BRIEF COMMUNICATION

Sources of dark fibre contamination in some lines of mid-micron fleece wools

T.C.REID AND R.A.URQUHART

Canesis Network Ltd, Private Bag 4749, Christchurch

Keywords: dark fibres; mid-micron wool; melanin pigment; age of ewe.

Unscourable dark stained wool fibres in a fleece are caused by melanin pigmentation, urine staining or foreign fibres from dogs or dark clothing. These fibres limit the dyeing potential of the wool.

There is limited published information on the amounts of dark fibre contamination in New Zealand wool or on the effects of such contamination on price, although a price penalty of 0.8 c/unit change/clean kg for subjectively assessed increases in black fibre content has been estimated for New Zealand wool across several seasons Maddever *et al.* (1991). Reid and Urquhart (2004) reported that the dark fibre contamination in 30 export consignments of New Zealand crossbred type wool (34-38 μm) ranged from 0-3,300 dark fibres/kg of clean wool. The main source of this contamination was "Down" type wool in the blend.

The upper limit for dark fibre concentration in Merino wool in Australia is often quoted as 100 dark fibres per kg, although this limit can vary according to end use (Fleet 1996). Recently, the New Zealand wool industry has expressed concern at increases in the dark fibre contamination of our national clip, attributing this to increased use of "black-faced" breeds, such as the Suffolk, as terminal sires and to reduced care in fleece skirting at shearing.

This paper describes an investigation of the extent of dark fibre contamination in some mid-micron wool clips representing several breeds.

Levels and types of dark fibre contamination were determined on 21 core samples from main lines of ewe fleece wool from 17 farms selected from the sale catalogues over the main selling season for this type of wool (August to October), using the method described earlier (Reid and Urquhart, 2004). The data were square root transformed for analysis. On four farms, two main lines of ewe fleece wool available were examined. Each farmer was questioned about their management and shearing practices to identify those associated with dark fibre contamination; including breeds of ewe and ram on the property, age of sheep shorn, time between crutching and shearing and procedures taken at shearing to remove dark coloured wool from the main lines.

There was considerable variation in dark fibre concentrations, both within each cored sample and between cored samples from different lines of fleece wool from the same property (Table 1), but no significant differences between ewe breeds in numbers or types of dark fibres found.

Several farmers acknowledged increasing sheep age as a factor in the presence of dark fibre in their wool; a finding in accord with Australian studies (Fleet, 1996). Two farmers who were in the process of changing their sheep breed, and shearing ewes up to 9 years of age as they built up numbers of the replacement breed, had the highest dark fibre contamination.

Most farmers reported that they examined replacement lambs for the presence of black spots at marking and at hogget shearing (Fleet, 1996), culling those with spots. On all farms, farmers relied on shearers and shed hands to detect and remove patches of dark fibres from fleeces; some baled the contaminated fleeces separately from the main line, others included the remainder of the fleece in the main line.

Some farmers culled adult ewes with black spots; others retained them but mated them to a terminal sire. Concentrations of pigmented fibres tended to be higher on farms where these ewes were retained than on those where they were not (225 vs. 88 dark fibres/kg: $P>0.05$). As all farms practised prelamb shearing (mid June to late September) it is unlikely that pigmented fibres transferred from the "black-faced" rams during mating or from their "black-faced" progeny during suckling (Hatcher *et al.,* 2000a,b) would still be present at shearing. However, the difference observed in this study could have resulted from retaining "black spot" ewes in the flock.

Two farmers bred their own rams. One of these (Farm 5) was very careful about black spots on the rams he bred and his pigmented fibre contamination was relatively low. All other farmers relied on ram breeders to reduce black spots in their rams.

TABLE 1: Levels of dark fibre contamination in samples of mid-micron wool from 17 farms.

Farm[1]	Dark fibres	Type of dark fibre (%)			Breed of ewe
	Mean ± SD[2]	Pigmented	Urine stained	Foreign	
1	124 ± 253	40	20	40	NZ Halfbred
1	632 ± 286	64	18	18	NZ Halfbred
2	180 ± 394	57	14	29	NZ Halfbred
2	234 ± 278	20	20	60	NZ Halfbred
3	0 ± 0				Corriedale
3	191 ± 229	0	60	40	Corriedale
4	110 ± 209	0	67	33	NZ Halfbred
4	470 ± 898	18	0	82	NZ Halfbred
5	69 ± 191	25	50	25	Corriedale
6	219 ± 174	29	14	57	Corriedale
7	225 ± 174	75	8	17	Corriedale
8	301 ± 362	60	20	20	Corriedale
9	32 ± 88	25	25	50	Corriedale
10	141 ± 200	40	30	30	NZ Halfbred
11	711 ± 384	77	14	9	Polwarth
12	287 ± 237	74	0	26	Corriedale
13	204 ± 100	43	0	57	NZ Halfbred
14	175 ± 269	40	20	40	NZ Halfbred
15	383 ± 286	61	13	26	Quarterbred
16	1060 ± 326	53	24	23	Corriedale
17	1546 ± 534	73	19	8	Corriedale

1. Duplicate samples were received from Farms 1,2,3 and 4
2. Back transformed

Urine staining of wool is reduced when ewes are shorn less than 3 months after crutching (Foulds, 1989). Most farmers crutched either at weaning or ram joining (late February to mid May) before shearing. There was little relationship between crutching to shearing interval and contamination by urine stain (Table 2).

TABLE 2: Relationship between the interval between crutching and shearing and the numbers of urine stained fibres identified.

Crutch to shear interval (days)	No. of farms	Concentration of stained fibres (no./kg)	
		Mean [1]	Range
90-100	7	53	0-297
100-130	4	46	0-247
≥131	6	41	8-70

1. Back-transformed

The principal factor associated with the presence of dark fibre contamination in the lines of mid-micron ewe fleece wool studied was the age of the ewes shorn. The practice of retaining ewes on which black spots were detected at shearing for mating to terminal sires the following season was also associated with a tendency for increased levels of dark fibre contamination. There was no measurable effect of breed of ewe or of interval between crutching and shearing.

The levels of dark fibre contamination found in the mid-micron flocks sampled in this study were within the range observed earlier in consignments of coarse wool (Reid and Urquhart, 2004), but generally greater than the Australian guidelines. On the basis of published information, the presence of dark fibre contamination would be expected to discount wool prices by approximately 2, 9, 18 and 25% where levels of 100, 500, 1000 and 1,500 dark fibres per kg of clean fibre, respectively, were present.

ACKNOWLEDGEMENTS

This study was funded by Meat and Wool New Zealand Ltd.

The assistance of the 17 farmers who supplied samples of wool and discussed their farm management was essential to this project. Alan Marshall (Tectra Ltd) assisted in identifying suitable lots of mid-micron wool to sample. Staff from Pyne Gould Guinness Ltd, Wrightson Ltd and Primary Wool Brokers Ltd approached the farmers to obtain their consent for involvement.

Staff in the testing laboratory at *Canesis* Network Ltd carried out the dark fibre counting.

REFERENCES

Fleet, M. 1996: Pigmentation types – understanding the heritability and importance. *Wool technology and sheep breeding 44*: 264-280

Foulds, R.A. 1989: Dark fibre contamination in wool: Its prediction and ramifications. *Wool technology and sheep breeding 37*: 33-37

Hatcher, S.; Lightfoot, R.J.; Purchase, I. W. 2000a: Mating Awassi rams to Merino ewes causes an initial level of fibre contamination which decreases to an insignificant level eight weeks post-mating. *Australian journal of experimental agriculture 40*: 363-369

Hatcher, S.; Lightfoot, R.J.; Purchase, I. W. 2000b: Transfer of contaminant lamb fibres to their dam's fleece, and loss within four weeks of weaning. *Australian journal of experimental agriculture 40*: 371-378

Maddever, D.C.; Carnaby, G.A.; Ross, D.A. 1991: Relative economic values of wool processing parameters. *Proceedings of the New Zealand Society of Animal Production 51*: 333-337

Reid, T.C.; Urquhart, R.A. 2004: Dark fibre content of some New Zealand export wool consignments. *Proceedings of the New Zealand Society of Animal Production 64*: 282-288.