

SRE/PSD/46D-2 (BR Papers)

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THE UTILIZATION OF CRS, WASTE AND LAMINA TOBACCO:  
A REVIEW OF THE TUMORIGENICITY OF CRS AND SOME  
RECONSTITUTED TOBACCO SHEETS

SUMMARY AND CONCLUSIONS

By (a) ignoring the evidence from the calibration groups, and (b) eliminating the high dose level groups, it is possible to determine the tumorigenic ratio of Janus sample B4 (50% CRS) with respect to B0 (100% FC lamina). These results indicate that the inclusion of 50% CRS leads to a 30% reduction in tumorigenic activity.

Examination of the provisional results from Experiment B11 shows that when a FC blend (60% lamina/40% stem) is manufactured into PCL the activity is reduced by 20%, while manufacturing into SRT reduces condensate activity by 60%.

The TWG experiment shows that Schweitzer stem sheet, CRS and AMF stem (plus scrap and strips, ? "fines") sheet all have significantly lower activity than the standard experimental blend (SEB). Nevertheless, the TWG results are based on a ranking of blends using a likelihood ratio and it is not possible on the information available to assess any possible differences between the CRS and/or the sheet samples. Further, the RTS samples produced from the SEB included a variety of additives or no additive and were manufactured at various densities and it is not possible to rationalise these results at the present time.

The information clearly shows that significant reductions in tumorigenicity can be achieved by the incorporation of CRS and even greater reductions achieved by the use of a paper reconstitution process. This information does not indicate, however, whether stems should be utilized as CRS or to produce PRT and no information is available to indicate the relative effect of the PRT process on stem and/or fines compared with lamina.

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In the commercial situation it is obvious that waste tobaccos will be utilized in the manufacture of PRT even when PRT is manufactured at well above waste utilization levels.

The questions to be answered may be stated as follows:

- (1) should stem be utilized in the blend as CRS (WTS) or should all or part of the stem be incorporated into PRT along with the waste;
- (2) should some of the lamina be incorporated into PRT; and
- (3) should some of the lamina plus some or all of the stem be incorporated?

It is proposed that (1) above should be examined in a promotion skin-painting experiment. Since an important principle is involved in (2) and (3) above and the materials can be defined more exactly, it is considered that the relative contributions of lamina and stem in PRT should be examined in a single long-term experiment. Proposals for both experiments will be circulated.

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The optimum method of using stem (i.e. as CRS or incorporated into a reconstituted tobacco) has been discussed on a number of occasions and at a previous BR meeting a request was made that the position should be reviewed.

JANUS RESULTS

A long-term mouse skin painting experiment (B4) has been undertaken to examine the effect of incorporating CRS at the 50% level into the all-lamina blend used for experiment B0.

In the report on experiment B4 (Report No. B32) the response of the B4 calibration groups was compared with that found in B0. This comparison showed that there were significant differences in response for the benzpyrene and dibenzanthracene groups used in these experiments. On this basis, the results of experiment B4 cannot be compared directly with those found in experiment B0.

Some further analysis of these experiments has now been undertaken. An initial attempt to fit common Weibull parameters to the data from B0 and B4 was not successful and reinforced the conclusion based on the calibration groups. It was considered, however, that the lack of fit could be due to differences in the "high dose anomaly" between the two experiments. On this basis, common k and w factors were fitted to the two lower dose groups from experiments B0 and B4 and to the 50 mg dose level B0 condensate group included in the B5 experiment. A satisfactory fit was obtained and it was also shown that for the 50 mg B0 groups there was not a significant difference between experiments B0 and the repeat experiment B5 (Report No. B33).

The tumorigenic ratio calculated on this basis for condensate B4 (50% FC lamina:50% CRS) with respect to B0 condensate was 0.7

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with 95% confidence limits of 0.63 and 0.76. Thus the tumorigenic response from 1 g B4 condensate is equivalent to that from 0.7 g BO (100% FC lamina) condensate.

These results may be summarised together with the final provisional values from experiment B11 as set out below with the proviso that the "controls" (BO and B11/1) which are both put equal to 1.0 cannot be equated.

		<u>Assumed Ranking</u>
BO (flue-cured lamina)	= 1.0	1.0
B4 (50% FC lamina/50% CRS)	= 0.7	0.7
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B11/1 (60% FC lamina/40% CRS)	= 1.0	(say) 0.80
B11/2 (PCL made from B11/1)	= 0.81	0.65
B11/3 (SRT made from B11/1)	= 0.41	0.33

From this summary it is obvious that the specific activity of SRT is much lower than that of a blend containing 50% CRS. If gross assumptions are made to equate the two experiments then the activity ratios for PCL and particularly SRT, manufactured from a blend containing 40% CRS, are reduced even further. Nevertheless the results, which indicate the probable advantages of a paper reconstituted sheet process, do not give any indication as to whether the reduction is achieved by processing the lamina portion of the blend or the stem.

RESULTS OBTAINED IN OTHER CENTRES

(a) T.R.C. (Harrogate)

In a single experiment condensates from FC lamina, CRS and RTS were compared with a FC control blend. The lamina was slightly more active (1.12) than the control while the reduction in activity for CRS (0.53) was slightly greater than that for the RTS sample (0.62), the latter being only just significant. These results must, however, be treated with some caution since the experiment had to be terminated at week 88.

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(b) T.W.G. Experiment

The provisional results of the first large TWG experiment provide some guide to the activity of both CRS and reconstituted sheets. This assessment of the results is limited, however, to the "Ranking of Blends on Likelihood Ratio Chi-Squared Tests of Difference from the Combined Standard Experimental Blend". It will also be remembered that this ranking is made much more difficult in some cases because of the differences found for the low and high dose groups.

The TWG results clearly show that condensate from CRS is very much less active than that from the blend and that from the lamina. The relative position of the lamina with respect to the blend cannot be interpreted; it is ranked more active at the low dose level and less active at the higher dose.

The CRS processed into RTS without additives by Schweitzer produced condensate with the lowest activity in the series. The same CRS was also processed by AMF but the ingredients included 27% scrap and strip tobacco, invert sugar (5.3%) and glycerine; the results for this sample were also significantly less active than the standard blend (SEB) but were not ranked as high as CRS or the Schweitzer sheet (Table 1).

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TABLE 1

T.W.G. RANKINGS

SAMPLE	RANKING	
	LOW DOSE	HIGH DOSE
Schweitzer sheet	1	1
CRS	3	2
AMF sheet	6	11
SEB	18	22
Lamina	19	12

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