

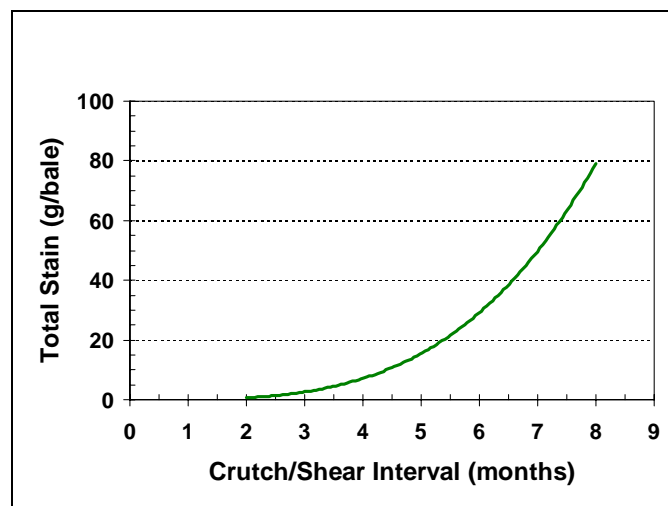
## Technical Basis for Allocation of DMFR Levels Based on Crutching History

Prepared by Dr Kerry Hansford, Teckel Consulting Pty Ltd on behalf of  
 AWI's Exotic Fibres Implementation Project (EC573-2)

**Reference:** Foulds, R.A. (1988) *Dark fibre contamination in wool - its prediction and ramifications. Proceedings Seminar on Technical Feasibility of the Sale of Wool by Description, CSIRO Division of Wool Technology, Sydney, NSW Australia, July 1988, p. 127.*

Figure 1 shows the amount of dangerous stain expressed as grams/bale. As an extrapolation, it takes about four staples to produce a levels of dark fibre >100/kg in the top. If a staple weighs approximately one gram, then you can see that the risk that the contamination levels are greater than 100/kg are high once the crutch shear interval extends past three or four months.

**Figure 1** Total dangerous stain (gram/bale) plotted against the crutch/shear interval for ewes



**Reference:** Burbidge, A, McInnes, C.B. and Foulds, R.A. (1991) *Development and preliminary evaluation of the CSIRO Dark Fibre Risk Scheme for Individual Sale Lots of Australian Wool. International Wool Textile Organisation Technical Committee Meeting, Lisbon, June 1991, Report No. 12.*

Table 1 presents the results of trials to validate the Dark Fibre Risk (DFR) Scheme prediction of risk of dark fibre contamination. Individual sale lots were processed to top, with the levels of contamination for each lot compared to the "Risk" predicted by the DFR Scheme. At this time, CSIRO was proposing an eight (8) Level Risk Scheme. Subsequently, Levels 6, 7 and 8 were combined with Level 5 to form a five (5) level scheme.

**Table 1 Mean number of dark fibres/kilogram top for DFR predicted levels for 99 Merino sale lots**

Risk Level	No Lots	Avg. No. Stained Fibres	Avg. No. Pigmented Fibres	Avg. Dark Fibres	Range	% lots that did not meet 100 df/kg benchmark
1	3	22	31	53	24-74	0
2	17	54	37	91	13-213	35
3	35	109	30	139	0-1014	NA
4	24	154	83	237	0-1014	NA
5	6	227	50	277	21-929	NA
6	3	228	20	247	133-1451	NA
7	3	279	125	404	252-604	NA
8	3	342	119	461	135-754	NA

NA – Not available

The paper reported that DFR Level 1 sale lots comprised fleece wool from ewes and wethers that had been crutched less than three months before shearing. On the other hand, DMF Level 2 comprised fleece wool from wethers that had a crutch shear interval greater than three months, and the piece wool from ewe and wethers that had been crutched less than three months before shearing.

On average, Risk Level 1 sale lots met the benchmark criteria of less than 50 dark/fibres kg, with 100% of lots meeting the benchmark criteria of 100df/kg. While Risk Level 2 averaged 91 df/kg, only 30% of the sale lots in Risk Level 2 did not meet the 100df/kg benchmark.

The results in the Table 1 are consistent with the current DMFR Tree where fleece wool from wethers crutched three months before shearing are allocated a Risk Level of 1. For a crutch/shear interval more than three months, fleece wool from ewes is allocated a Risk Level of 2, with pieces from wethers and ewes, allocated Levels 3 and 4 respectively.

Table 2 shows results for ewes and wethers that had similar husbandry characteristics – they were both mulesed and crutched. While the paper does specify the crutch/shear interval, it is assumed to be more than three months as this is most commonly used by industry.

**Table 2 Comparison of mean dark fibres/kg top between fleece and pieces wool of ewe and wether samples grown under similar husbandry characteristics**

Sex	Wool Type	No. Lots	Avg. No. Stained Fibres	Avg. No. Pigmented Fibres	Avg. Dark Fibres
Wethers	Flc	14	45	31	76
	Pcs	7	130	22	152
Ewes	Flc	30	53	23	76
	Pcs	5	402	21	423

The total dark fibre counts put the ewe and wether fleece sale lots (average 76 df/kg) into Risk Level 2. For the piece lines, the wether pieces would be allocated a Risk Level of 3 while the ewe pieces would be allocated a Risk Level of 4. This data supports current DMFR tree and the allocation of Risk Levels based on crutch/shear intervals more than three months.

**Reference:** *Burbidge A. and McInnes C.B., (1994) Dark Fibre Risk and Prediction, Seminar Proceedings: Specification of Australian Wool and Its Implications for Marketing and Processing, CSIRO Division of Wool Technology and the International Wool Secretariat, November 1994.*

The data presented in Table 3 is very similar to that presented in Table 2 above. This paper confirms that these ewes and wethers were mulesed and had a crutch/shear interval of greater than three months. The contamination values are very similar; hence it seems likely that this dataset includes new data as well as the results from those lots previously reported by the authors.

The results validate the allocation of a Risk Level of to ewe and wether fleece lines that had a crutch/shear interval of more than 3 months, while the wether piece lines would receive a Risk Level of 3 and the ewe piece lines would receive a Risk Level of 4.

**Table 3 Comparison between of mean dark fibres/kg top between fleece and pieces wool of ewe and wether samples grown under similar husbandry characteristics**

Sex	Wool Type	Avg. No. Stained Fibres	Avg. No. Pigmented Fibres	Avg. Dark Fibres
Wethers	Flc	43	29	72
	Pcs	115	20	135
Ewes	Flc	55	17	72
	Pcs	267	106	373

Other crutch/shear interval studies are summarised in Table 4 below (**Note:** stained fibres only – these numbers might increase if pigmented fibres were included). The data highlights that the crutch/shear interval of three months is critical. The results for sheep that were not crutched are also shown. High levels of stained fibres are found in both fleece and piece lines of un-crutched wool. Even without the addition of pigmented fibres to the urine-stained values in Table 4, un-crutched fleece wool would be allocated a Risk level of 4, and un-crutched pieces a Risk Level of 5.

**Table 4 Comparison between mean results of urine stained fibres per kg top for different crutching histories**

Wool Type	Less than 3 months	More than 3 months	Un-crutched
Flc	15	70	302
Pcs	11	251	2366

In addition, this paper reported that sheep crutched one month before shearing showed little or no stain in the top. On the other hand, sale lots that were crutched four months before shearing showed large increases in the number of stained fibres. The average values of stained fibres for piece wools for the six groups studied were one stained fibre/kg if crutched one month before shearing, and 190 stained fibres/kg if crutched four months before shearing.

It has been proposed that visual assessment prior to shearing can be used to determine whether urine stain is present or absent on the sheep. At two properties, six individual sheep were assessed for urine stain with their un-skirted fleeces subsequently processed to top. The results are presented in Table 5.

**Table 5 Visual assessment for presence (Yes) or absence (No) of urine stain and dark fibres/kg in top for six fleeces on two properties**

Shed A		Shed B	
Visual Assessment	Top Measurement	Visual Assessment	Top Measurement
No	0	No	0
No	0	Yes	0
No	58	Yes	0
Yes	0	Yes	0
Yes	693	Yes	0
Yes	13643	Yes	5

The results in Table 5 show that the relationship between visual assessment of stain and that measured on an individually processed top is poor. It is considered that visual assessment of stain may adversely influenced by the presence of vegetable matter, scouring or dust in the wool and hence, it cannot be used as a reliable indicator of dark fibre contamination.