those producers who had sold main lines of wool privately before, often took a different view of private selling and were more likely to undertake it in the future if the net returns they received had been as good as returns they had expected from auction. If returns from private sale had not been as good as from auction, then another trigger reason was required to entice them to consider selling privately again.

According to Kelly (1955), anxiety is provoked when a person recognises that, when faced with a particular choice, they have very little ability to predict or control the

subsequent events. In this study, most wool producers recognised they lacked the competence to predict the direction prices would take in the wool market, from sale to sale, or from year to year. To avoid the anxiety this induced, most appeared to have chosen a simplifying rule that provided some degree of stability and control; that is, if they did not deliberately choose the sale time (on a year to year basis), their prices would average out in the end. Such an approach is also consistent with the competence hypothesis that people do not like to bet when they lack information about the underlying causes of events (Heath and Tversky 1990), and that they appear to react more strongly to adverse outcomes caused by action than inaction (Ritov and Baron 1992).

2.4 Risk aspects

Other criteria in the models allowed for circumstances that arose when producers decided to depart from their normal strategies, or where other situations occurred which involved a degree of risk. In the models of how and when to sell wool, criteria were included to deal with uncertainty associated with predictions about price rises and falls, and with risks associated with losses that might have occurred if sale of all the wool was delayed, or if it was sold privately. When considering a change in sale time for their wool, producers who were not confident in their prediction about price, often offset this uncertainty by consulting their broker and taking their advice about price trends. For obvious reasons, this option was not available to producers who considered selling privately because of a predicted price fall. Testing of the model showed the risk criterion in this situation was not a major determinant of behaviour.

Two options were used by producers who were unwilling to take the risk of a loss if all their wool was delayed to a later sale: split the wool and sell some early and some later, or not to delay the sale of any wool. Some producers in this circumstance decided to 'split their risk', but most opted not to delay sale.

Producers who were deciding between private and auction sale also could have split their wool and sold some privately and some by auction. No producers mentioned this option and so it was not included in the model. A criterion was included which allowed

them to avoid a private sale if they were unwilling to take the risk of selling all their wool in that manner, although this was not an important factor limiting private sale.

Another form of risk was perceived by producers considering private selling for the first time. This risk arose because of their inexperience with assessing the value of wool, and the disparity between their knowledge and information, and the perceived experience, knowledge and information possessed by the private buyers. This was not an important criterion once private sale was being considered consciously, but many producers did not even consider private sale because they expected the information disparity would result in lower returns from private than auction sale. Therefore this aspect was more likely to have been acting pre-attentively than consciously. It is a practical example of the heuristic to 'avoid betting when you lack information others might have' (Camerer and Weber 1992, p. 330).

3 Responses to risk in wool production decisions

While the wool marketing decisions occurred on a regular basis, the production decisions studied were often one-off decisions. Little opportunity had arisen to develop a structure for particular problems since serious consideration of such decisions occurred infrequently. However, factors that might have triggered decisions to change occurred regularly, implying a greater structure for this part of a decision. In many instances, people had developed strategies that limited their response to price and other signals.

Many decisions of this type had a major impact on the management of the property and were expensive to undertake. They could have a disastrous impact on the financial viability of the property if a poor decision was made and circumstances turned against the producer. While each decision was unique, producers had developed processes to handle them because different decisions in this group contained similar elements. A coherent theme throughout was the need to maintain the viability of the property.

An example of this type of decision is the model of the decision to begin merino breeding, including the choice of micron type of merino to breed. Part of this model can

be seen in Figures 6, 7 and 8. In these types of models the responses to risk and uncertainty can be detected in three main areas: the trigger aspects; strategic orientations; and the risk aspects.

3.1 Trigger aspects

Decisions of this type required a reason, or trigger, to begin considering the need for a change because the present, or projected future, was construed as unsatisfactory. Doing nothing was the reference point in the decisions, as well as a major alternative. Often, a particular trigger reason had a bearing on the possible changes that could be made, by defining particular options and eliciting particular constructions about the future (eg increased relative prices for finer wool, or dramatic increases in wool prices).

In many cases producers filtered information about short- to medium-term profitability of their major enterprises. From their comments it was obvious this came about because producers took a long-term orientation to profitability and maintained their existing enterprises (Murray-Prior 1994b). Uncertainty about the permanence of price changes contributed to this with producers expressing a lack of confidence in their ability to make meaningful predictions about price changes. Their strategy to handle this kind of uncertainty was to ignore much of the information about price changes when it came to considering changes in their enterprise mix.

3.2 Price aspects

Response of producers to risk and uncertainty is also apparent from the models in the criteria incorporating price. As mentioned in the previous section, price may act as a trigger to change, however, other aspects included price as part of an assessment of enterprise return. These criteria contained wording such as a 'noticeably different return' and 'profitable in the medium to long term'. In addition criteria often contained a comparison of the medium to long-term expectations about returns and the risk of prices moving against the change.

In some decisions such as mating of cull or cfa merino ewes to prime lamb rams short- to medium-term expectations were more relevant. However, these decisions tended to involve marginal changes in enterprise mix with low costs of change. In this situation

less risk to the viability of the farm was involved and there was an opportunity to take a small gamble.

3.3 Strategic factors

As with wool marketing decisions, strategy was an important component of the approach taken by producers to their wool production decisions. It was apparent from the strategy taken by many of not 'chasing their tail'. In many instances they were not prepared to depart from their strategic orientation by making radical changes to their operation. This type of response was designed to handle uncertainty and ambiguity associated with predicting price and seasonal conditions and their potential impact on the continued viability of the farm.

The effect of this strategy was to reduce responsiveness to price, working through such processes as filtering of information about prices, and use of long-term expectations about returns balanced against the costs of change. For example, only eight out of 36 producers had considered stopping merino breeding (even briefly) in 1991-92 after the collapse of wool prices, while between 1991 and 1992, 44 percent of the flocks surveyed still increased matings to merinos rams. Decreases in matings were overwhelmingly due to the drought, not the decline in wool prices.

Other strategies designed to handle variability in prices and climatic conditions included diversification of enterprises and keeping wethers as a safety valve for the breeding flock during drought years.

3.4 Risk aspects

Producers perceived many different forms of risk. Risks of introducing diseases associated with buying sheep were managed by some producers by not buying sheep other than rams. Risks associated with running breeding flocks during droughts were lessened by having a substantial proportion of wethers, or having a conservative stocking rate. Risks arising from fluctuations in prices were countered by diversification of enterprises, off-farm investment, by specialising in a quality product, and by maintaining a high equity. Risks connected with beginning a new enterprise with limited technical knowledge and experience were decreased by beginning with a

related enterprise that would not be as susceptible to these shortcomings. Perhaps most important, risks associated with changing to new enterprises in response to fluctuations in prices in the short to medium term, were handled by adopting a strategy of resisting change.

The impact of risk was also apparent when producers considered buying expensive sheep, either when starting a new enterprise, or when buying speculative stock. In the first of these situations, producers mentioned two types of risk. The first arose because of the chance that they would make a loss if prices fell. Experience with the tendency for prices to go in cycles made some producers cautious about paying too much for stock. The second risk arose for producers who needed to borrow money to buy stock. Their attitude to borrowing money, and the attitude of their creditors, tended to place a cap on the money available to purchase stock. Although in theory more money could have been borrowed, this would have increased the risk of going broke to an unacceptable level, and thus placed a limit on purchase prices.

Although these criteria were not particularly important factors by the number of times they split final decisions, they were probably relevant to bidding at particular auctions when bids were being made on lines of sheep. In the 'initial' series of interviews, two producers delayed the purchase of sheep for a year or more because they were outbid at auction (more than once). In both cases it was the risk associated with borrowing money that had placed a cap on the amount of money they were willing to pay for the sheep.

For speculative stock purchases, the main risk was that wool prices would fall and they would make a loss on the deal. This seemed an unimportant criterion for the speculative purchases discussed in the study (most of which occurred after wool prices fell), largely because producers considered the wool market had bottomed. With the benefit of hindsight they were incorrect in this assumption.

It seems from the above discussion there were many forms of risk perceived by producers. They were handled in several different ways, some of which might be explained using utility theory. Usually, however, better descriptions, and perhaps predictions of behaviour, can be obtained by means of hierarchical decision models.

Strategic behaviour obviously fulfilled an important function in setting the context in which they made risky decisions.

4 Effect of risk on production and marketing decisions

The effect of risk and uncertainty on decisions was alluded to earlier. It was perceived in many different contexts, arose from a myriad of different influences, entailed a range of outcomes, and evoked a host of strategies and responses from producers. A hierarchy of responses was observed, beginning with strategic decisions to maintain a particular level of equity, diversify or specialise, and resist change arising from fluctuations in prices of alternative commodities. This strategy focused on coping with uncertainty. It is unrelated to any biological or economic characteristic of the farm apart from their uncertainty. It is set at a conceptually higher level than production and marketing plans and decisions, and hence conditions them. It is meta-strategy. It could even be termed a decision style or policy.

A lack of response to price fluctuations was apparent when it came to both producing and selling wool. Most producers adopted strategies designed to 'average out' prices rather than have to make a prediction about prices. Occasionally (eg selling at the same sale every year no matter what the time of shearing) these strategies may not have been profit maximising, even in the long-run, because they ignored the opportunity cost of money. These responses were designed to cope with the uncertainties of price and climate.

While some became carried away with the high prices during the 1980s, it was apparent many experienced wool and prime lamb producers realised it was a passing phase and that the pendulum would swing back sometime in the future. Even after the collapse of the wool industry the same view was common. Although they were not sure what would happen, or how or when it would happen, and were unwilling to make a long-term prediction about prices except in the vaguest of terms, when the industry was 'up' they were aware that they should allow for some unfavourable event or events in the future.

A possible explanation for some lack of response, which is consistent with the strategic explanation, is that limited cognitive capacities mean that producers can only pay attention periodically to the profitability of their enterprises (Earl 1990). Thus, consideration of change will occur if something happens to attract the persons' attention, or the person has a policy of undertaking reviews at regular intervals.

In response to uncertainty arising from insufficient information about price formation in the wool market, many producers appeared to have been reluctant to gamble. A reluctance to gamble was apparent in the models of decisions to delay the sale of wool and whether to sell privately or by auction. Anyhow, perceived competence in forecasting a market was evidently an element that reduced producers' sensitivity to price fluctuations.

The hypothesis that people prefer inaction to action when action is associated with uncertain change (Ritov and Baron 1992) may also offer a partial explanation for the reluctance of some producers to change even when their formal analyses suggested it was profitable to do so. It is also relevant to the decisions about the selling time for the wool and whether to sell privately or by auction. Those producers who sold their wool at the same time every year, even if this involved a delay, seemed to perceive selling earlier as trying to pick the market, that is, taking a decision. On the other hand, those who sold the wool when it was available did not consider this trying to pick the market. If this was the case, it would probably be simple to convince the first group to reframe or reconstrue the problem and sell when the wool became available.

The strategic responses formed the context in which other decisions were made. For instance, once a decision to begin merino breeding had been made, there were other risks to be considered. Purchase of sheep involved a risk of a loss if the purchase price was too high, also the risks associated with going into debt when a loan was required to finance the purchase. Additional risks arose from the chance of introducing disease and the uncertainty associated with the breeding quality of the sheep to be purchased. For example, responses to price risk for wool may include off- and on-farm diversification, maintaining high equity, lower use of inputs, selling at the same time every year and so on.

In these circumstances, it is difficult to conceive of a wool producer as having a fixed attitude to risk for all decisions that can be gauged from the shape of their utility function. How they would react to the risks in a particular situation could depend upon how they construed the situation at the time - on the context of the decision. Their construction could include the initiatives they had taken at higher levels in the hierarchy of decisions to alleviate the possible effects of uncertainty. They may also adapt to risks involved with a particular decision by adjusting other aspects of their business. Therefore, response to a particular type of risk may be multifaceted.

As for immediate impact on livestock numbers, climatic conditions, in particular dry conditions, were found to have the greatest effect. Much of the build-up in total livestock numbers during the 1980s appears to have been due to a combination of prices and seasonal conditions. Interestingly, total cattle numbers increased in approximately the same proportion as sheep numbers over this period, although beef prices showed only a steady increase compared to wool prices. Prices seemed to have a greater effect on changes between enterprises within the sheep industry than between the sheep and cattle industries.

Poor seasonal conditions during the beginning of the 1990s was the main reason given for the decreases in dry stock and matings of merino ewes. It had a cumulative effect through its impact on lambing percentages. Dry springs and summers during the early and late 1980s, which made it difficult to finish prime lambs, were important in several decisions to stop prime lamb production. Finishing lambs in a dry season was expensive on some properties, and lambs that were not finished brought only lower, store prices for lambs.

5 Implications

Consistent with the notion of coherent planning hierarchies, strategy defines aspects of the environment with which lower level plans and decisions have to cope; it prescribes and proscribes response acceptability. The need for this to be recognised and adhered to is that strategic level planning is the most comprehensive. Lower level decision making is partial with respect to the overall operating (and information) environment.

The importance attached in the models to strategies that limited response to price fluctuations provides compelling evidence about the overriding importance of survival to the wool producers surveyed. These strategies acted as a 'blinkers' that may have limited the producers' opportunities to maximise their profits. It shows producers were willing to pay this price in recognition of the higher priority given to the survival objective.

It also suggests an objection many producers may have to advice based on the expected value of outcomes (however measured). For many major decisions producers may only get one chance, while the expected value measure implicitly assumes many chances. Prescriptive advice must therefore recognise that the main objective of many producers is not the maximisation of some objective function. In most situations alternatives must first pass some form of survival criterion. Even then, other criteria may be applied in a hierarchical fashion to decisions. About the only case where a survival criterion may not be passed is when the survival of the property is already under threat, in which case high-risk options may be chosen.

Evidence about use of strategies by wool producers to deal with situations where information about a variable is perceived as ambiguous, or where little confidence is felt in their predictions of a variable, shows it poses an important practical problem for prescriptive advice. Evidence from the literature suggests this ambiguity may take many forms and that people's reaction to it will be context-dependent (Winkler 1991). It would appear, therefore, ambiguity cannot be ignored, since in many situations people are unwilling to accept advice that ignores the issue.

A solution to the problem that is currently being applied by producers is to develop strategies that minimise the perceived impact of ambiguity. Occasionally (e.g., when selling wool), some strategies may produce lower profits and yet not reduce the impact of ambiguity compared to alternative strategies.

It was also apparent from the decision models that risk was not incorporated holistically in choosing between alternatives; it was considered separately. Their attitude to risk appeared to depend upon the context of the decision as well as their general attitude to

risk. A range of strategies and responses was used by producers in responding to the various forms of risk perceived.

Since a producer's 'attitude to risk' may vary from context to context, it may not be appropriate to incorporate attitude to risk in a single recommendation for risk-averse farmers, or for farmers with particular 'levels' of risk aversion. Without an understanding of the context in which the decision is made, particularly the degree to which uncertainty has been mitigated by strategy, it would be invalid to incorporate 'attitude to risk' in making the recommendation. Methods are required which present the information in a format that allows producers to make their decisions about the levels of risk they wish to bear in a particular situation.

The apparent importance attached to strategy by many wool producers, as a means of coping with risk and uncertainty, reinforces the need for greater attention to be paid to this area in providing advice to farmers. It is an area that has so far been largely neglected in the Australian farm management literature (see Malcolm 1990), if not by farmers. A recent paper by Wright (1993) suggests a cybernetic attitude to strategy should be taken. In this framework the purpose of strategic planning is to specify what is to be avoided, rather than placing the main emphasis on achieving particular levels of profit or production. Such an approach seems to have the advantage of being consistent with the philosophy of management embraced by many wool producers (as interpreted from the results of this research).

To help farmers in their decision making the context of a decision has to be properly specified. Part of that context is the farmer's strategic response to uncertainty (whether explicit or implicit). Specific decision-making algorithms embody strategic responses to uncertainty and the consistency of these with that of the farmer as decision maker is a core issue. Inconsistency is likely to lead to bad advice, in the sense of irrational advice.

6 References

- Bogetoft, P. and Pruzan, P. 1991, *Planning with Multiple Criteria: Investigation, Communication and Choice*, North-Holland, Amsterdam.
- Camerer, C. and Weber, M. 1992, 'Recent developments in modeling preferences, uncertainty and ambiguity', *Journal of Risk and Uncertainty*, 5(4), 325-70.
- Earl, P.E. 1990, 'Economics and psychology: a survey', *The Economic Journal*, 100, 718-55.
- Heath, C. and Tversky, A. 1990, 'Preference and belief: ambiguity and competence in choice under uncertainty', in *Contemporary Issues in Decision Making*, K. Borchering, O.I. Lancher, and D.M. Messick (eds.), NorthHolland, Amsterdam, pp. 93-123.
- Kelly, G.A. 1955, *The Psychology of Personal Constructs*, Norton, New York.
- Malcolm, L.R. 1990, 'Fifty years of farm management in Australia: survey and review', *Review of Marketing and Agricultural Economics*, 58(1), 24-55.
- Murray-Prior, R.B. 1994a, Farmers as scientists: A personal construct theory interpretation of hierarchical decision models. Paper presented to the Annual Conference of the Australian Agricultural Economics Society, Victoria University, Wellington, February.
- Murray-Prior, R.B. 1994 b, Modelling decisions of woolproducers: hierarchical decision models and personal construct theory, PhD thesis, University of New England, Armidale, NSW.
- Murray-Prior, R.B. and Wright, V. 1994, Farmer decisions and aggregate supply: an explanation of the impact of major price changes, Paper presented to the Annual Conference of the Australian Agricultural Economics Society, Victoria University, Wellington, February.

- Ritov, I. and Baron, J. 1992. 'Status-quo and omission biases', *Journal of Risk and Uncertainty*, 5(1), 49-61
- Winkler, R. L. 1991. 'Ambiguity, probability, preference, and decision analysis', *Journal of Risk and Uncertainty*, 4(3), 285-97
- Wright, V. 1993. Finding the plot: the strategic management of Australian farms. Paper presented to Australian Agricultural Economics Society Conference, Sydney. February

Figure 1 Decision to delay sale of wool

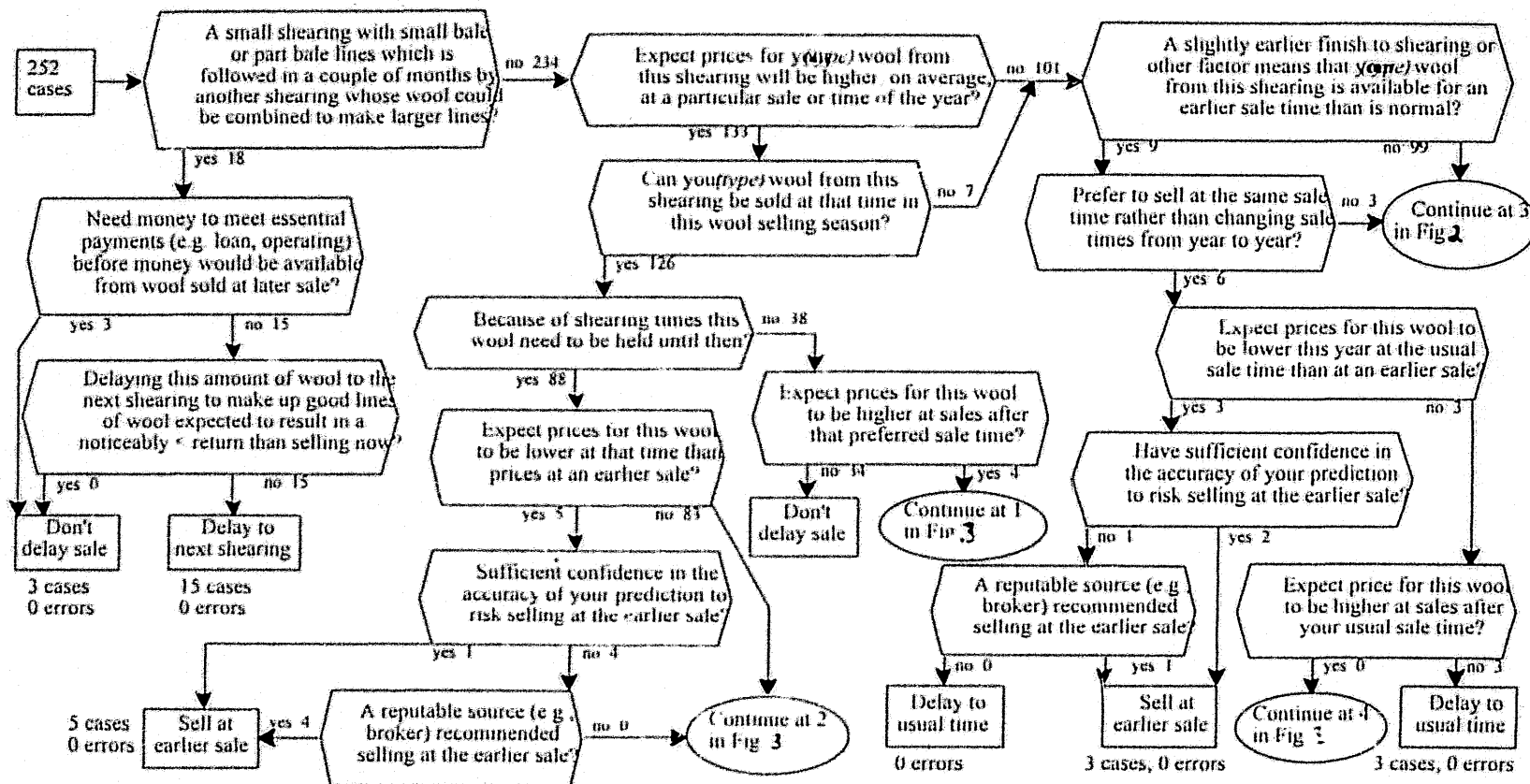


Figure 2 Decision to delay sale of wool (continued)

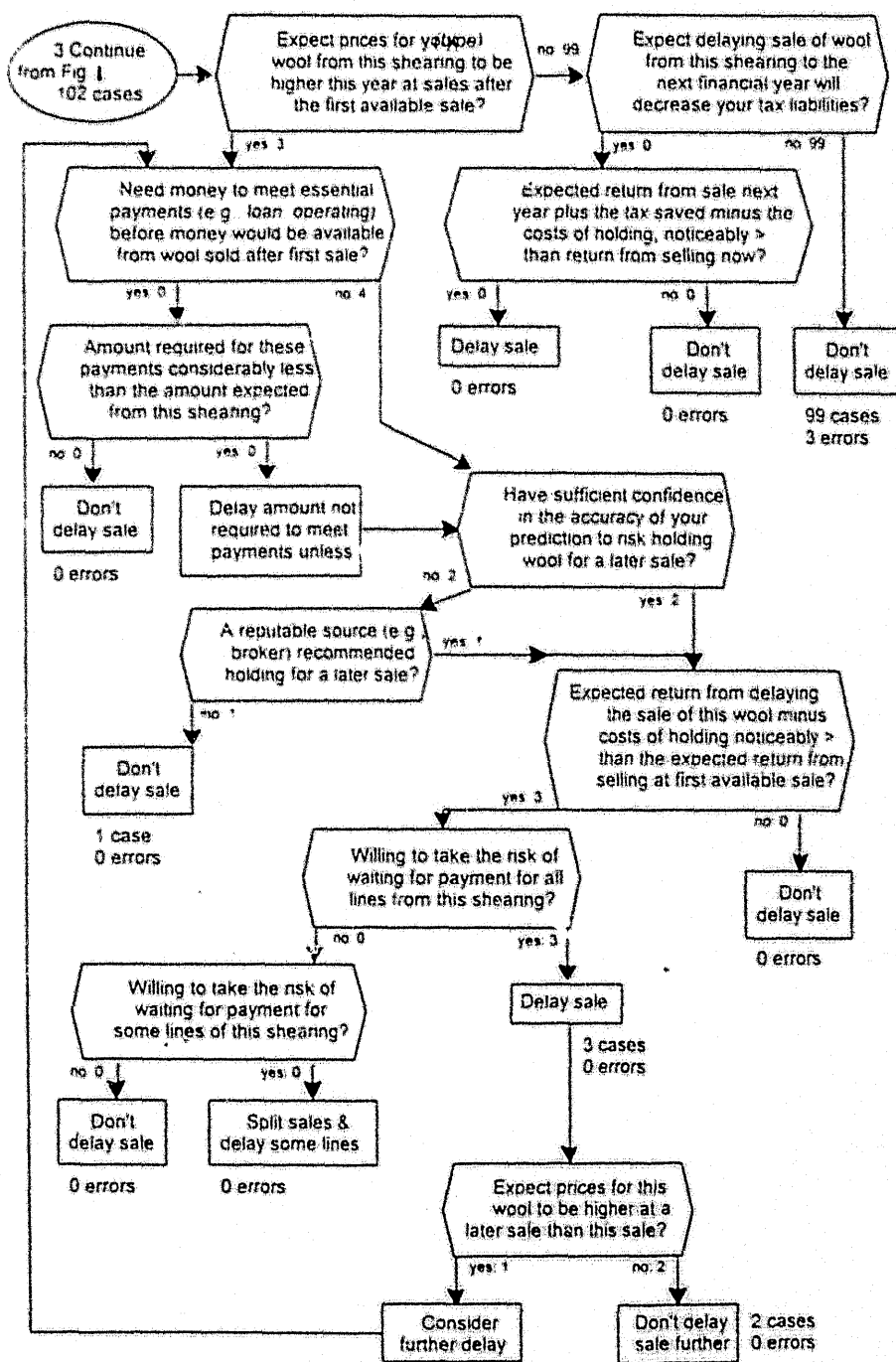


Figure 3 Decision to delay sale of wool (continued)

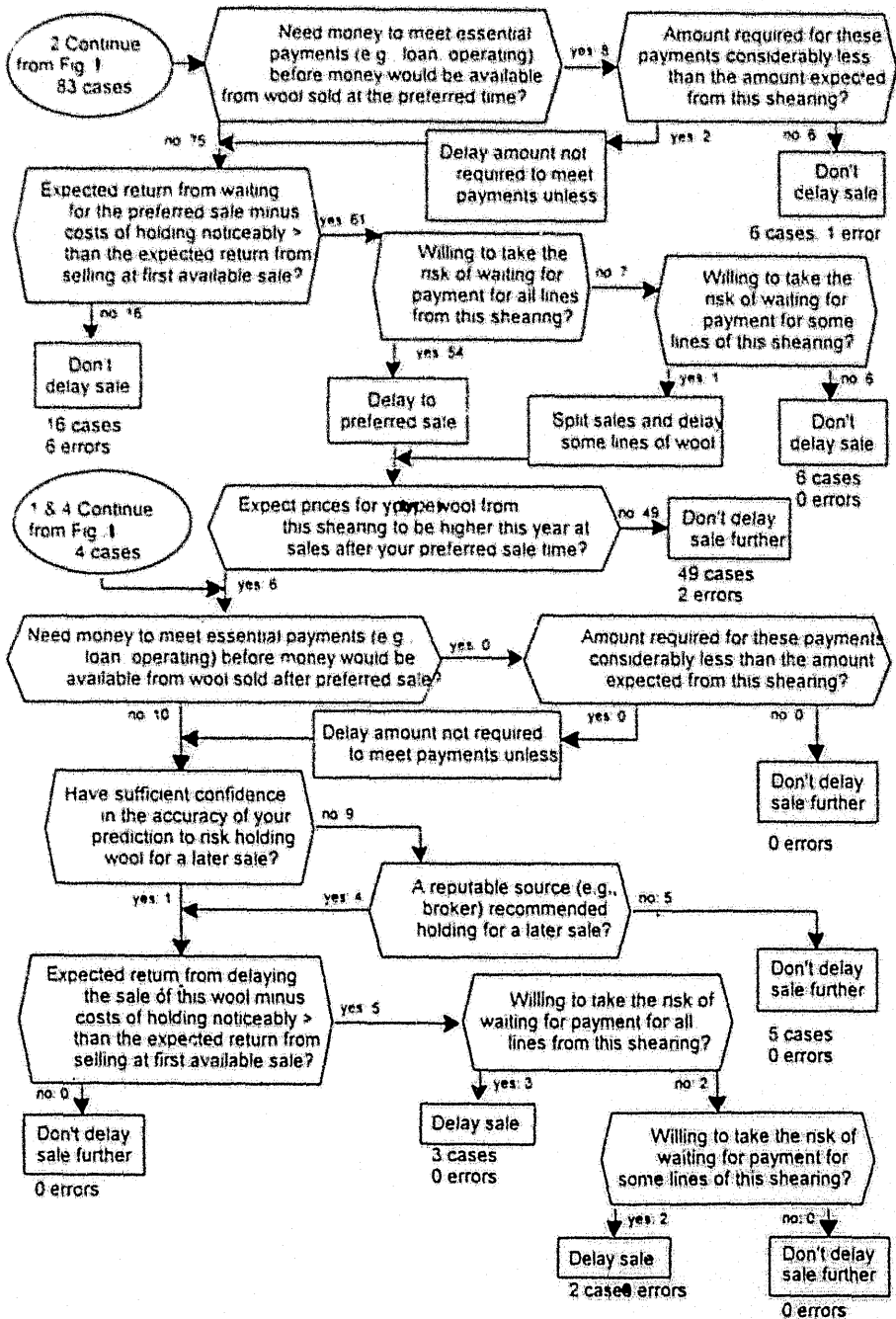


Figure 4 Decision whether to sell main lines by auction or private

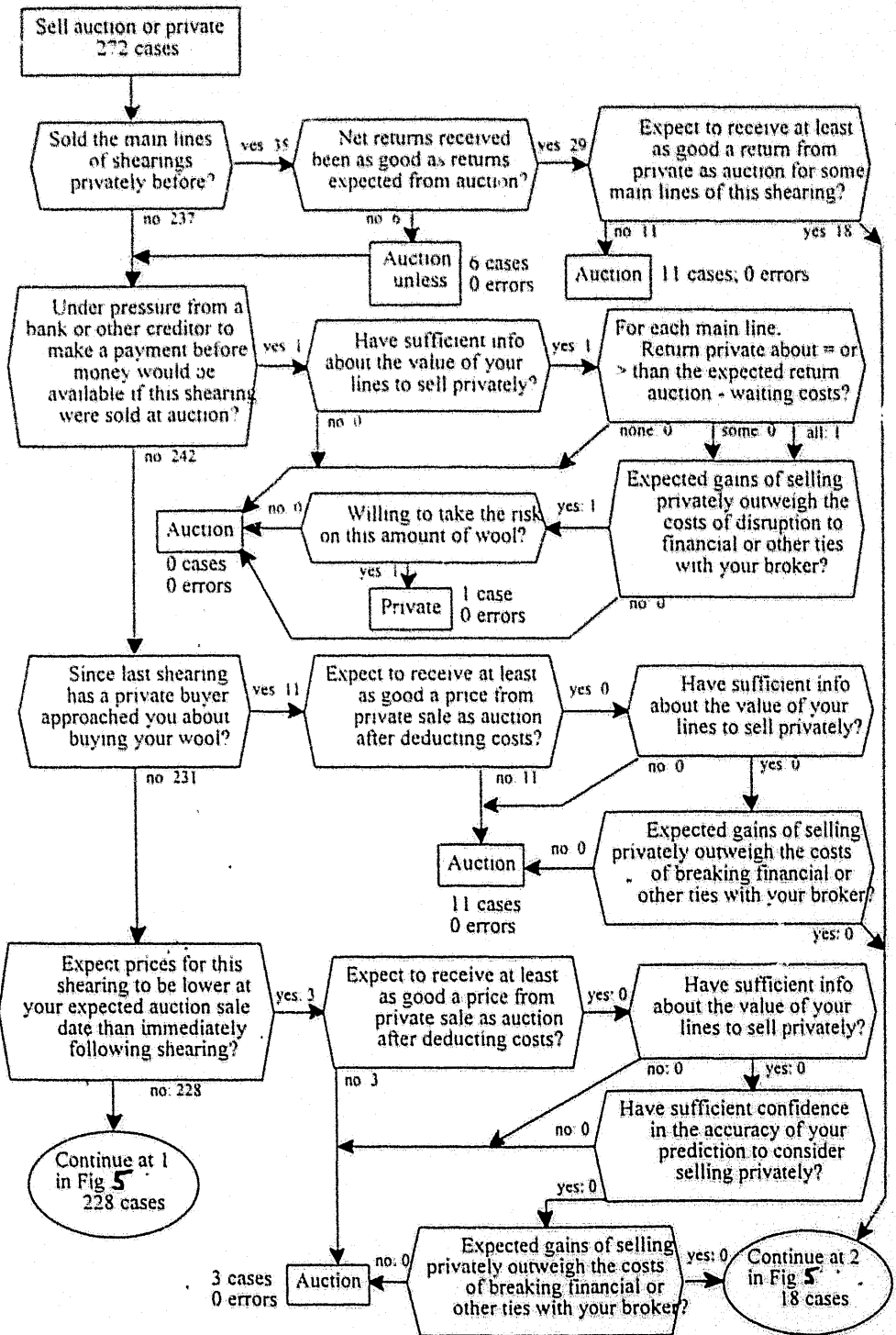


Figure 5 Decision whether to sell main lines by auction or private (continued)

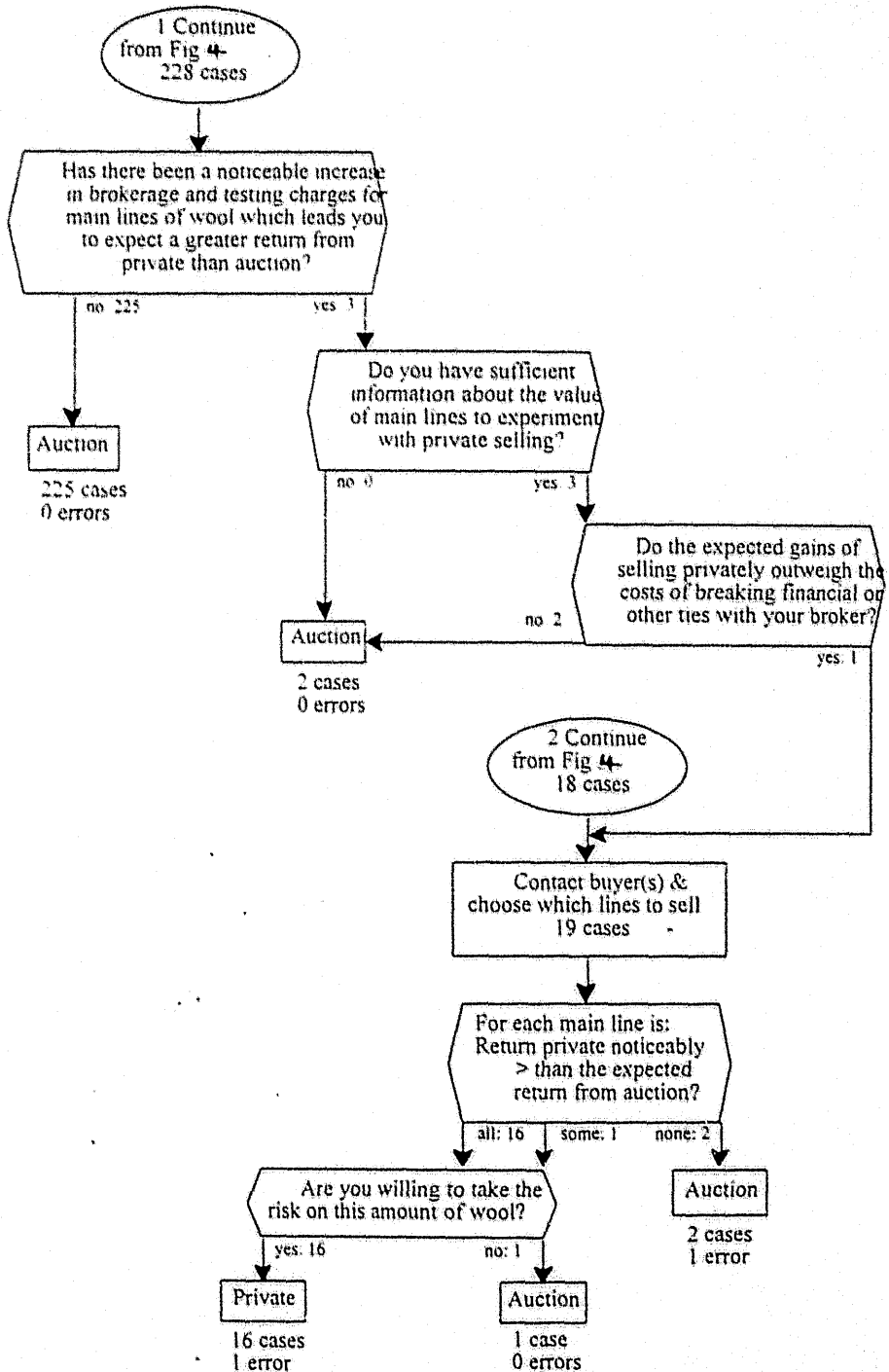


Figure 6 Reasons for decisions to begin merino breeding (a)

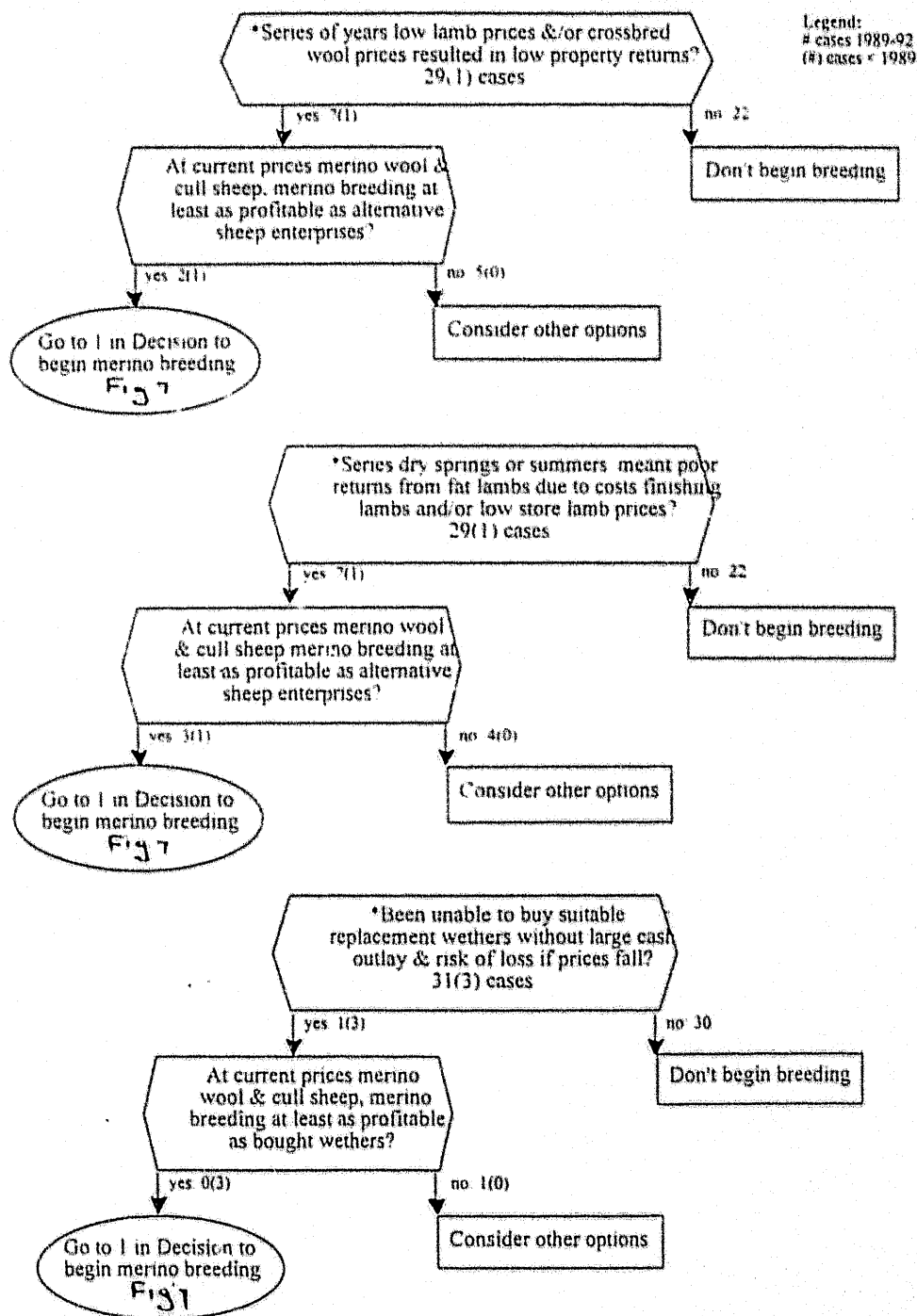


Figure 7 Decision to begin merino breeding

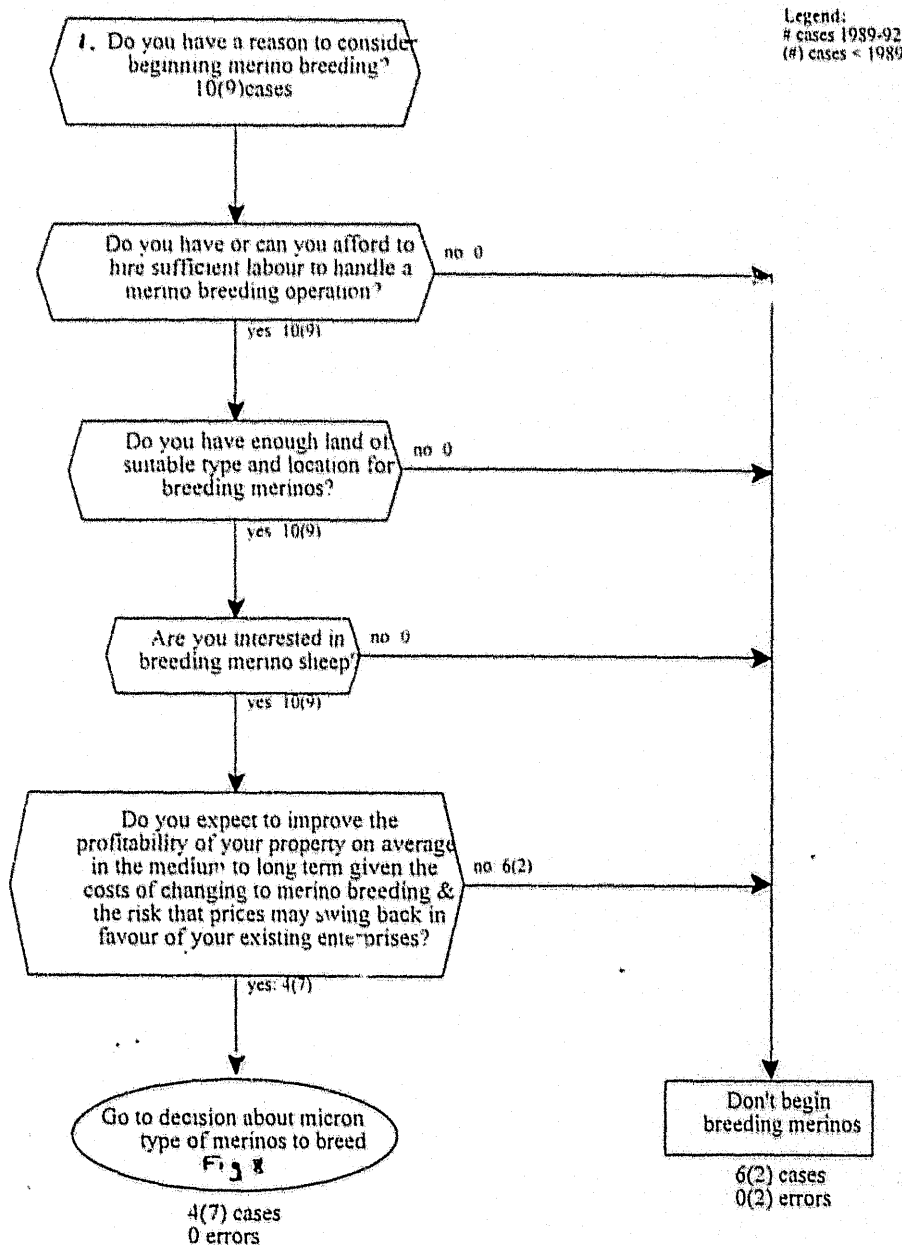


Figure 8 Decision about micron type of merino to breed

