

Cigarette Size and Composition

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Work has continued in the cigarette size and composition study started at the University of Kentucky in 1956 and reported in Kentucky Farm and Home Science (Spring 1958). In August 1959, single packages of 37 leading brands, representing 96 percent of the total 1959 domestic cigarette production, were purchased at each of five locations in the United States.^{1/}

Ten cigarettes from each pack were dried and weighed. The paper was slit lengthwise and the tobacco removed. After this the paper (and filter) was reweighed and the weight of tobacco obtained by the difference of the two weighings. Cigarette circumference was obtained by measuring the width of the paper. The tobacco from these 10 cigarettes was ground and mixed for alkaloid determinations. Total cigarette length and filter length measurements were also made. Two of the remaining cigarettes in each package of the three leading brands of each of the six major producers were separated visually into the following fractions: (1) stem, (2) reconstituted tobacco, (3) Turkish tobacco, (4) flue-cured tobacco and (5) burley tobacco. The separated fractions were checked under a microscope and weighed to determine the percentage that each contributed to the total weight of the cigarette.

SIZE OF CIGARETTES

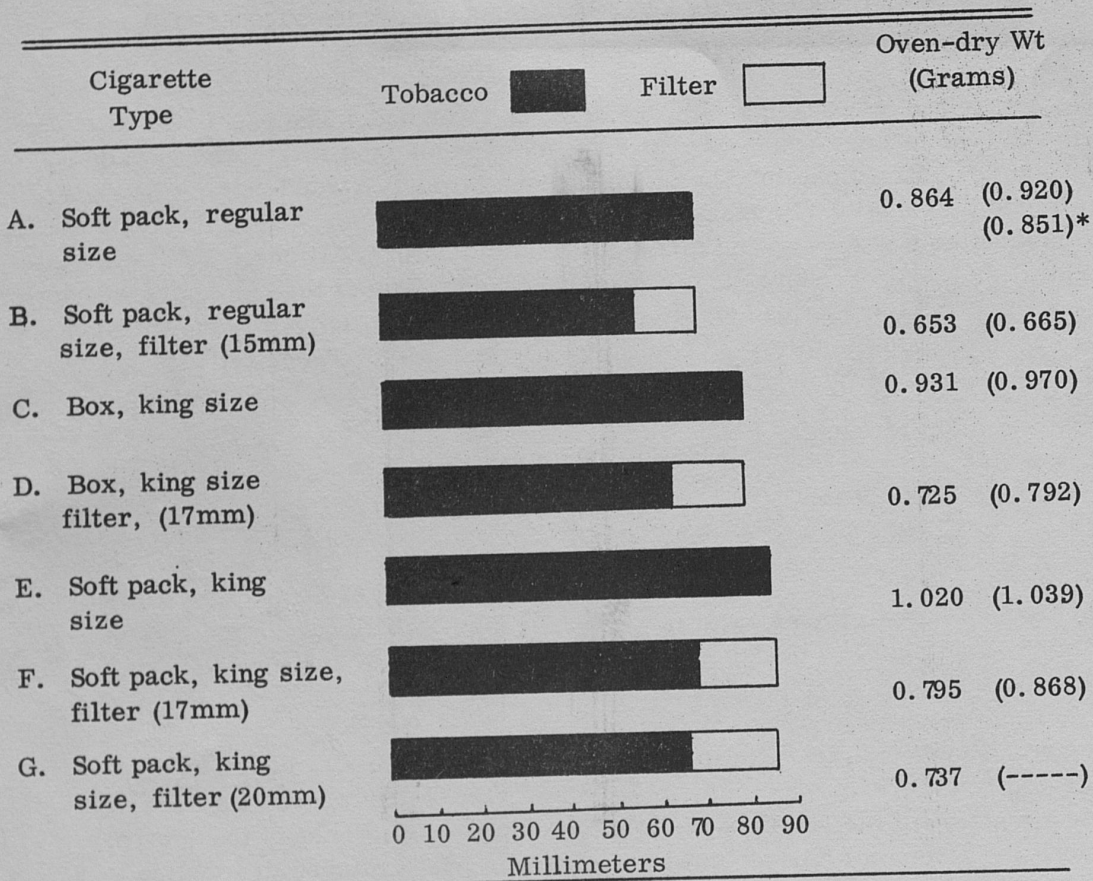
All brands of the same type (i. e. regular size, king size, etc), of cigarettes purchased in 1959 were very uniform in size. Circumference was 25 mm and total length 70, 80, or 85 mm. Filter length varied from 15 mm to 20 mm, with the majority of brands using a 17 mm length.

Figure 1 shows the cigarette length, filter length and dry weight of tobacco in each. Since circumference was uniform at 25 mm, the weight of tobacco used was primarily a function of the length of the tobacco column. It is evident that in types C, D, and F the amount of tobacco used per cigarette has continued the decline that was noted in 1957 for all cigarettes. Type A shows a decrease in weight if compared with the cigarettes of greater circumference made in 1957 but none if compared with those of the smaller circumference presently used. Manufacturers were able to produce cigarettes in 1959 of the same length as in 1957 but with a reduction of up to 8 percent in the amount of tobacco material used. This was made possible, at least in part, by reducing the circumference of the cigarettes.

No filter cigarette in 1959 contained as much tobacco as did the regular size non-filter. The production of regular sizes showed a decrease of 22.8 percent since 1957, king sizes a decrease of 8 percent, while all filtered types increased by 26.6 percent.^{2/} This demonstrates a second means whereby cigarette manufacturers were able to produce more cigarettes from the same amount of tobacco.

^{1/} Washington, D. C., Lexington, Ky., Kansas City, Kans., Madison, Wis. and Long Beach, Calif.

^{2/} These percentages were obtained from production estimates contained in Wooten's Reports from Printer's Ink. Dec. 26, 1958 and Dec. 25, 1959.



*Smaller diameter

FIG. 1. - LENGTH OF TOBACCO COLUMN AND FILTER AND AVERAGE OVEN DRY WEIGHT OF TOBACCO IN CIGARETTES PURCHASED IN AUGUST 1959 AT 5 LOCATIONS. (FIGURES IN PARENTHESES ARE WEIGHTS OF COMPARABLE LENGTH CIGARETTES IN DECEMBER 1957).

USE OF RECONSTITUTED TOBACCO AND STEM MATERIAL

Reconstituted tobacco was used extensively in 1959 by three companies in both filter and non-filter cigarettes, but to a much greater extent in filter cigarettes - 10 to 18 percent vs 4 to 7 percent in non-filter ones. Small quantities of reconstituted tobacco ranging from trace amounts to as much as 4 percent were found in certain cigarettes of the other three companies studied. The companies using the lesser amounts of reconstituted tobacco, however, increased their use of stem material, in some instances using twice as much in 1959 as in 1957. Since an unknown portion of the reconstituted leaf is undoubtedly made up of stem material, this shows one of the ways in which the cigarette industry is utilizing a material that formerly was largely waste.

BLEND COMPOSITION

The blending of the major types of tobaccos (flue-cured and burley) used in cigarette production poses a very difficult problem in attempting to evaluate cigarette composition. It seems evident that the composition of each blend lot by a particular company differs to some extent from any other one. This can be explained by the variation in physical and chemical properties of the tobaccos used in striving to manufacture a product with uniform properties. Therefore, one of the ways to control the quality of the cigarette is by varying the amounts of the materials used. This is readily seen if the percentages of flue-cured and burley found in one brand purchased at five different locations in 1959 are shown (Table 1).

TABLE 1. - Percentage of flue-cured and burley tobaccos in one brand of cigarettes from five locations.

Location	Flue-Cured	Burley*
	Percent	
I	46	38
II	42	44
III	46	35
IV	50	31
V	50	33

*Maryland tobacco was not identified separately and is considered a part of the fraction labeled burley, which would result in approximately 4 or 5 percent reduction in the actual burley.

While specific figures on blend composition are of little general significance, the ranges of the amounts of different tobaccos used indicate company differences in blending. For instance one company used flue-cured tobacco in amounts ranging from 24 to 40 percent and burley from 34 to 36 percent, while another company varied from 36 to 50 percent in flue-cured used and 23 to 36 percent in amounts of burley used. Turkish tobacco was found in amounts of from 3 percent to 7 percent, indicating a small increase in use over 1957. The amounts of Turkish tobacco found may be slightly low because of the difficulty in obtaining complete accuracy in separating certain of the fractions.

TABLE 2. - The percentage of total alkaloids (nicotine) found in the tobacco of cigarettes manufactured by 6 major companies in 1957 and 1959.

Company	1957			1959		
	Regular	King Size	Filter	Regular	King Size	Filter
A	2.23	2.05	2.22	1.99	1.82	1.91
B	2.18	2.28	2.38	1.77	1.74	1.86
C	1.84	1.95	1.99	1.55	1.62	1.64
D	2.16	1.93	2.04	2.15	1.83	1.89
E	2.05	2.11	2.23	1.68	1.67	1.71
F	2.41	2.29	2.09	1.37	1.34	1.34
Average	2.15	2.10	2.16	1.75	1.67	1.72

NICOTINE CONTENT

Table 2 shows the average nicotine contents for the different types of cigarettes produced in 1957 and 1959 by the six leading companies. Reduction in nicotine content was industry wide for all types of cigarettes. Some of the factors that may have contributed to this reduction in nicotine content are (1) milder tobacco grown in 1956 and 1957, (2) use of larger amounts of reconstituted tobacco, (3) increased use of stem material and (4) technological advancements which have made it possible to reduce the nicotine content of tobacco before it is manufactured into cigarettes.

DISCUSSION

Uniformity of product is the goal of any manufacturing concern. In the manufacture of cigarettes, the achievement of this goal is made extremely difficult by the complexity and variability of the raw material (tobacco) that is used. The tremendous expansion in research facilities by all tobacco companies during the past decade bears witness of this, and as a result they have been able to deal more effectively with the problems which have been encountered during this period.

The use of reconstituted tobacco, presently used to some extent by all six of the leading cigarette manufacturers, increased during the period of this study as did the use of stem material. This greater use of materials that formerly were not extensively used in cigarette manufacturing coupled with the general reduction in cigarette circumference and increased filter length has made possible the production of substantially more cigarettes from the same amount of raw tobacco.

Flue-cured and burley tobaccos constitute about 90 percent of most cigarettes (this would include stem material and reconstituted leaf where used). Although there was conclusive evidence that certain companies regularly used larger amounts of flue-cured and less burley than others, it is difficult or impossible to establish definite composition percentages. It seems certain from this study that, within certain ranges, the amount of flue-cured and burley tobacco used by any one company in manufacturing a given lot of cigarettes may vary considerably. This leads to the conclusion that, again within certain limits, the amount of flue-cured or burley tobacco used depends upon the supply and the relative quality, or usefulness, of the two tobaccos as determined by company specifications.

Perhaps the greatest change observed during this period of the study was the marked reduction in nicotine content of cigarettes. This was true for all companies and nearly every individual brand studied. Several new brands appeared on the market near the end of the study which were even lower in nicotine than the established brands produced by the same companies. This again reflects the industry's desire to market a product that meets the demand of the smoking public and makes use of innovations that were not known or were impractical a few years ago.

Several changes have been noted during the course of this study which have been discussed in some detail. It is logical to assume that the coming years will see many more changes instituted by this very competitive industry.