

MINUTES
OF THE TOBACCO PROCESS CONFERENCE
- BRAZIL -

October 6-9, 1986

Rio de Janeiro

OBJECTIVE

The objectives of the Conference were to exchange results, to review the state of knowledge in the topic areas discussed, and to identify continuing and future work areas.

OVERVIEW

Overall, the work reviewed fell into four main categories. These were:

- Tobacco Improvement - preprimary
- Tobacco Improvement - post-aging
- Reduction of Specific Smoke/Tobacco Components
- Process Studies

The first two items have been driven by taste/flavour considerations, the third by needs to meet social requirements, and the fourth by considerations other than taste and flavour. Each of these items is discussed below. Details of each topic can be got from the copies of the papers provided.

Topics for future work of both Group and individual relevance to be developed by Souza Cruz were invited from all members. Brazil will collate and circularize alternatives and suggest priorities. Group relevance does not mean that a majority should have a need.

Brazil should continue to provide detailed sound information on a longer-term basis for others in the Group to use in short-term projects. This is based on building upon existing knowledge and resources, and

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the integrated operations in Brazil. Following the Group reorganization, most members of the Group are now depending on this happening.

It was suggested that the Conference should take place every two to three years.

INTRODUCTORY REVIEW

The members with the strongest interest in taste/flavour were Brazil, Germany, U. K., and USA, with Australia and Canada likely to increase interest therein.

The strongest interest in physical and yield parameters came from Australia and Canada followed by the U. K. and Brazil, with all the others regarding such results as important also.

1 - Tobacco Improvement

1.1 - Process Research Programme

Brazil's efforts in this area have been focused on the chemical monitoring of Souza Cruz conventional process (Virginia and Burley). Later some changes in the tobacco processing conditions (Virginia and Burley) using existing equipment were studied to evaluate the effect on tobacco and tobacco smoke quality. On the grounds of these results, studies involving drastic changes in the processing (Virginia and Burley), especially in respect to CLD treatment and addition of special casings (preheated, amino acid-bearing casings, etc.) were made to identify new directions (screening evaluations). Studies on Virginia tobacco aging per tobacco grade and evaluation of CLD thermal conditions are currently in progress.

A value of results to take has been in promoting ideas for new treatments and giving hints and clues for dealing with poor tobaccos, which are a widespread problem.

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Directed studies on upgrading such tobaccos are needed.

Future Work

Studies aimed at improving tobacco quality were proposed by Brazil and are defined in the following specific paragraphs.

1.2 - Analytical Measurements

The chemical programme was considered to be strong, relevant and, with the changes proposed, up-to-date.

Within limits of available resources, as many relevant tobacco and smoke chemicals, expected to be related to sensory response, should be measured. The choice and number should be controlled by the Brazilians, as follows, using their experience. Where possible sensory results should be obtained early and only if a real effect is found should full exploration arise, following what has been done in the Brazilian Programme, 1983/84 crop. A larger number of measures would be appropriate for process studies where no casings or additives are involved. Equally, some measures are not useful where casings are involved.

The methods (Starch, Potassium, Calcium, Protein Nitrogen, Carotenoids, Nitrate) to be deleted and the new methods (Amadori Compounds, Tobacco Smoke NVS and SDE, Purge and Trap, Modified Capillary O/WP, Fructosamines and Hydroxymethylpyrazine) proposed were agreed. Where other chemical constituents become of importance these should be included.

Measurements of physical characteristics performed in the studies of processes conducted in Brazil were considered by the Group as sufficient, the inclusion of new physical analyses therefore being not a must.

There could be occasions when samples are transferred to other Centers for specific measurements, as has happened from time to time.

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Future Work

There has been no effective study across the Group of the interactions of physical/chemical/sensory changes. Future studies across the Group - including Brazil - should recognize that all process findings are only partial without gathering information in each of these three areas.

1.3 - Tobacco Improvement Preprimary

1.3.1 - Curing

Although considerable work has been done by Souza Cruz, we still do not know the basic chemical curing mechanisms for development of leaf quality. However, it was agreed that no further general studies should be conducted. Rather, the Group agreed that further studies should be directed towards specific needs.

Chemical comparison between tobaccos from conventional flue-curing barns and from forced-air curing barns showed the two methods to be similar with reduced variation in final chemistry resulting from forced-air curing. The difference is attributed to much greater temperature uniformity across the barn in forced-air curing.

Low plant position tobaccos in particular continue to change chemically post-curing.

There was considerable support for a B&W proposal that work is needed on the creation of so-called red flue-cured grades, now considered high desirable in blended products but in limited supply. The character is believed to result from a deviation from normal in curing which needs to be identified.

There was support for a BAT (Hamburg) idea concerning an approach to poor quality tobacco improvement. It was suggested that tobaccos to be deliberately miscured in known ways so that curing deficiencies in commercial tobaccos can be recognized and remedial action taken, or purchase avoided. It is expected that a detailed proposal be presented.

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Australia suggested this concept should be extended to include growing/harvesting.

Future Work

Brazil would design a project to determine red Virginia tobacco grade chemical characteristics so as to find out whether the flue-curing conditions influence the production of this tobacco type.

1.3.2 - GLT/Aging

Tobacco treatments at GLT plant could potentially improve leaf quality with or without the addition of special casings.

In GLT, the redrying stage induces the greater degree of chemical change; the basic transformation is from less volatile to more volatile components.

The addition of casings at the GLT, followed by 15 months aging, resulted in greater chemical change than aging uncased tobacco followed by casing application in Primary. Aging in the presence of casings provided opportunity for desirable chemical change.

Aging studies of flue-cured tobaccos demonstrated that many chemical changes were complete after 6/9 months. There were differences in the degree of chemical change induced by aging between brown grades and orange grades, but in general for smoke flavour constituents, plant position effects are far more important than GLT and aging effects.

Similar observations were drawn from casing Burley tobaccos at GLT. A combination of GLT casing of Burley plus aging resulted in greater chemical change than a CLD operation.

Sensory work remains to be completed.

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Future Work

Souza Cruz proposal to conduct experimental work designed to provide low quality Virginia tobacco improvement through application of special casings at GLT. This was supported in principle but delegates requested time to consider, after the Conference, other possible casings or treatments they might wish to suggest.

The inclusion of tests to confirm earlier results at PMD for Virginia tobacco processing was also supported.

1.4 - Tobacco Improvement Post-Aging

1.4.1 - CLD

CLD treatment of some flue-cured grades using a sugar/cocoa casing formulation reduced impact, irritation and many undesirable flavour notes. Bulking prior to CLD improved the effect. The process is believed applicable to low quality flue-cured tobaccos.

Other Souza Cruz CLD studies demonstrated effects of inlet moisture and temperature profiles on chemical and sensory change. High temperatures effected greater change, particularly so when coupled with low inlet moisture. There was a reduction in impact, irritation, bitterness and flavour amplitude. Additionally, higher temperatures gave better filling value at equal firmness, but if higher inlet moisture is used, the advantage is lost.

B&W CLD studies confirmed the sensory trends found by Souza Cruz and further demonstrated little difference between cooling section moistures of 6% and 3%. Chemical reactions accelerate when moisture drops to 7% (i. e., when bound water starts to be removed and tobacco temperature rises). At 6% moisture, ammonia, sugar, and nicotine "losses" start to become appreciable.

The theoretical studies proposed and presented in Section 3.1 may be particularly relevant to interpreting results in this area of work.

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1.4.2 - Casing/Heat Treatment Alternatives

Related to this topic is the use of ammonia-containing casings, pre-heated casings, and other amino acid/sugar casings as means to upgrade taste and flavour.

Novel casing materials such as soya protein hydrolyzate and ameliorants such as tartaric acid can upgrade low quality Virginia when coupled with heat treatment. The effect is grade specific; in successful cases a green note is introduced, considered desirable in some Souza Cruz blend recipes.

Novel casing materials for Burley tobacco (various combination of sugar, cocoa, sodium carbonate, ammonium bicarbonate and soya protein hydrolyzate) can create marked sensory change through a CLD-type process especially at high temperature. Variation of inlet moisture allowed variation of sensory effect. Improvements are gained for low quality Burleys. It is argued that the Burley sub-blend should be split between good quality grades (bypassing CLD) and poor quality grades (receiving special casings and CLD). CLD is believed to be more relevant, in the Souza Cruz view, to poor Virginia than good Burley.

Future Work

Souza Cruz proposed an experimental programme for Virginia tobacco in which further special casing approaches would be compared, for a variety of grades, with conventional CLD. In addition, treatment of individual grades with different special casings would be compared with blend treatment with combined special casings. This experiment will be included in the work proposed in item 1.3.2 (GLT/Aging).

Brazil should continue the project **Evaluation of Alternatives for Burley Tobacco Processing**, started in 1985/86 where the possibility of certain Burley tobacco grades bypassing CLD by using GLT redryer temperatures associated with addition of special casings at PMD after aging, will be studied.

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1.4.3 - Reconstituted Materials

In the past, reconstituted smoking materials have been viewed as neutral at best. Recently, the Group has generated four new process formulations which outperform in sensory terms the existing materials.

Two of these materials result from extensive B&W studies resulting in paper-type and band-cast sheet materials modified by sugar, pectin and ammonia inclusions. Use of these materials, particularly the band-cast approach, significantly improve blend sensory properties.

BAT (Hamburg) have developed an extrusion process for reutilization of factory wastes which is now in limited commercial use. Pre-reacted additives (sugar, ammonia, pectin at a critical time and temperature) enhance sensory effects in German-blended products.

BATUKE (Southampton) have developed an extrusion process based on a different formulation. This converts wastes into a material superior in sensory terms to Le Mans SRT.

An intention, prior to B&W optimization and commercialization of the band-cast process, is a comparison of this with extruded wastes containing taste modifiers, with and without pre-reaction.

Closer contact and coordination between members to be established in RTS projects, were suggested.

2 - Reduction in Specific Tobacco/Smoke Components

It was agreed that more consideration should be given to the selective reduction of certain tobacco and/or smoke components.

Levels of nitrosamines are low in Virginia but Burley levels are higher and in some studies increase during curing and in other process stages.

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3 - Process Studies

3.1 - Dryer Studies

Papers were presented defining air flow characteristics through pneumatic dryers. Additionally, a new approach to the understanding of the relationship between tobacco drying and chemical degradation in terms of thermodynamic and kinetic parameters were described.

This knowledge will enable the Group to optimize the design of pneumatic dryers to achieve the best product quality; e. g., control of physical/chemical changes, reduction of intense dryer deposits that can cause product contamination.

Future Work

There is a strong need to find a way to express the information contained in tobacco temperature, time, and moisture profiles to a form for use in correlating with the sensory and chemical changes being found.

Southampton will continue its theoretical work of studying the relationships between tobacco temperature/time/moisture and sensory/chemical changes.

3.2 - Grading and Blending

The Group has made considerable progress in building up a knowledge base covering the practical and theoretical aspects of grading and blending. The value of this work is that of enabling the Group to meet league-table targets and improving variance control of physical quality.

Though the role and value of grading and blending have been thoroughly studied and are now well understood by the Group, the variabilities of

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grading and blending limit our ability to reduce variances of sensory behaviour, and chemical/physical properties.

On-line instruments for GLT, PMD, and possibly Secondary may emerge commercially to permit real-time monitoring and control of these variances; e. g., a further development of the Australian NIR system.

Future Work

- B&W is developing a capital proposal to install large stem blending bulkers to further reduce grade and product variances.

- Wills is studying blending efficiency in lamina bins.

- Brazil is studying the relationship between sugar and fill value of Virginia and Amarelinho stem.

3.3 - Shredded Stem

The technical results for the patent position are essentially complete. The strategy for the Group should be finalized without jeopardy to the American and Australian positions.

Results to-date indicate that, compared to CRS/WTS, some or all of the following effects are found by the various operating companies: (1) puff number increase, (2) reduction in CO, (3) increased nicotine transfer efficiency, and (4) fill value increase.

The choice of shredded product size depends on local conditions; e. g., since B&W can divert material to reconstitution, removal of fines may be relatively unimportant, but a programme to maximize overall stem yield is beginning immediately. At this time, SDS has a lower product yield than CRS/WTS, but various optimization programmes may turn this situation around. B&W is exploring new plate designs to achieve improved particle size distributions. This is of Group benefit.

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Control of plate gap on the basis of energy per unit of dry stem throughput (specific energy) is a well-known concept in the pulp/paper industry, and will probably be the final route to particle size control.

Future Work

- To improve particle size distribution (B&W, W. D. & H. O. Wills, and UK&E).

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List of Delegates

BAT(UK&E)

- R. W. Hedge
- R. Crellin
- R. Prowse

B&W/U S A

- T. Rienl
- R. Marshall

BAT/Hamburg

- V. Heemann
- A. Weiss

IMPERIAL/Canada

- Y. Primeau
- G. DuPlessis

W. D. & H. O. WILLS/Australia

- T. I. Wilson

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SOUZA CRUZ/Brazil

- Iran Pedro
- I. Volpon Filho
- J. P. Gava
- Antonio A. S. Rodrigues
- Paulo A. M. Oliveira
- J. C. Sena Maia
- Octavio A. C. Antunes
- Marcos P. A. Campos
- L. Bergter
- José Roberto P. Silva
- Reginaldo C. C. Pinto

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