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Workshop on Leather Industry Development
in Developing Countries

Vienna, Austria, 27 August to 1 September 1973

APPROACH TO A NATIONAL QUALITY CONTROL FOR THE LEATHER PRODUCING INDUSTRY 1/

by

J.H. Sharphouse
Head of Leather Technology, College of Technology,
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Addendum

STATISTICAL APPENDIX [1]

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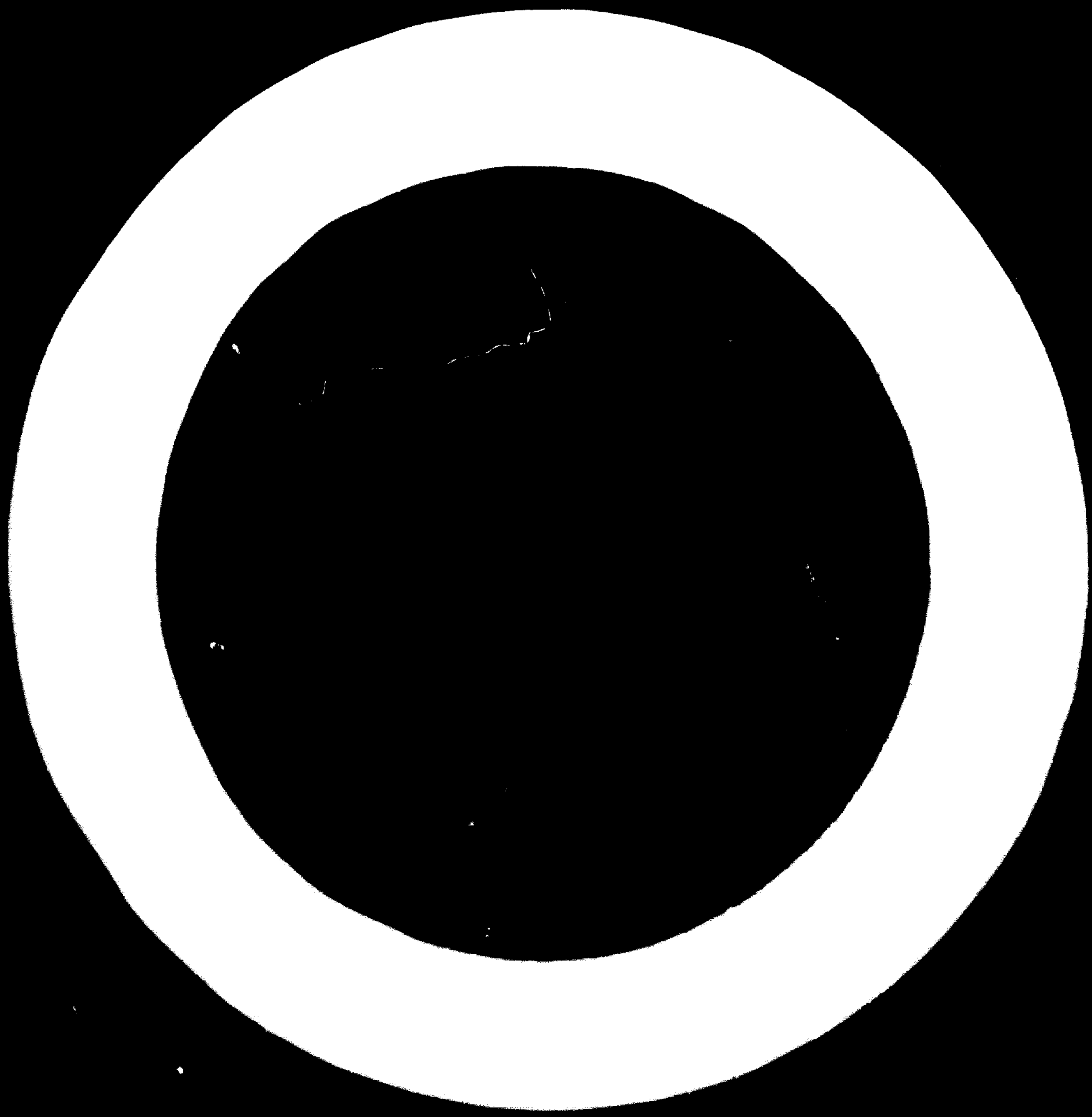

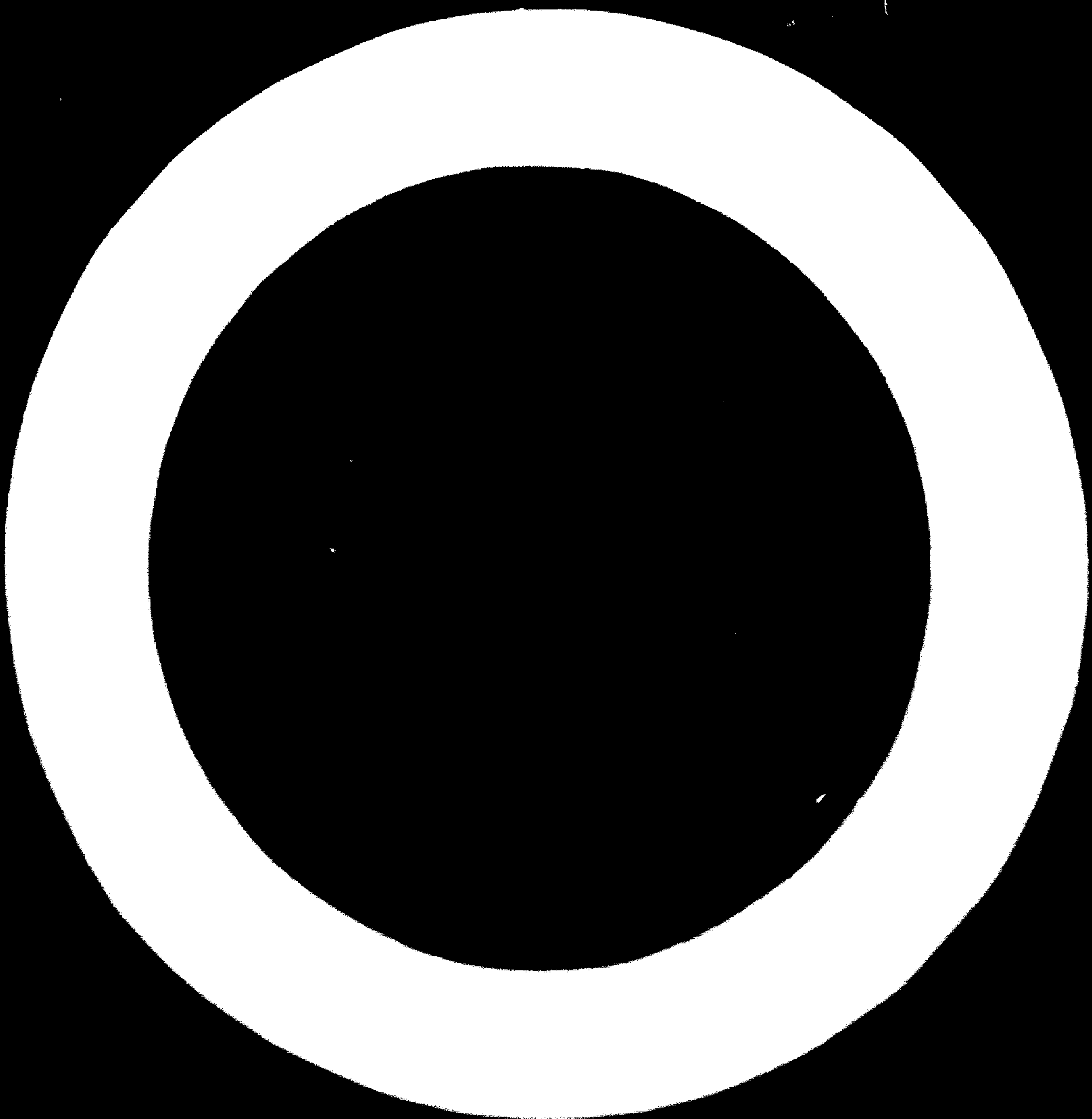

<u>Statistical Appendix</u>

<u>on the area measurements of [illegible]</u>

1. <u>Summary</u>

This paper gives the results of the certified area measurements of 101 bales of wet blue chrome hides. These 101 bales (plus another three bales which were missing) being the combined samples obtained from seven different agents. After considering the statistics of the combined samples the data is then split into the separate samples obtained from each agent and an estimate of the total area to be supplied by each agent is then found. In addition the correlation between the quoted and the certified area of each bale is investigated.

Finally various recommendations are made as to how samples such as this could be improved upon.

2. <u>The combined samples</u>

The 101 bales of the combined samples consisting of 1,350 hides (excluding the three bales which were missing) were made up as follows:

1 bale of 9 hides
37 bales, each containing 10 hides
1 bale of 1[illegible] hides
3 bales, each containing 14 hides
49 bales, each containing 15 hides
7 bales, each containing 18 hides
2 bales, each containing 20 hides

Each hide was measured according to the specifications laid down in BLF/LIPMA Contract No. 1 and the measured footage was given to the nearest quarter square foot.

Table 1 shows the distribution of the area of the 1,350 as well as the distribution for:

(i) the area of hides packed in bales of 20 (which also includes the area of hides packed in bales of 18)

(ii) the area of hides packed in bales of 15 (which also includes the area of hides packed in bales of 16, 14 and 12)

(iii) the area of hides packed in bales of 10 (which also includes the area of hides packed in bales of 9)

The following should be noted for this table and subsequent tables:

(a) The interval 8 - represents the area of all hides between $7\frac{7}{8}$ and $9\frac{7}{8}$ sq. ft., and the other intervals are to be interpreted in a similar manner.

(b) The means and standard deviations are calculated from the original data and hence will differ slightly from any calculated from the grouped data.

(c) All standard deviations are unbiased estimates of the 'population' standard deviation and have been found from the formula $\sigma = \sqrt{\frac{n\Sigma x_i^2 - (\Sigma x_i)^2}{n(n-1)}}$

Table 1

Area (in sq. ft.)	Frequency: All Hides	Bales of 20	Bales of 15	Bales of 10
8-	1	1		
10-	8	7		
12-	29	23	1	3
14-	84	34	3	4
16-	134	36	46	11
18-	188	26	87	18
20-	227	17	144	19
22-	173	16	191	20
24-	178	5	137	61
26-	143	1	112	83
28-	92		59	76
30-	47		16	42
32-	14		5	14
34-	18		0	17
36-	5		1	4
38-	2		1	2
40-	6		0	4
42-	1		2	1
No. of Hides	1,350	166	805	379
Total area	30,151	2,849.25	17,142.25	10,159.5
Mean area	22.334	17.164	21.295	26.806
Standard deviation	5.035	3.507	3.651	4.760
C.V.	22.5	20.4	17.1	17.8

(C.V. denotes the coefficient of variation = $\left(\frac{\text{standard deviation}}{\text{mean}}\right) \times 100$

From Table 1 the following results were obtained:

(a) the distributions for bales of 20, 15 and 10 are approximately normal

(b) as the number of hides per bale increases the mean area decreases and it can be shown that the differences are highly significant

(c) the standard deviations can be shown to be significantly different (at the 99% level)

3. The Individual Samples

In the following analysis of the seven agent's samples, denoted by agent A, B, C, D, E, F, G respectively, it has been assumed that all the samples were obtained by using a "simple" random sampling method.

In this section the following notation will be used: number of hides denoted by "n", total area of hides denoted by "T", mean area of hides denoted by "m", standard deviation of hides denoted by "σ", standard deviation of mean area of hides denoted by "$\sigma_m (= \sigma/\sqrt{n})$", coefficient of variation denoted by "C.V.", degrees of freedom denoted by "df (= n-1)", 97.5% value of the t - distribution denoted by "t".

Agent A

This agent presented a 1% sample consisting of 342 hides which were made up as follows:

1 bale of 9 hides
18 bales, each containing 10 hides
3 bales, each containing 15 hides
6 bales, each containing 18 hides

Table 2 shows the distribution of this sample.

Table 2

Area (in sq. ft.)	All Hides	Bales of 16	Bales of 15	Bales of 10
	Frequency			
8-	1	1		
10-	5	5		
12-	16	15		1
14-	33	32		1
16-	31	31		0
18-	22	20	1	1
20-	19	4	13	2
22-	19		17	2
24-	44		11	33
26-	57		3	54
28-	43			43
30-	25			25
32-	8			8
34-	13			13
36-	2			2
38-	2			2
40-	1			1
42-	1			1
n	342	108	45	189
T	8,097.00	1,716.25	1,034.75	5,346.00
m	23.675	15.891	22.994	28.286
σ	6.395	2.364	1.910	3.724
C.V.	27.0	14.9	8.3	13.2
df	341	107	44	188
σ_m	0.3458	0.2275	0.2847	0.2709
t	1.967	1.982	2.015	1.973

Agent B

This agent presented a 5% sample consisting of 30 hides which were made up of two bales, each containing 15 hides. Table 3 shows the distribution of this sample.

Table 3

Area (in sq. ft.)	Frequency
14-	3
16-	11
18-	6
20-	5
22-	4
24-	1
n	30
T	560.00
m	18.667
σ	2.619
C.V.	14
df	29
σ_m	0.4782
t	2.045

Agent C

This agent presented a 1% sample consisting of 27 hides which were made up of 1 bale containing 15 hides and 1 bale containing 12 hides. Table 4 shows the distribution of this sample.

Table 4

Area (in sq. ft.)	Frequency
14-	2
16-	9
18-	10
20-	3
22-	2
24-	1
n	27
T	500.25
m	18.528
σ	2.307
C.V.	12.5
df	26
σ_m	0.4440
t	2.056

Agent D

This agent presented a 6.6% sample consisting of 248 hides which were made up as follows:

1 bale of 10 hides

2 bales, each containing 14 hides

14 bales, each containing 15 hides.

Table 5 shows the distribution of this sample.

Table 5

Area (in sq. ft.)	Frequency: All Hides	Bales of 15	Bales of 10
10-	1	1	
12-	3	3	
14-	27	27	
16-	40	39	1
18-	60	60	0
20-	56	55	1
22-	22	21	1
24-	22	19	3
26-	8	8	0
28-	3	2	1
30-	3	2	1
32-	0	0	0
34-	1	0	1
36-	1	1	0
38-	0		0
40-	1		1
n	248	238	10
T	4970.75	4703.00	267.75
m	20.043	19.761	26.775
σ	4.031	3.600	7.228
C.V.	24.1	18.2	27.0
df	247	237	9
σ_m	0.2560	0.2334	2.2857
t	1.970	1.970	2.262

Agent F

This agent presented a 1% sample consisting of 58 hides which were made up as follows:

4 bales, each containing 10 hides

1 bale containing 18 hides

Table 6 shows the distribution of this sample.

Table 6

Area (in sq. ft.)	Frequency: All Hides	Bales of 18	Bales of 10
10-	2	2	
12-	8	8	
14-	2	2	
16-	2	2	
18-	4	2	2
20-	1	1	0
22-	6	1	5
24-	8		8
26-	10		10
28-	11		11
30	3		3
32-	0		0
34-	0		0
36-	1		1
n	58	18	40
T	1334.50	269.25	1065.25
m	23.009	14.958	26.631
σ	6.371	3.252	3.369
C.V.	27.7	21.7	12.7
df	57	17	39
σ_m	0.8366	0.7665	0.5327
t	2.002	2.110	2.023

Agent F

This agent presented a 3% sample consisting of 484 hides (of which 2 bales of 15 hides each were missing) which were made up as follows:

8 bales, each containing 10 hides

1 bale containing 14 hides

24 bales, each containing 15 hides

Table 7 shows the distribution of this sample.

Table 7

Area (in sq. ft.)	Frequency All Hides	Bales of 15	Bales of 10
14-	13	13	
16-	16	16	
18-	51	51	
20-	85	85	
22-	82	80	2
24-	84	70	14
26-	60	42	18
28-	34	13	21
30-	15	2	13
32-	6	0	6
34-	3	0	3
36-	1	0	1
38-	0	0	0
40-	4	2	2
n	454	374	80
T	10698.75	8401.25	2297.50
m	23.566	22.463	28.719
σ	4.189	3.477	3.302
C.V.	17.8	15.5	11.5
df	453	373	79
σ_m	0.1966	0.1798	0.3692
t	1.965	1.966	1.990

Agent C

This agent presented a 2% sample consisting of 201 hides (of which 1 bale of 10 hides was missing) which were made up as follows:

6 bales, each containing 10 hides

5 bales, each containing 15 hides

1 bale containing 16 hides

2 bales, each containing 20 hides

Table 8 shows the distribution of this sample.

Table 8

Area (in sq. ft.)	All Hides	Frequency: Bales of 20	Bales of 15	Bales of 10
12-	2			2
14-	4		1	3
16-	25	3	12	10
18-	35	4	16	15
20-	58	12	30	16
22-	38	15	13	10
24-	18	5	10	3
26-	8	1	6	1
28-	1		1	
30-	1		1	
32-	0		0	
34-	1		1	
n	191	40	91	60
T	3989.75	863.75	1943.00	1183.00
m	20.889	21.594	21.352	19.717
σ	3.088	2.290	3.373	2.795
C.V.	14.8	10.6	15.8	14.2
df	190	39	90	59
σ_m	0.2234	0.3621	0.3536	0.3608
t	1.973	2.023	1.987	2.001

From the above tables the estimated total areas with their 95% confidence limits can be found from the formula $(T \pm nt\sigma_m) \times \frac{100}{\text{sample size}}$ with an appropriate correction for those samples in which some bales were missing. The values of T, n, t, σ_m all being taken from the first column of the tables.

Agent A:	total area	809,700	±	23,263 sq. ft.
Agent B:	total area	11,200	±	587 sq. ft.
Agent C:	total area	50,025	±	2,465 sq. ft.
Agent D:	total area	75,314	±	1,895 sq. ft.
Agent E:	total area	133,350	±	9,714 sq. ft.
Agent F:	total area	379,068	±	6,720 sq. ft.
Agent G:	total area	209,346	±	7,189 sq. ft.

Total area for all agents: 1,668,123 ± 51,833 sq. ft.

4. The correlation between the certified and quoted area

For each of the 101 bales the quoted area and the certified area were recorded and from these the following values were obtained:

$\sum x_i = 34,070.5$; $\sum y_i = 30,151$; $n = 101$

$\sum x_i^2 = 11,757,059$; $\sum y_i^2 = 9,243,039$; $\sum x_i y_i = 10,379,435$

where the x_i's are the quoted areas and the y_i's are the certified areas.

Correcting the above values to bring them relative to their respective means gives

$$\bar{x} = \frac{\sum x_i}{n} = 337.33; \quad \bar{y} = \frac{\sum y_i}{n} = 298.52$$

$$C_{xx} = \sum x_i^2 - \frac{1}{n}\left(\sum x_i\right)^2 = 264,990.59$$

$$C_{yy} = \sum y_i^2 - \frac{1}{n}\left(\sum y_i\right)^2 = 242,219.19$$

$$C_{xy} = \sum x_i y_i - \frac{1}{n}\left(\sum x_i\right)\left(\sum y_i\right) = 208,547.42$$

and hence the correlation r between x and y is:

$$r = \frac{C_{xy}}{\sqrt{C_{xx}\,C_{yy}}} = 0.8238$$

This correlation, although highly significant, is not as large as one would have expected when comparing two systems of measurements.

The regression line ($y = a + bx$) of y on x is given by

$$y - \bar{y} = b\,(x - \bar{x})$$

where $b = \frac{C_{xy}}{C_{xx}} = 0.7882$, and hence

$$y = 0.7882x + 32.64$$

An "analysis of variance" of this regression gives:

Source	S.S.	d.f.	M.S.	F
Due to regression	164,374.61	1	164,374.61	209.05
Residual	77,844.58	99	786.31	-
Total	242,219.19	100	-	-

We see that the F value of 209.05 based on 1 and 99 degrees of freedom is highly significant.

Inspection of the residual mean square gives the variance (S_Y^2) of the error incurred by using a + bx as an estimate of y and as $S_Y^2 = 786.31$, then Sr = 28.04.

The standard deviation of the constant a in the regression equation is given by

$$S_a = S_r\sqrt{\left\{\frac{1}{n} + \frac{(\bar{x})^2}{C_{xx}}\right\}} = 18.60$$

and the 95% confidence limits for a are given by

$$a \pm tS_a$$

where t is the 97.5% point in the t - distribution based on 99 d.f.

Hence the 95% confidence limits for a are

- 4.26 to 69.54

As would be expected, for these measurements, this includes the origin.

On the assumption that the regression line passes through the origin then the regression of y on x is

$$y = cx$$

where $c = \frac{\sum x_i y_i}{\sum x_i^2} = 0.8828$ Hence $y = 0.8828x$

and the standard deviation of c is

$$S_c = \sqrt{\frac{\sum x_i^2 \sum y_i^2 - (\sum x_i y_i)^2}{(n - 2)(\sum x_i^2)^2}} = 0.008304$$

The 95% confidence limits for c are 0.8828 $\pm$ Sct which gives c between 0.8663 and 0.8993

5. Recommendations

The sampling procedure used above is inefficient as can be seen by considering the following two points:

1. No prior consideration seems to have been taken into what size sample was required, as is seen by the range (from 1% to 6.6%) of sample sizes. This, in effect, means that a total of 1350 hides have been sampled to give an estimate of the total area without having (until after the sample) any ideal of the error involved in this estimate. Unfortunately this procedure of "get the sample and hope the figures come out right" is all too common in sampling.

In all sampling schemes the prime consideration should be how large a sample must be taken in order that the quantity to be estimated has a specified precision. This is particularly important in samples involving destructive testing, as a badly designed sample may yield inconclusive results.

2. If it had been found from past experience, or a preliminary survey, that different sized bales tend to have different sized hides, then using a "stratified" random sample instead of a "simple" random sample would have improved the precision of the estimate. For if we assume that the hide samples were obtained by using "stratified" random sampling instead of "simple" random sampling, then using the data from Tables 2 to 6 we would find that the 95% confidence interval had been reduced by nearly 15%.

In general, for any data which contains heterogeneous groups, a "stratified" randon sample is preferred to a "simple" random sample.

With regard to the relationship between the quoted and certified areas, the surprising feature of this is the low correlation ($r = 0.8238$) between them, which implies that $(1 - r^2) \times 100\% = 32\%$ of the variation is not accounted for by the regression. This "poor" fit is further emphasised by the large standard error of 28.04 incurred in using $a + bx$ as an estimate of y. If, however, we assume that the regression line passes through the origin and there are valid reasons for supposing this, then the regression estimate becomes much more precise to the extent that we can say (with 95% confidence) that the certified area is between 86.6% and 90% of the quoted area.

It may prove useful, if it has not already been done, to obtain data on the relationship between area and weight of dry hides.

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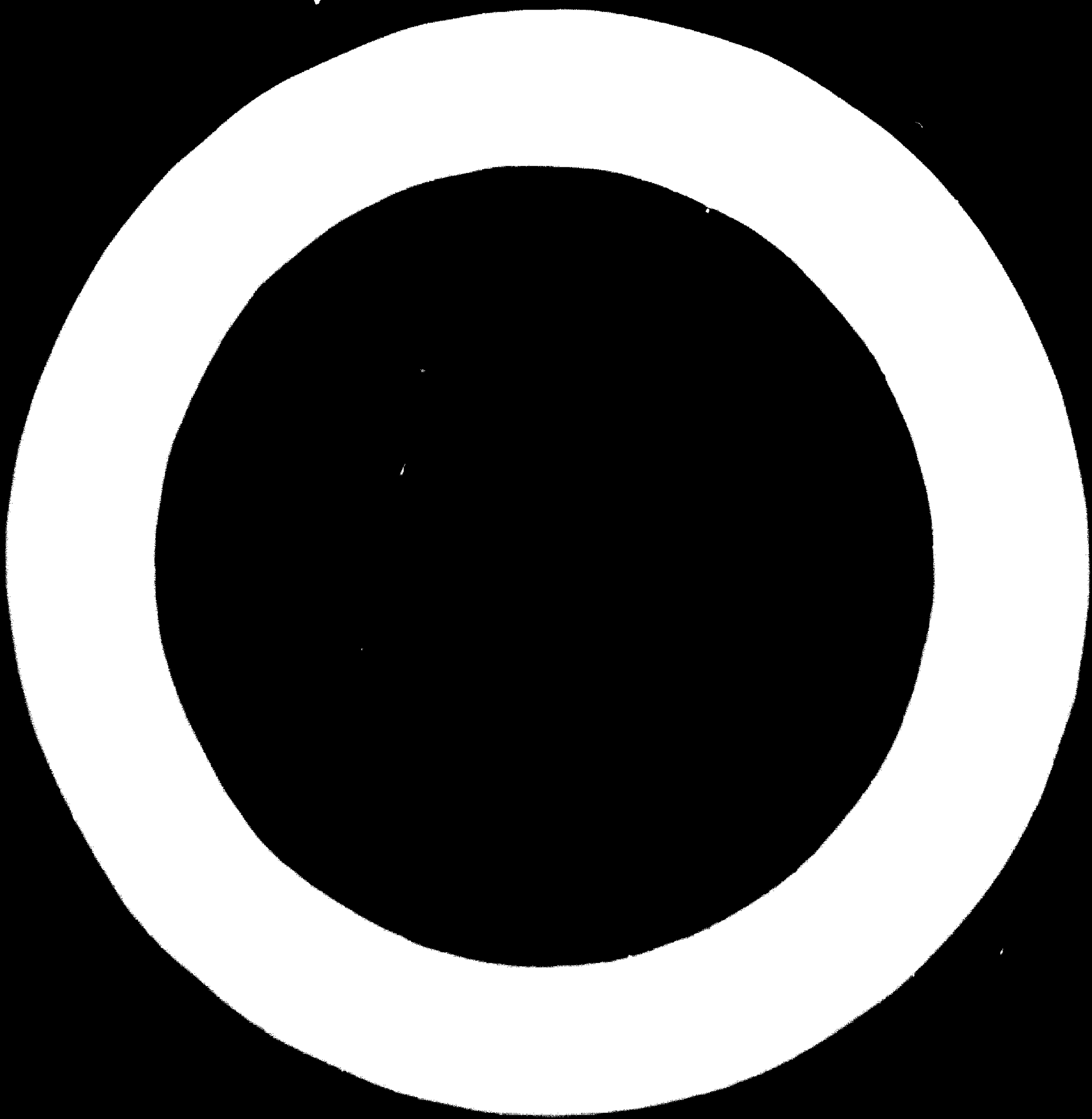

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(2) Mitton Statistics of Sampling J SLTC (54) 1970 p.210.

(3) ALCA Method JI Sampling Light Leathers for Physical Tests.

Approaches to a National Quality Control for the Leather Producing Industries.

Introduction.

Considering those countries which believe that one of their resources could be a supply of hides and skins which could be processed and marketed either as cured skins, finished leather or made-up articles such as shoes or handbags, either for export or to reduce imports of such articles into the country, a prime consideration is to make the product marketable.

This infers that the product must eventually be sold to a retail house who can resell at a reasonable profit. Thus the price, quality and delivery must be satisfactory.

These three factors are not independent items in that price may be adjusted to quality or that a quality may be made to suit a particular price.

Modifications of both may be made depending upon readiness of supply (or delivery time).

In this respect quality must be a subjective term.

This paper limits the sphere of the remarks to the leather producing industries, i.e. the quality of leather and not to industries producing articles from it, e.g. the shoe industry.

This is to try and simplify a difficult problem. Nevertheless such industries are the direct customer of most finished leather producers. Their assessment of quality will depend upon the profit they can make from using a particular leather for a particular shoe or handbag.

To spell this out more precisely: - how many shoe uppers they can produce from a given area of leather?

Wastage occuring due to -

(i) faults in the leather or the clicking economics of a particular design.

(ii) faults in the leather occurring in processing i.e. cracking on lasting, poor stitch strength, etc.,

(iii) the leather developing an unseemly appearance, e.g. colour changes, stains, a bad break, etc.,

(iv) delivery being so late that the market for a seasonal fashion shoe has gone,

(v) retail price fluctuations making it uneconomic to make the product.

Items (iv) and (v) would hardly appear to be scientific reasons for complaining about quality/price, but it is generally found that they are occasions which stimulate the customer to complain about quality and, where possible, have tests done to prove his point.

The mass producing customer will demand a uniformity of quality.

Ideally this demands a supply of skins of uniform size and properties.

This does not exist, and evidence has been published which implies that even the left and right side of one skin are not identical in physical properties.

Where animal husbandry is a carefully controlled industry, with careful and controlled slaughter of the animals in the best abattoirs, followed by accurate grading of the hides this variability can be very greatly minimised. Often it implies the existence of a sophisticated meat industry.

The more the conditions of supply of the hides or skins vary from these, the greater will be the problems of establishing a supply of leather of uniform quality. No improvement can be expected in the [illegible] for it and Hide Improvement Organisations can have little success unless quality [illegible] and eventually their customers find the supply of carefully graded hides profitable.

This may be instigated by producing a supply of graded skins for which a profitable market may be found, or that the market is prepared to pay a justifiable price in return for improved quality.

It has happened that neither of these conditions have occurred when the efforts of the Hide or Skin Improvement Organisation have failed to have any impact.

This is an area where National Organisations can stimulate a demand for quality control and start to implement it.

Quality Standards of Leather.

It has already been implied that these do not exist as scientific measurable entities.

Many organisations, National and International have established a large number of methods for analysing and testing leather, (1)

The validity of these and new tests is being constantly checked.

Nevertheless there is still considerable disagreement on what are acceptable standards for these tests. This is not due to lack of effort but to the nature of the problem. Thus in the case of a shoe upper leather 6 or 7 physical properties are required of which some are apparently contradictory, e.g. stretchability for lasting and compressibility, scuff resistance, but good roughing properties. The peculiar merit of leather is its large variety of physical properties which have made it so suitable for that odd piece of construction - "the shoe".

Not all parts of the shoe require the same properties [illegible] [illegible] overall uniform properties [illegible] to indicate [illegible] of the "Analysis [illegible]" are perfectly adequate for certain parts of shoe construction. This type of [illegible] the art of [illegible].

The tests done should be related to the method of shoe construction to be employed.

Common general tests would be [illegible] or folding tests, flexometer tests, to them tests of the finish and grease content of the leather. First line analytical tests would be water-soluble matter, grease and chrome content.

These are generally informative to the shoe manufacturer, but are very often less informative to the tanner in indicating to him how to modify his process, i.e. to improve his quality grading. Some specifications state that the leather must be made from good quality hides or skins whose definition may be difficult in a developing country.

Consequently any Institute whose aim is to improve the quality must be prepared to co-operate with the producer in translating its test findings into practical suggestions for modifying the production process. This will be a long term project demanding patient co-operation between the two partners.

Sampling Problems.

The I.U.L.C.S. have specified sampling positions on the hide or skin. Originally designed for sole leather but still considered to give a fairly average indication of the overall properties of the leather.

However one can get considerable variations, skin to skin, and pack of leather to pack of leather.

The question arises as to how many samples must be taken to get a fair assessment of a bulk consignment of leather?

The L.I.F.M.A. Contract No.1. specifies a 5% sample of blue chrome skins for check area measurement. This may or may not be adequate as an assessment of the whole. It is a non-destructive test but can involve very considerable cost and delay in assessing a large consignment. For these reasons, the parties concerned may agree on a 1% sample. Statistically the findings on a 1% sample may be quite useless in assessing the whole and lead to entirely false predictions.

No tests based on sampling are going to give a prediction on the whole with 100% certainty. The parties concerned should appreciate this, but still expect that the samples tested will give a certainty of prediction of 90% or 95% as the case may be.

In the case of area measurement of blue chrome, it is normally expected that there will be a tolerance of +5% or -5% in the measurement.

Although a 5% sample is specified this can give very erroneous predictions depending on the variance within the pack.

If there is little difference between the specified and actual measurement, e.g. +1%; -0.5%; +1.0%; -0.8%; +1.0%; +1.1% etc. then a small number of samples tested will give a high degree of certainty that the sample represents the whole. However if there are large differences between the specified and actual measurements, e.g. -20%; +1%; +30%; -6%; +2%; -15%; -18%; +25%, a very large number of samples must be taken to arrive at any meaningful prediction of the whole.

Before any system is established for quality testing it is essential to consider the statistics of sampling the particular product, to avoid producing meaningless results by taking too small a sample or overloading the testing station with samples for testing, causing delay and the waste of a lot of leather. (2) (3).

This part [illegible] greater variation in physical [illegible] products, as [illegible].

Caution [illegible] some of the specifications existing [illegible] are based [illegible] analysis of a leather which has been satisfactorily used [illegible]. Thus the limits set may be unnecessarily high e.g. a lastometer distension of 7 mm, when in fact 5mm, would be adequate, provided all the leather had this as a minimum value. Some specifications demand that the extractable grease should have a [illegible] free fatty acid content. It is not known what specific merit this has but that the leather which had it, was used satisfactorily.

Establishment of Testing Procedures.

These require careful consideration not only by the Laboratory staff but also by a competent practical tanner and by a technologist versed in the customers requirements (e.g. a shoe-man), otherwise they will be produced in a vacuum, when they can not be translated into action by the leather producer, or as a basis for negotiation with the customer.

Where the leather is being made to a customer specification for export, it is not enough to test a suitable number of samples to give a go/no-go decision. Ideally the leather production should be checked at regular intervals during production, to determine its possible variability and co-relate these with known variabilities during processing, e.g. type of skin input, process checks, e.g. pH, machining variables, sorting, etc. Thus any complaints on quality may be co-related to this historical technical background and rapid corrective action taken.

General Considerations of How a National Authority can improve Quality Standards.

This will vary enormously in different countries. Where the tanneries and shoe factories are nationally controlled the implementation of these systems should be easier. Where the industries are privately owned it will be extremely difficult, and some degree of resentment at National Interference must be expected. They must be convinced that it is to their advantage to co-operate, i.e. that to produce a recognisably higher quality of leather is more profitable.

Some advantage may be gained by issuing Official Certificates of Approval or Grading, which it would be hoped would enable the tanner to command a higher price, or negotiate for larger long term contracts. These will take time to establish their credibility, particularly in view of what has already been said. The tanner may well find his own reputation of more significance than such a certificate.

The Authority may penalise a tanner for producing bad or inferior leather - presumably knowingly- . Such systems were practised by the Mediaeval Guilds in Europe whereby the tanner could be severely penalised for bad workmanship etc. However leather production was a relatively simple art in those days and identification of faults in the leather with "malpractice" relatively easy.

Further it must be assumed that if the leather is bad he will not be able to sell it for long. However his misbehaviour may well reflect on his fellow producers and lower the image of their products. Assessment of the penalty poses many problems.

Great care must be taken in any such administration.

If one takes the instance of a country wishing to develop its sheepskin industry. The skins may be pickled, wet blue tanned or or finished for export as a first quality product profitably. However only [illegible] of the skins available and collected really meet this grade. There will always be the temptation to dilute these with some second or third grade skins. This will be particularly so if there is no ready outlet for the inferior skins, which may not justify export.

The local tanner who processes these into a low quality leather for sale is a very important part of the system, and standards set for him must be adjusted accordingly. A sound market for the lower grades is the surest way of establishing quality and price gradings for the better quality skins.

Generally the aim is to encourage the leather producer and penalties are normally not very effective in doing this.

Stick and Carrot Methods.

These are based on the principle of offering the producer of satisfactory leather certain benefits over and above his normal trading benefits. These may consist of certain Tax benefits for exported leather, assistance with export or transport charges, Import Permits for chemicals, plant or raw skins.

These may be granted on the assumption that the exported leather is of satisfactory quality and if it is not his exports will fail and indirectly he will be penalised. Nevertheless this is a situation which a National Authority would wish to avoid and it could then insist that such leather be tested to ensure it was of acceptable quality before export. If quality complaints were still made it would be improper for the producer alone to be penalised and the National Authority should shoulder some of the responsibility, i.e. the producer might still get his export benefits and the Authority give some guidance as to where the failure was.

[illegible] co-operation between the Sampling/Testing Authority and the producer.

<u>Another system would be that of Levy and Grants.</u>

This might operate by making a "Quality Control Levy" on all hide, skin or leather producers based as a percentage of their annual turnover. At the end of the year a Grant is paid to them if their products have been satisfactory, and a deduction from this Grant is made if this is not so.

Ideally Grant should equal Levy minus Running Costs of the Scheme.

To avoid capital gains lost on the year's Levy a system of "netting" could be used, i.e. no money is collected in advance but at the end of the year a firm's Levy and Grant were balanced and the difference paid.

This might encourage the Producer to have the quality of his products validated by the Authority. Excessive use of this system would affect the Running Cost item and reduce his Grant.

In the early stages it might be presumed that if no complaints were made to the Authority by his customers he should obtain maximum Grant.

The ones is on the Producer to disprove any suggestion that his product is below quality.

Of course he can settle potential customer complaints by a price adjustment, which is a penalty in itself, but it might stimulate him in to asking for some co-operation from the Authority.

The funds deducted for "Running Costs" might be used for various purposes other than simple administrative costs, plant, labour and travel costs. It might be deemed advisable to use such funding for

(i) export incentive - advertising;

(ii) cost of importing plant, chemicals or otherwise in bulk for the use of all firms in scope;

(iii) training of technicians in quality control;

etc.

Conclusions.

Any National Authority, wishing to establish a System for improving the quality of its Hide and Leather Industry must carefully consider the standards of Quality relative to its particular conditions, and particularly how these standards can be assessed, bearing in mind the variable nature of Hides, Skins and Leather.

Mechanisms for implementing Quality Improvement should be such as to encourage the active co-operation of the Producers.

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