Castration, tail docking and dehorning — What are the constraints?

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ABSTRACT

The present public and scientific interest in the welfare of farm livestock has caused traditional management procedures, including castration, tail docking and dehorning, to be scrutinised as causes of stress (stressors). This laudable scientific endeavour is however subject to a range of constraints. Major constraints are the subjective nature of distress, and the consequent difficulty of identifying indices which can be used confidently to quantify it. Nevertheless, behavioural and physiological indices have been identified by comparison with human responses to aversive stimuli, and allow distress to be assessed in animals. Changes in plasma cortisol concentrations, reflecting the activity of the hypothalamic-pituitary-adrenal system, are commonly used as an index of distress in farm livestock exposed to stressors. Judged thus, the distress caused by castration or tail docking of sheep and cattle apparently depends on several factors including the procedure itself, the age of the animal, the method used, the species and possibly the prior method of rearing. Little is known about the distress caused by dehorning of cattle.

Several factors can confound the assessment of distress. They are: (1) balancing the objectivity of the measured indices with subjective judgements about what are acceptable and unacceptable levels of distress; (2) ensuring that the parameters used do indeed reflect distress, and not other phenomena; (3) avoiding erroneous predictions, based on anthropocentric projections and not scientific observations, about expected distress levels in situations which have not yet been examined; and (4) meeting the high cost of rigorous studies in this complex area in which a wide range of factors may affect the outcome.

Reducing the distress caused by castration, tail docking or dehorning may be achieved by choosing an age when the distress response is least, choosing the least distressing method, or using anaesthesia (local, general) or systemic analgesia. When a method is identified which causes the least distress, its widespread use on farms should not be recommended unless it is also practicable. To do so will not benefit either the livestock concerned or the industry. Political and trade pressures related to overseas perceptions of New Zealand animal welfare standards require responses based on rigorous scientific assessments. Those responses are likely to involve, as appropriate, vigorous defenses of current practices or the adoption of new approaches.

Keywords: behaviour, castration, dehorning, docking distress, methods, practicalties, recommendations, research contraints, physiology.

INTRODUCTION

We inherit traditional ways of doing things. In our turn we consolidate or challenge those practices. Challenges to traditional approaches evoke apprehension in some people, because the reasons for continuing to use such methods often have not been re-examined since they were introduced. That is especially so when a method devised in the past has successfully eradicated or reduced the incidence of a problem. Habit of thought or habit of use can also be barriers to fresh thinking about established techniques. However resistance to change arises it is especially strong when the need for change is highlighted by 'outsiders' who lack direct experience of the practices they challenge. These ingredients all contribute to the unease within the livestock industry which attends current re-evaluations, on animal welfare grounds, of husbandry practices such as castration, tail docking and dehorning.

Routine animal husbandry procedures were developed to aid the management and marketing of animals and their products. Early in the history of domestication castration was used to help control aggressive male behaviour and unwanted breeding (Clutton-Brock, 1987). Castration was also used to avoid male taint in meat, especially from boars and billy goats (Thornton and Gracey, 1974), and, independently, to improve the taste quality of meat. Present consumer preferences for leaner meat may lead to less castration when such male features would not be troublesome.

Castration of cattle continues to be common practice in the English speaking world, but the development in New Zealand of management techniques for bull beef production from pasture shows that alternatives to castration can be successful (McRea and Morris, 1984). Castration of sheep remains the norm. A major reason for continuing to castrate lambs in New Zealand, even when unwanted breeding would not be a problem, is to avoid the handling and hygiene difficulties associated with a long scrotum during processing in meat works (Dobbie *et al.*, 1985). However, the short-scrotum technique (placing a ring distal to the testes), used in sheep in New Zealand, overcomes these problems and in addition confers the benefits of continuing testosterone secretion (ie faster growth rates, leaner carcass) without unwanted breeding (Probert and Davies, 1986).

Tail docking of lambs, developed originally to reduce the level of dag accumulation, wool soiling and fly-strike, is still

employed extensively in tropical and temperate climates, where it is considered to be an essential procedure, but is used less in colder countries where fly-strike is a less serious problem. The docking of dairy heifers' tails is a controversial practice even among dairy farmers and is mostly restricted to Australia and New Zealand. Its advocates suggest that docked cows are easier to milk, that the teats and udder are cleaner (Wilson, 1972), and that there are fewer flies of all types around the cows. Its opponents claim that tail docking is not an essential aid to milking practice and the maintenance of adequate hygiene, and that it compromises welfare, especially during the summer, by the removal of the animal's natural fly swat (Carsons, 1992). Docked cows are apparently harassed by more biting flies than are their undocked twins (Wilson, 1972; Ladewig and Matthews, 1992).

Dehorning of cattle was developed to reduce the hazards to stockhandlers, to decrease fighting by horned animals and to minimise bruising and injury to other cattle, especially during transport before slaughter. It is widely agreed that this procedure is essential (Fox, 1984; Armstrong, 1985).

The actual methods currently used to castrate, tail-dock and dehorn animals were developed with both practical and humane considerations in mind. Ease of execution and speed were emphasised to minimise training needs, the hazards to stockhandlers, and time-consuming and costly intrusions into busy farming schedules. Speedy completion also reduced the duration of handling and restraint involved - both are potentially distressing to animals - and ensured that the animals could be returned to their dams or to pasture in the shortest possible time. The methods developed were also designed to minimise problems such as haemorrhage, sepsis and swelling. Although animals regularly exhibited signs of pain during the act of damaging or removing the tissue in question, this was usually considered to be short-lived. More recently, however, attention has been given to evaluating and minimising the pain and distress which are now thought to persist for at least several hours after such tissue damage or removal (Fell *et al.*, 1986; Cohen *et al.*, 1990; Mellor and Murray, 1989a; Mellor *et al.*, 1991; Lester *et al.*, 1991a, b).

A point often not appreciated by others is that farmers, stockhandlers and veterinarians do not like carrying out castration, tail docking, dehorning and other similar husbandry tissue removals. Such procedures are not undertaken lightly and are only used because they are considered to be an essential part of managing an efficient and humane livestock enterprise. These procedures will continue to be used while they reduce handling or health problems on farms or increase the saleability of livestock.

In recent years urban dwellers (especially in Western Europe) with little direct experience of farming, and professionals, veterinarians, animal scientists and farmers involved in the livestock industry have begun to re-evaluate routine husbandry practices. This is part of a burgeoning interest in farm animal welfare, the impetus for which has come in part from the media drawing public attention to real or supposed cases of animal welfare compromise. However, the main impetus in New Zealand and elsewhere has come from the activities of national and international humane societies, veterinary associations and other groups including animal welfare scientists and national bodies responsible for advising governments on farm animal welfare standards. The activities of these groups represent constructive responses to the rising public interest in animal welfare issues, and to the increasing commercial and political uses of animal welfare as a means of gaining or resticting access to national and international markets (Bayvel, 1992).

The result with regard to husbandry procedures like castration, tail docking and dehorning is that the emphasis is now shifting away from efficiency and safety towards evaluating and minimising the pain and distress caused by such procedures. While such procedures continue to be used, it is important to identify or devise methods which are practicable, effective, easy to execute, safe for the stock and the stockhandlers, and which cause the least distress to the animals. All currently used methods, some of which may fulfill these criteria, need to be investigated, and new methods devised if necessary. To be credible, any recommendations for retaining or modifying current practice must be based on objective information which has been collected and evaluated scientifically. That, however, may be less straightforward than might be apparent at first sight.

The present paper deals with the constraints facing animal welfare scientists wishing to investigate the welfare consequences of these routine husbandry practices. It is presented as a series of questions and attempts to answer them.

HOW STRESSFUL ARE THE DIFFERENT PROCEDURES?

Pain is most often associated with actual or potential tissue damage and the perception of pain stimulates attempts to avoid its source. Pain is a subjective experience which humans, as social animals who succour the sick and injured, can discuss through a highly developed language. However, lack of a common language between humans and other animals, and an apparent poorer ability of many domesticated species, as prey animals, to express pain because of the disadvantages of doing so, have both contributed to pain in other animals being overlooked or ignored until recently (Rollin, 1989). Interpretative problems persist. For instance, although similarities in the nervous development of humans and domestic animals suggest that they are all likely to sense and perceive pain in a similar manner, the level of distress or suffering caused by an insult may not be the same across the species. Thus, human empathy for injured animals and anthropocentric projections about the significance of pain may lead to erroneous conclusions about the noxiousness of particular painful experiences for other animals. Just as it does not promote animal welfare to conclude that suffering is absent when it is present, animals' interests are not safeguarded by concluding that suffering is present when it is absent. A further complication is the possible involvement of a phenomenon called 'stress-induced analgesia' (Basbaum and Fields, 1984; Terman *et al.*, 1984; Amit and Galina, 1986). It is not known whether the stresses of castration, tail docking or dehorning cause endogenous opioid release in sufficient quantities or in appropriate locations to reduce markedly the perception of pain, but endogenous opioid release does apparently effect a small reduction in castration

and tail docking distress in 1-week-old lambs (Wood *et al.*, 1991).

These observations lead to the question, Is there a common basis for comparison and evaluation of the noxiousness of particular experiences in different species? Use of physiological indices is considered to be worthwhile (Stephens, 1980; Duncan and Dawkins, 1983; Dantzer *et al.*, 1983). When experiences which are noxious for humans cause similar deviations in particular physiological variables both in humans and in other animals, it may be concluded by analogy that those experiences are noxious for the other animals too (Molony, 1992). A range of variables has been used for this purpose (Mellor, 1992). The most common are those which indicate changes in the activity of the hypothalamic-pituitary-adrenal axis (i.e. plasma concentrations of corticotropin releasing factor, adrenocorticotropic hormone, and especially corticosteroids), because the activity of that axis increases both in humans and in other animals in response to emotionally and physically noxious experiences (Kilgour and de Langen, 1970; Pearson and Mellor, 1975, 1976; Moberg *et al.*, 1980; Stephens, 1980; Domzal *et al.*, 1983; Kent and Ewbank, 1983, 1986a, b; Anand *et al.* 1987; Cohen *et al.*, 1990). Comparisons, based on this approach, of the noxiousness of particular experiences in different species have been informative (Mellor *et al.*, 1991), but they assume that a uniform relationship exists between the levels of distress experienced by animals of each species and the magnitudes of the related deviations in the variables measured. That assumption is difficult to test, but reference to other indices including behavioural expressions of distress may increase confidence in it. However, it would seem safe to assume that such a uniform relationship exists within a species, provided that allowance is made for possible effects of physiological state and maturational changes on the dynamics of the responding system (Mellor and Murray, 1989b). Under those circumstances, physiological variables may be used validly to compare responses of members of the same species to different treatments. Some examples, using changes in plasma cortisol concentrations as the index of distress, are given below.

Castration

Sheep. Rubber ring castration causes significant distress which lasts for about 1.5-2.0 hours in (British) lambs aged up to 1 week (Mellor *et al.*, 1991) and for about 3.0-3.5 hours in (New Zealand) lambs aged 4-5 weeks (Lester *et al.*, 1991b). Combining ring-castration with tailing causes additional distress in lambs aged up to 1 week (Mellor and Murray, 1989a; Mellor *et al.*, 1991) but little additional distress in 4-5 week-old lambs (Lester *et al.*, 1991b). As yet changes with age in the responses of lambs to castration and/or tailing using rings or any other methods have not been studied in the same breed.

Short-scrotum creation with a ring and ring-castration in 4-5 week-old lambs both cause a similar amount of distress for about 3.0-3.5 hours after ring placement (Lester *et al.*, 1991b). In contrast, lambs of the same age exhibit distress of much greater intensity for about 8 hours after surgical castration plus tail docking with a knife (Lester *et al.*, 1991a, b), and knife castration alone causes a similar amount of marked distress for at least the first 4 hours after the surgery (Lester *et al.*, 1991b). On this basis use of a knife cannot be recommended. This interpretation is opposite to that reached in a less rigorous study (Shutt *et al.*, 1988), the results of which were found after re-evaluation (Mellor and Holmes, 1988) to support the present conclusion (Lester *et al.*, 1991a, b). There are apparently no detailed published reports of evaluations of the distress caused by burdizzo and chemical castration in lambs.

Cattle. Several factors appear to influence the amount of distress cattle experience after castration. They are the method of castration, the age of the calve and the method of rearing them prior to castration. Surgical castration apparently causes more distress than does castration using rubber rings (Fell *et al.*, 1986), a burdizzo (King *et al.*, 1991) or chemical means (Cohen *et al.*, 1990), and the distress, when it occurs, lasts for about 4-6 hours (Fell *et al.*, 1986; Cohen *et al.*, 1990). Artificially fed calves castrated with rings within 1 week of birth apparently experience no distress within 4 hours of ring placement (Mellor *et al.*, 1991) whereas calves left with their mothers do (I.S. Robertson, unpublished data). Likewise, 11-week-old beef calves which were isolated from their mothers immediately before the procedure displayed no distress responses after surgical or burdizzo castration, whereas similarly treated 24-week-old calves did (King *et al.*, 1991). The reasons for the absent or lower distress responses in these cases remain to be clarified and may complicate evaluations of the relative levels of distress caused by different methods. If confirmed, these observations suggest that husbandry practices such as recent isolation might be used to reduce castration distress in calves. This should be assessed.

Tail docking

Sheep. Tail docking alone with a ring causes less distress than ring-castration alone or ring-castration plus tailing at 4 hours to 7 days of age (Mellor and Murray, 1989a, b; Mellor *et al.*, 1991) and at 4-5 weeks of age (Lester *et al.*, 1991b). Tail docking at 4-5 weeks causes similar levels of distress lasting about 3.0-3.5 hours whether it is done with a ring or a heated docking iron, but that distress may be considered to be quite mild because it is equivalent to that induced by the relatively benign procedures of repeated handling and blood sampling without tailing (Lester *et al.*, 1991b). In contrast, tail docking with a knife causes marked distress which lasts beyond 4 hours (Lester *et al.*, 1991b) and possibly for as long as 8 hours (Lester *et al.*, 1991a). On this basis use of rubber rings or a docking iron to tail dock lambs can be recommended whereas use of a knife cannot.

Cattle. Although it has been reported that tail docking of cows using rubber rings causes a small amount of distress (Wilson, 1972; G. Verkerk and L.R. Matthews, unpublished data) which lasts for at least 6 but not more than 24 hours after ring application (Wilson, 1972), published details do not allow a more precise evaluation of the immediate distress responses to this procedure. The tailing distress caused to calves by using a rubber ring or a heated docking iron is currently being researched at Massey University. Of equal concern to any acute distress, however, is the possible distress

which may affect the animal throughout the rest of its life because of the lack of a tail. Cows without tails spend more time fruitlessly flicking their tail stumps and adopting other fly-avoidance behaviours than do undocked animals (Ladewig and Matthews, 1992). It is not clear, as yet, whether or not the higher numbers of flies seen on docked cows (Ladewig and Matthews, 1992) cause them unacceptable levels of distress, but rates of herbage dry matter intake are not apparently affected by the presence of stable flies (Dougherty *et al.*, 1993).

Dehorning

Dehorning is performed widely in cattle. The immediate distress caused by dehorning is obvious to anyone who has carried out the procedure. Adult cattle being dehorned without local anaesthetic vocalise and struggle more strongly than do cattle being handled but not dehorned, which suggests that the procedure is painful. Similarly, calves aged less than 3 months can also respond quite strongly to the procedure. However, there is apparently no published information which would allow the amount of distress caused by different methods to be assessed. Two studies do show that dehorning by cautery of calves at 7-16 weeks of age causes some distress which lasts for about 2-3 hours (Laden *et al.*, 1985; Boandl *et al.*, 1989). The magnitude and duration of distress caused by dehorning using different methods are currently being investigated at Massey University.

Possible beneficial effect of stress

Evidence suggests that animals in captivity actively seek challenge (Wood-Gush, 1973), that animals maintained at low levels of arousal over-react when faced by stressful situations (Chamove, 1984), and that stress in early life enables animals to cope better with stress when they are older (Daly, 1973). Could it be that castration, tail docking or dehorning distress in early life might assist the animals to handle stressors in later life? This question merits investigation.

WHAT FACTORS CAN CONFOUND ASSESSMENTS OF DISTRESS?

This question may be framed in another way: How can we be confident that we are actually measuring distress? No matter what index of distress we choose, whether physiological or behavioural, there will be constraints on its usefulness. However, several safeguards are helpful.

1. All parameters which might be chosen to indicate the presence of distress must by definition also show variations or frequencies of occurrence which indicate the absence of distress. The variations or frequencies present in distress-free or minimal-distress states must therefore be determined. A common pitfall for the novice is to assume that *all* deviations from base-line values indicate distress, an assumption which neglects the existence of homeostatic responses which sustain well-being in the absence of distress. For instance, plasma corticosteroid concentrations show a cyclic diurnal pattern in unstressed sheep in response to feeding (Slater and Mellor, 1981), as does the frequency of rumination (Gordon and McAllister, 1970), but elevations in corticosteroid concentrations above this range (Pearson and Mellor, 1975, 1976) and unusual decreases in ruminating behaviour (K.J. Stafford; unpublished observations) are both useful indices of distress. Although a full range of responses between distress-free and severely distressed states can be distinguished using physiological and behavioural variables, it remains a matter of subjective judgement to decide not only where the boundary lies between distress-free and mildly distressed states, but also what constitute acceptable and unacceptable levels of distress.

2. It is also important to determine whether or not deviations of chosen indices from control values to levels indicating distress actually do reflect the expected type of distress or indeed reflect distress at all. For instance, evaluations of the pain-induced distress which accompanies recovery from anaesthesia after abdominal surgery (Pearson and Mellor, 1975) can be complicated by secondary effects of the anaesthesia (i.e. hypoxaemia and hypotension) contributing to elevations in plasma cortisol concentrations (Taylor, 1989). Moreover, the upper lip curling which is often seen during labour contractions in goats (D.J. Mellor: unpublished observation) probably indicates pain under those circumstances, whereas similar lip curling (Flehmen reaction) in rutting males when pursuing females in heat (Kilgour and Dalton, 1984) presumably does not.

3. Anthropocentric projections attributing greater or lesser significance to different distress-specific behaviours should be checked, where possible, against physiological indices. For instance, cursory observations of behaviour and underestimating the importance of immobility as an index of distress (Sanford *et al.*, 1986) can lead to erroneous conclusions regarding the relative levels of distress caused in lambs by castration and/or tail docking using rubber rings or a knife. These two methods cause markedly different behavioural responses. Ring application causes about 45 minutes of marked restlessness followed by a similar period of recumbency, whereas cut lambs mostly stand still with splayed legs for at least 4 hours, and when they move, do so tentatively (unpublished data from the study of Lester *et al.*, 1991b). As the restlessness of ringed lambs is more obvious than the restricted movements of cut lambs, casual observers on farms often conclude that rings cause more distress than the knife, and further that cut lambs are almost free of distress. However, reference to plasma cortisol responses shows that the knife causes far more acute distress than rings (Lester *et al.*, 1991a, b).

4. Another pitfall is to make recommendations based on unchecked or poorly checked assumptions. This should be especially discouraged in the animal welfare arena because of the potential harm ill-considered guidelines can cause, and because of the speed with which apparently authoritative recommendations will be adopted at this time of heightened animal welfare consciousness. Unexpected outcomes often arise when investigating distress. Two examples will illustrate this point. Firstly, it might be thought on the face of it that the distress caused by tail docking with a knife would be less than that caused by a docking iron, because the former involves cutting only, while the latter involves both cutting

and burning. In fact a detailed study revealed that the opposite was the case, with the docking iron causing far less acute distress than the knife (Lester *et al.*, 1991b), possibly because the cauterising action of the docking iron destroys pain nerve endings (nociceptors) where the tail is transected (Groer and Shekleton, 1983; Johnston, 1985). Had recommendations been based on this unchecked assumption, use of the docking iron would have been wrongly discouraged. Secondly, the virtual absence of behavioural and physiological distress responses to ring-castration in hand-reared calves aged up to 1 week was most unexpected in view of prior experience of the obvious distress responses caused by the same procedure in similarly aged lambs and kids (Mellor *et al.*, 1991). Codes of practice in the United Kingdom which limit ring-castration of ruminants to the first week after birth, a limitation imposed several decades ago without reference to objective studies, would appear at least in the case of hand-reared calves to have been unnecessarily restictive.

5. Rigorous studies of the distress caused by husbandry practices are constrained by the complexity of the subject. Consequently they are time-consuming and expensive to perform. To be worthwhile they must allow for possible effects of the species, breed, sex and age of the animals, the different methods used, and even factors such as the rearing methods of young animals. They must also involve the use of appropriate indices of distress, whether those indices are behavioural or physiological or both. In addition, they must allow sufficient time for responses to become manifest and to recede. Because knowledge of distress monitoring is still a developing part of animal welfare science, it would be preferable at present to use combinations of as many different variables as possible (Stamp-Dawkins, 1980), rather than be too restrictive.

HOW CAN THE DISTRESS BE MINIMISED?

To this point we have described some features of the short-term, or acute, distress (as assessed by cortisol concentrations) caused by castration, tail docking and dehorning. That distress, when it occurs, arises from one or more of the following factors: apprehension due to unfamiliar handling and restraint, pain which accompanies and follows tissue damage or removal, and emotional responses to that pain. Reducing that distress may be achieved in several ways.

Firstly, *choose an age when distress responses are least.* As indicated above some of these husbandry practices may cause less distress in younger than in older animals, an observation which requires further study.

Secondly, *choose a method for each procedure which causes the least distress.* We have seen that the amounts of acute distress lambs experience after castration and/or tailing are affected by the methods used, and that is apparently also true for castration in cattle (King *et al.*, 1991).

Thirdly, *use anaesthesia, either local or general, to block nociceptor input or the conscious perception of it.* Such an approach is at present not common on farms, because it is considered to be unnecessary or to be too complicated, time-consuming and costly. Nevertheless, in lambs aged 4-5 days, extensive infiltration of local anaesthetic into the scrotum, testes and tail abolishes distress responses to ring castration plus tailing (Wood *et al.*, 1991). At present it is not known whether or not in 4-5 week-old lambs a similar use of local anaesthetic would be effective thoughout their more protracted (3.0-3.5 hours) distress response to the same procedure (Lester *et al.*, 1991a, b). Similarly, it is not known whether the period of significant nociceptor input following dehorning in cattle is less than or exceeds the duration of effective action of local anaesthetics when they are used.

The relative benefits of using short-acting or long-acting local anaesthetics merit investigation, as do more practicable strategies for administering them on farms. An objective of such strategies, which should not be complicated, time-consuming or costly, may be to reduce to low levels but not necessarily to eradicate the distress. As the administration of local anaesthetic may itself distress the animals (Boandl *et al.*, 1989), its use may not always be appropriate when tissue damage or removal causes low-grade pain. That would need to be assessed. Different aspects of the use of local anaesthetic during such husbandry practices are currently being researched at Massey University.

The use on farms of general anaesthesia in ruminants, especially large ruminants, is hazardous to the animals and is therefore rare, although deep sedation is regularly and easily carried out. However, it is not known to what extent these procedures reduce distress or indeed cause it. Sedatives, by their effects on consciousness, may be beneficial in both reducing handling distress as well as blunting pain-induced distress.

Fourthly, *use systemic analgesics ('pain killers') to reduce pain-induced distress.* The use of analgesics in farm livestock, and indeed in most animals, is only a relatively recent innovation in veterinary medicine, and the efficacy of such agents is presently under world-wide investigation.

WHAT PRACTICAL FACTORS CONSTRAIN THE CHOICE OF 'BEST' METHODS?

After an extensive series of investigations based on behavioural and physiological measurements, has demonstrated that particular methods of castration, tail docking or dehorning cause the least distress, what other factors need to be considered before these methods can be recommended?

They include the following practical questions. Is the method fast, efficient and safe for the operator? Can it be carried out under usual farm conditions in inclement weather and with limited staff? Are any special facilities needed? Does it require one, two or more people? Does it require special training or the employment of trained personnel? How many animals can be treated each day? How compatible is it with essential management routines? How expensive is it? Is it effective? (Burdizzo use, for instance, can apparently leave 15 % of lambs incorrectly castrated). Does it affect the severity of bleeding or swelling, the rate of wound healing, or the danger of sepsis or tetanus? Do the benefits of any recommended changes to current methods outweigh the possible harm? (Use of local anaesthetic, for example, should reduce the pain of a procedure, but injecting it into the epidural space, scrotum, testes or tail of large numbers of

lambs in dirty yards would lead to spinal abscesses, sepsis or overdosing in some cases.)

All of these points highlight the importance of ensuring that recommendations arising from scientific studies of the welfare implications of husbandry practices reflect the practical reality of farm conditions. *It will not serve the interests of the livestock industry, or the animals on which it depends, for animal welfare scientists to promulgate approaches which lack practicality and therefore acceptability to farmers.*

Finally, it is important to recognise that procedures compatible with farming practice and acceptable to the public in New Zealand, may be regarded as unacceptable in our chief overseas markets. For instance, there are increasing moves in the European Community to impose European animal welfare standards, and therefore perceptions, on so called 'third countries' as prerequisites to importing animals or animal products from those countries (Baddeley, 1992; Bayvel, 1992). Such developments highlight two points. (1) The New Zealand industry must continue to maintain high welfare standards, and where necessary improve them. (2) Rigorous scientific assessments of our husbandry practices, some of which are unfamiliar to legislators overseas, are essential to enable credible defenses of procedures which do not compromise welfare, and to aid the development of alternatives to the practices which do.

It is therefore in the interests of the livestock industry to support the conduct of animal welfare science in New Zealand.

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