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The ethically improved sheep concept

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ABSTRACT

The need to improve animal welfare and reduce chemical residues to maintain the competitive position of our sheep products is unquestionable. However sheep producers perceive that the required actions are in conflict with production, so there have been few recent changes which allay consumer concerns. This paper discusses possibilities for producing more attractive products without substantial reductions in production or increases in costs. It identifies gene pools that should be exploited to develop a polled sheep with a short tail, that is devoid of wool on the head, legs, belly and breech. It reviews evidence that shows such animals require less handling and chemical treatment, and produce more lambs. It is proposed that these traits be accumulated into "Ethically Improved Sheep". The concept of ethically improved sheep is not presented as a prescribed combination of breeds. There are a number of breed sources of each trait, and other traits should be introduced as they become available or important in the future. This would permanently reduce the need for husbandry practices that emulate the same effects, thus reducing input costs, pre-empting any bans and forestalling any trade barriers based on current husbandry practices.

Keywords: tail docking; mulesing; face cover; flystrike; dags.

INTRODUCTION

Imagine New Zealand without sheep farming. Surely an extreme scenario! Examine the facts then. Since the 1970's, the real returns from sheep farming have been squeezed by falling relative prices and growing costs (Figure 1). All the innovations that research providers and marketers have come up with have not stopped the squeeze, but merely slowed it down slightly. In the light of this situation, we must find a way to respond. The best of both worlds would be to address market concerns while reducing costs. In this paper we discuss what might be achieved in these regards by a genetic reduction in tail length and a reduction in wool cover around strategic parts of the sheep's body.

A significant part of this paper revolves around ways of reducing the incidence of flystrike. Currently a range of

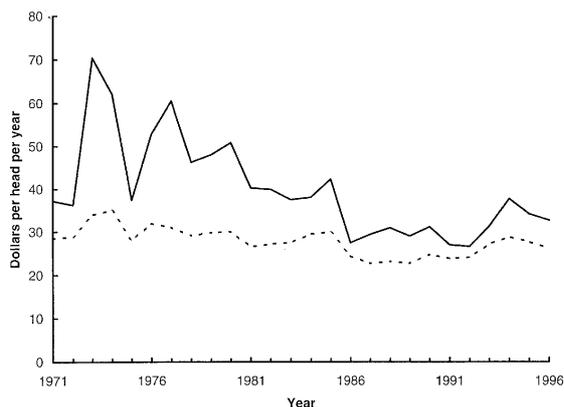
practices are employed for this purpose, but they impinge on animal welfare and chemical residues in sheep products. Tail-docking is used almost universally in New Zealand, but is unpalatable to animal rights activists. Even crutching and shearing have been perceived as cruel in some sectors. To the authors, tail-docking, mulesing, crutching, dagging, jetting and dipping to prevent flystrike seem a bit like lowering the water rather than raising the bridge. If the wool was not there to be crutched in the first place, the dags and stains would not accumulate and the flies would not be a problem! It may surprise some readers to find that there are countries who do not tail dock lambs and most of the adult sheep are found with long tails. So what is their secret? A lack of flies could be the reason, but perhaps no wool is the real reason!

The following sections deal with individual components of the overall problem, and conclude in a recipe of traits that can be obtained from exotic and traditional breeds to create ethically and economically better sheep for New Zealand conditions.

Tail length

Many animals are blessed with short tails. The domestic goat (*Capra hircus*) for example never needs docking. There are five sub-species groupings of *Ovis aries*, that can be classified based on tail form and length (Ryder 1983). The so-called "primitive" breeds such as the feral Soay, have a very practical short tail. The group of fat-rumped breeds also have a short tail, and as the name suggests, so do the short-tailed breeds. The fat-tailed breeds are also self explanatory, having a large pendulous and obese tail. However, the sheep industry of the Western world is based mainly on the thin-tailed breeds, including the Merino and Romney which constitute more than 90%

FIGURE 1: The expenditure (dashed line) and income (solid line), on a per head of sheep per year basis, expressed in terms of 1995-1996 dollars. (The date is the year in which the financial year ended).



of the sheep in Australia and New Zealand. There have been several attempts at breeding short-tailed sheep from mutants within breeds in Australia and New Zealand (Carter, 1976; James *et al.* 1991), the difficulties being complex inheritance patterns (James *et al.* 1991) and lethal genes with an effect akin to spina bifida (Carter 1976). Success was achieved in America, with the "No-tailed" sheep breed, but lack of enthusiasm saw their demise in the 1950's (Jordan 1952).

The perfect opportunity has now arisen in New Zealand, because both the Finnish Landrace and the Gotland Pelt have short tails, having come from the North European short-tailed group. The genetically short tail has a complicated inheritance, because it is associated with more than one gene, however the first-cross progeny have half-length tails (Branford-Oltenacu and Boylan, 1974). From these breeds, genes for short tails could be incorporated into the New Zealand flock. True, there would be some loss in fleeceweight in Finn crosses, but there is evidence for a reduction in fibre diameter which is the primary determinant of price per kilogram (Dobbie *et al.* 1991; Newman and Paterson 1991). Given the rapid responses that have been achieved when selecting for fleeceweight (Johnson *et al.* 1995), loose wool bulk (Sumner *et al.*, 1995) and staple tenacity (Bray *et al.*, 1995), recovery of wool quantity and quality could be rapid, whilst the change in tail length would be permanent.

Bare breech

Any, or all of the following occasions may involve a dagging episode or a full crutching operation. Commencing with a pre-tupping crutch, there may be wool removal around the breech and/or belly at pregnancy scanning, pre-shearing, pre-lambing, during a fly-wave or prior to a seasonal fly-risk period. Crutching and dagging are undeniably two very good ways of preventing flystrike and improving wool quality, but let us look at the root of the problem. It is not the fly! Flystrike can be controlled by removing the wool. Cattle, goats and deer are grazed in the same environments as sheep, but they produce dags much less frequently and are rarely flystruck. Quite obviously the wool around the breech area is the problem. Heath and Bishop (1995) found that 80 % of flystrike in New Zealand lambs occurred around the breech. Although this percentage may change with the introduction of the Australian green blowfly (*Lucilia cuprina*), "body-strike" will only occur when temperature and moisture conditions are suitable for the fly larvae. Temperature and moisture conditions are most often suitable for fly larvae survival around the breech.

There is ample scientific evidence to show that reduced wool around the tail will reduce dags and also flystrike. Fisher (unpublished) has reviewed the ethical issues surrounding the 'mules' operation, and he points out that many try to justify the cruelty, by the reduction in the incidence of flystrike. Surely this decrease is due to the reduced wool around the breech, since more protection is achieved with a larger bare area (Dun 1954). In the absence of insecticide protection, an Australian study showed that 35% of conventionally mulesed and crutched

Merino ewes were affected by flystrike (Rathie *et al.*, 1994). Only 5% of Wiltshire Horn x Merino ewes run under the same conditions were affected, even though they were unmulesed and uncrutched. Even with the bias in preventative measures, the Wiltshire cross ewes were seven times less susceptible to flystrike. In a comparable study in New Zealand, Litherland *et al.* (1992) found that one third of Merino lambs were flystruck, compared with one tenth of Romney and New Zealand Wiltshire lambs run under the same conditions. Lambs from a feral strain suffered no flystrike at all during the same experiment, and Wiltshire and feral lambs carried 7.5 times less dags than Merino lambs, and an incredible 30 times less than Romneys. In yet another example of the superiority of traditional New Zealand breeds for producing dags, Allison (1995) found that Border Leicester x Romney lambs produced twice as many dags as East Friesian x Romney lambs. Scientific evidence is necessary of course, but an ounce of common sense could give these same answers, bare tails form less dags and less flystrike occurs.

Dags can be sold, but compared to the cost of harvesting, there is rarely a profit to anyone but the dag crusher. Daggy or stained wool, even when cleaned, carries into the product and causes appearance and performance problems. Not producing dags in the first place could potentially have the following flow-on effects. Reduced drenching, increased natural immunity to internal parasites and less selection for drench resistant parasites are potential consequences for farmers that tend to use the presence of dags as an indicator of the need to drench. Reduced dagging and crutching, would reduce the amount of poor quality wool on the market to blend with good quality fleece wool. This may result in subsequent improvements in product performance and satisfaction for the consumer, and therefore repeat purchases. Reduced crutching, dagging, dipping, jetting and drenching would decrease input costs, and although shearing equipment would be used less often and dag crushing plants would become obsolete, there would be a generalised saving and quality improvement throughout the industry. Reduced chemical residues, as a consequence of the reduced need for dipping and jetting would also be well received in the current market place.

Bare points and open faces

Grass seeds lodged in the orbit and the eye, and impaired vision or 'wool-blindness' occur because of excessive growth of wool on the head. Removing the "topknot", "wiggling" or "eye-clipping" are obvious measures used to fix the problem, but they do not deal with the root cause. Indeed, sheep with a wool-blindness problem will generally require repeat treatments each year, although there is a general increase in the bare area around the head with age (Jefferies, 1966). Wool on the lower legs is well placed for catching and holding grass seeds and mud. If these 'socks' are removed at shearing, they can potentially contaminate the fleece, because the current shearing technique is pre-disposed to the wool from the front legs falling into the open fleece. The cheek, topknot and shank wool contain excessive soiling, vegeta-

ble matter, kemps and short fibres, all of which lower fleece quality and reduce processing performance. These parts of the fleece must be extracted and sold separately, and usually fetch a lower price. Less obvious advantages would be a reduction in the numbers of cut ears and eyes, improved rates of shearing and better shearer safety due to clear visibility of eartags.

Much research has been dedicated to sheep with bare points. The fact that sheep with open-faces produce more lambs both within and between breeds has been observed on numerous occasions (Cockrem, 1958; Jefferies, 1962; 1966), and open-faced lambs also achieve faster growth rates (Cockrem 1968). Cockrem and Rae (1966) cited ten papers written by nine independent authors between 1949 and 1957, all of which carry this same message. Three of the studies were conducted on New Zealand Romneys and two on New Zealand Corriedales, but 30 years later, these breeds are by no means bald!

Contrary to general opinion, Cockrem and Rae (1966) observed higher fleeceweights from Romneys with open faces. The impact of the higher lambing percentages, on fleeceweight of open-faced sheep should be taken into account (Cockrem and Rae 1966). Blair *et al.* (1984) observed a small decrease in greasy fleeceweight, and an even smaller decline in clean fleeceweight of Romneys selected for open faces relative to a control group. Although there has been the popular belief that increasing wool cover would be associated with heavier fleeceweights, there is little evidence to support this. Selection for increased fleeceweight gave no correlated response in face cover in Merinos (Barlow, 1974), in fact selection against fleeceweight was associated with a slight decrease in the bare area of the face. Romney fleeceweight selection lines are not covered from nose to toe with wool, nor are industry animals that have been selected for fleeceweight. Why the wool on the head remains there is beyond the authors, perhaps the sheep fanciers in the industry would rather a nice face on their sheep than on their bank manager.

Bare belly

Belly wool is of lower quality than fleecewool, it is more difficult to harvest and removal can lead to cut teats and udders, and subsequent reductions in lamb survival and performance. Pre-lamb crutching often involves removal of wool from half or all of the belly and pregnancy scanning would be greatly facilitated if clipping the belly wool were unnecessary. Selection for wool-free bellies could be possible within breeds. When crossed with the Wiltshire, the amount of greasy belly wool harvested, reduced from 300 g of the pure Merino to immeasurable quantities in the first cross (Tierney, 1978). At 1996 prices, 300 g of clean belly wool was worth about \$1. Greasy it might be worth 60 to 70 cents, so even though wool on the belly has not been shown to be detrimental to production as it is on the head and tail, is it really worth having and harvesting?

Restraint time

The time taken to shear each sheep has also been investigated. Reduced restraint equates to reduced stress for the animal and lower cost of shearing. In Australia, Tierney (1980) found that where shearing a Merino required 4.5 minutes on average, Wiltshire Horn x Merino first cross sheep could be shorn in less than half that time (2 minutes 3 seconds). However, the reduction in fleeceweight, increased diameter and reduced yield would decrease financial returns (in 1980), despite faster liveweight gain, reduced flystrike, better lactation and improved reproductive performance. In Australian Merino sheep, McGuirk *et al.* (1981) found that the time required to shear each animal increased with greasy fleeceweight, the number of wrinkles, increased face cover and liveweight. However, they found no economic reason to consider the time required to shear a sheep as a breeding objective (in 1981). As recently as 1994, Rathie *et al.* (1994) making a further report on the Wiltshire Horn x Merino, suggested that the fibre diameter was too high and they carried too little wool to compete with Merinos. In New Zealand in 1997, considering both economic and ethical issues, the Wiltshire may have too much to offer to not consider it in production systems that are biased towards lambs for slaughter!

The ethically improved solution

Currently, no single breed can provide us with all the desirable characteristics sheep farming needs to survive. The recipe described below is one suggestion to help reduce costs, reduce chemicals and improve animal welfare. At the same time, the suggested changes will improve New Zealand's image and give it the competitive edge over other sheep producing countries. A polled sheep, genetically-mulesed, with a short tail, bare head, legs and belly is required. Traditional selective breeding may produce strains with some of these traits, but given that it took about 15 years to breed an open-faced Romney (Blair *et al.*, 1984), this solution may arrive too late to save the industry. Cross-breeding will be the fastest way of producing the necessary changes.

The Finnish Landrace and/or the Gotland Pelt should be used early in the cross-breeding program, to introduce the short tail into the population. Given that short tails are evident at birth, the process of selecting for them could be undertaken at an early age. Since the Finn crosses have a reputation for early maturity, mating the offspring as lambs should be possible for rapid multiplication.

The bare tail of the East Friesian should also be incorporated from the outset. Some breeds, notably the Border Leicester, Poll Dorset and Texel also contain individuals with usefully bare breeches. The Border Leicester and Cheviot are the obvious choices for bare points, but the East Friesian, Finnish Landrace and Texel should not be overlooked.

The bare belly should be harnessed from wherever it can be found. It has been noted on occasion in many breeds, but the heritability of this trait is unknown. The Wiltshire Horn is a likely candidate, although horned animals should be selected against. Coopworths,

Perendales and even Romneys may provide some extreme individuals for any of these traits, and such animals should certainly be used in breeding the 45 million sheep needed to replace the New Zealand flock.

CONCLUSIONS

The range of breed sources of each trait provide flexibility to breeding options. It will be possible to introduce the traits into sheep that grow any type of wool, from Drysdale to Merino. Some of the loss in fleeceweight may also be recoverable when crossed with highly productive breeds, although the loss of oddments and crutchings will be greater and hopefully irreversible. Wool quality of the crossbreds should actually improve considering the breeds prescribed above.

There is a case for maintaining the 20 to 25 breeds that are currently available, in case we ever want to go backwards again. Fortunately there has been enough sheep fanciers to rescue the Wiltshire Horn from extinction due to financial pressure (Thatcher and Pascoe 1973), and we are sure that some traditional breeders will have sufficient reserves to maintain their high cost sheep.

Genetically removing the tail and the wool from places where it compromises production, will obviate the current husbandry practices that emulate the same effects. It will only be necessary to do this once in our lifetime, rather than one or more times a year for the rest of our lives. There may be compromises in the fleece, but there will be gains in lamb production. Relative returns for wool and lamb make the present time the right time. Consumer awareness of animal welfare and chemical residues make the present time too late. It will not be easy and it will take time to produce ethically improved sheep, but we must head down this road now and not stop when we get there!

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