COMPARISON OF SINGLE JERSEY FABRICS USING YARNS FROM THREE SPINNING SYSTEMS.

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KEY WORDS: KNITTING, SINGLE JERSEY, CROSSLINKED, ROTOR YARNS, RELAXED STRUCTURE, VARIATION

C O N T E N T S

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1. INTRODUCTION

During a meeting earlier this year, Mr. T. Atkins of Atkins of Hinckley mentioned that he had produced some experimental single jersey fabrics using standard ring spun, carded based rotor and combed based rotor yarns. These fabrics had been dyed and resin finished.

We expressed our interest in this work and it was agreed that we would evaluate these fabrics. We were able to obtain a limited amount of yarn on cone from the Atkins factory at Hinckley, together with greige fabric, dyed only fabric and dyed and resin finished fabric, produced from the three spinning systems.

Resin finishing is a new venture for Atkins as they are predominantly circular finishers and the machinery within their factory would not normally be regarded as ideal for resin finishing. As they had no experience in this area, they approache B.I.P. for advice and assistance.

In a discussion with the dyer at Atkins we learned that the resin finishing had been carried out in tubular form using the Kiefer drum dryer in a two-pass process, first drying at 140°C then curing at 160°C, at 8 metres per minute. The recipe had been developed in conjunction with B.I.P. All the fabrics were dyed in a Longclose Softflow machine (PINK) and finished in tubular form.

2. YARNS

We were unable to obtain the usual number of cones for testing. Yarns collected were as follows:-

1. 1 cone of 1/30'scc Courtaulds LW (UK)
2. 5 cones of 1/30'scc carded base, open-end (NAOUSSA)
3. 1 cone of 1/30'scc combed base, open-end (FILS)

NB: 1/30'scc = 19.68 TEX

Yarn No. 2 (NAOUSSA) comes from Greece, Yarn No. 3 comes from Fils Textil in Germany and the base fibre is Egyptian.

For the purpose of this report all fabric samples will be numbered either 1, 2, or 3 and this number will relate to the yarns used. Hence, all samples:

No. 1 used Courtaulds LW
No. 2 used NAOUSSA
No. 3 used FILS TEXTIL

2.1. Knitting Details

All the knitting was carried out at Atkins of Hinckley on a 24 gauge single jersey machine, 16" diameter, with 1200 needles and trip tape positive feed.

2.2. Fabric Description

Fabrics as received:

Greige (tubular)

5 metres - LW
5 metres - OE NAOUSSA
5 metres - OE FILS

Dyed Only (PINK) (tubular)

5 metres - LW
5 metres - OE NAOUSSA
5 metres - OE FILS

Dyed and Resin Finished (PINK) (tubular)

5 metres - LW
5 metres - OE NAOUSSA
5 metres - OE FILS

The samples were taken from the same piece throughout.

3. AFTER RELAXATION RESULTS

3.1. Greige Fabric

Test results after five wash and tumble cycles.

Sample No.	1	2	3
Courses AW	63.8	66.0	64.6
Wales AW	47.4	44.6	43.6
Weight AW	167.74	172.10	170.31
Spirality AW	22.26°	14.47°	15.58°

(See Figures)

3.2. Dyed Only

Test results after five wash and tumble cycles.

Sample No.....	1	2	3
Courses AW	60.2	62.4	61.2
Wales AW	46.6	44.0	44.4
Weight AW	153.24	155.48	154.08
Spirality AW	19.29°	13.39°	12.19°

3.3. Dyed and Resin Finished

Test results after five wash and tumble cycles

Sample No.	1	2	3
Courses AW	58.6	60.2	58.0
Wales AW	42.4	41.8	41.6
Weight AW	141.13	141.20	141.48
Spirality AW	14.79°	12.49°	11.09°

3.4. Finishing Factor

i.e., the difference between greige AW and dyed only AW: (Ratio = $\frac{\text{DYED AW}}{\text{GREIGE AW}}$)

	1	2	3
Courses =	0.943	0.945	0.947
Wales =	0.983	0.986	1.02

4. COMPARISON OF TEST RESULTS AGAINST STARFISH

4.1. Comparison of the greige fabric test results against STARFISH AW

The % difference is the distance away from STARFISH.

Sample No. 1 (Tex 19.2 SL 0.280cms)

	Measured	Predicted	% Difference
Courses/3cm	63.8	62.7	+1.75
Wales/3cm	47.4	46.0	+3.04
Weight g/sq. m.	167.74	167.0	+0.44

Sample No. 2 (Tex 20.4 SL 0.281 cms)

	Measured	Predicted	% Difference
Courses/3cm	66.0	62.7	+5.26
Wales/3cm	44.6	45.5	-1.98
Weight g/sq. m.	172.10	176.0	-2.22

Samples No. 3 (Tex 20.0 SL 0.282 cms)

	Measured	Predicted	% Difference
Courses/3cm	64.6	62.4	+3.53
Wales/3cm	43.6	45.5	-4.17
Weight g/sq. m.	170.31	173.0	-1.55

4.2. Comparison of the dyed only AW test results against STARFISH (R95)

Sample No. 1 (Tex 19.2 SL 0.280 cms)

	Measured	Predicted	% Difference
Courses/3cm	60.2	60.3	-0.16
Wales/3cm	46.6	45.7	+1.97
Weight g/sq. m.	153.24	154.0	-0.49

Sample No. 2 (Tex 20.4 SL 0.281 cms)

	Measured	Predicted	% Difference
Courses/3cm	62.4	60.5	+3.14
Wales/3cm	44.0	45.2	-2.65
Weight g/sq. m.	155.48	163.0	-4.61

Sample No. 3 (Tex 20.0 SL 0.282 cms)

	Measured	Predicted	% Difference
Courses/3cm	61.2	60.1	+1.83
Wales/3cm	44.4	45.2	-1.77
Weight g/sq. m.	154.08	160.0	-3.7

5. BURST STRENGTH

Some store groups specify a required burst strength and so losses incurred during resin finishing are critical.

NB: Burst Strength units are in Kilonewtons per square metre. For conversion to lbs/sq in. divide by 6.895.

Sample No.	1	2	3
Dyed only BW	574.20	453.80	532.00
Dyed & Resin BW	426.60	326.20	371.80
% Loss	25.70%	28.12%	30.11%

Sample No.	1	2	3
Dyed only AW	605.20	483.00	519.10
Dyed & Resin AW	437.40	373.10	379.40
% Loss	27.72%	22.77%	26.91%

5.1. Single End Strength (grammes)

Sample No	1	2	3
Dyed only BW	317.00	234.01	273.24
Dyed & Resin BW	209.12	151.83	161.91
% Loss	34.03%	35.12%	40.74%

Sample No.	1	2	3
Dyed only AW	309.16	249.99	259.65
Dyed & Resin AW	191.01	151.53	163.39
% Loss	38.21%	39.38%	37.07%

NB: The strength losses between burst strength and single end strength are not the same.

6. NITROGENS

Measured by the Kjeldahl method

Dyed Only

Sample No.	1	2	3
TOTAL	0.04	0.05	0.05
FIXED	0.06	0.07	0.07

$\bar{x}$ of all six readings = 0.0566

Dyed and Resin Finished

Sample No.	1	2	3
TOTAL	0.36	0.40	0.40
FIXED	0.30	0.34	0.33

Dyed and Resin Finished minus $\bar{x}$ of dyed only

Sample No.	1	2	3
TOTAL corrected	0.3034	0.343	0.343
FIXED corrected	0.243	0.283	0.273

Dyed and Resin Finished - Fixation

Sample No.	1	2	3
Corrected $\frac{\text{FIXED}}{\text{TOTAL}} \times 100$	80.09%	82.50%	79.59%

7. FREE FORMALDEHYDE (PPM)

Sample No.	1	2	3
Dyed & Resin Finished	2591.25	2658.88	2010.76

These high figures would be regarded as commercially unacceptable.

8. DISCUSSION OF RESULTS

The yarn count or tex of the yarn as delivered would be regarded as just commercially acceptable with all three yarns. The twist, or turns per metre, show that the two combed yarns (ring and OE) recorded similar numbers with the carded OE recording a higher number.

One of the major problems with single jersey fabric is spirality. Over recent months, people in the trade have been saying that the new OE yarns from Fils Textil gave improved results in this area. If one looks at the twist liveliness and the angle of spirality in the fabrics it appears that there is some justification in their observations.

As one would expect, the yarn strength is reduced on the open end or Rotor Spun yarns with both the carded and combed base yarns giving similar results.

Comparing the greige fabric AW test results from the three yarns shows relaxed courses having a spread of approximately 3.5%, between ring spun and OE carded yarns. In wales AW the largest differences are between ring spun and OE combed yarn (approximately 8.5%). On weight the maximum differences were only 2.6%.

In the dyed only fabrics the maximum differences in dimensions AW are:-

Courses (approx. 3.6%)
Wales (approx. 5.9%)
Weight (approx. 1.3%)

which are less than the differences recorded in the greige state.

The differences in the dyed and resin finished fabrics are:-

Courses - 2.75%
Wales - 1.92%
Weight - 0.24%

which are less than both the greige state and the dyed only state.

This somewhat clouds the issue as the only concern the manufacturer has is whether any change in yarn type can have an effect on the end product, and one has to say, in this particular case, that the answer would have to be that the fabric performances are similar, and this is confirmed by the shrinkage results. However, more evidence is needed before definite conclusions can be drawn.

The nitrogen results indicate a fixation after resin treatment of approximately 80%, which indicates inadequate curing. This is substantiated by the high free-formaldehyde levels of over 2000 ppm.

Looking at the possible colour changes brought about by the resin finishing the following observations were made.

If one calculates the ΔE from the colour values of R. G. and B. they are:-

Sample 1 = 1.95
Sample 2 = 0.98
Sample 3 = 0.35

which indicates no significant differences between the dyed only and the dyed and resin treated fabrics in this pink shade.

Measurements of the strength losses incurred as a result of the resin treatment show the losses in yarn strength to be greater by 7-10% than those recorded on fabric (Burst Strength).

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ATKINS
COURTAULDS/LW

Sample no.	1
Yarn count (Tex)	19.23
Twist (turns per metre)	800.50
Single end strength (g)	290.82
Extension at break (%)	5.63
Coefficient of friction (mu)	0.11
Twist liveliness (tpm)	54.55
Yarn Count (Ne)	30.71
Turns per inch	20.33
Twist Factor - alpha Tex	35.10
Twist Factor - English	3.67
Tenacity (g./Tex)	15.12

ATKINS
NAOUSSA/OE

Sample no.	2
Yarn count (Tex)	20.42
Twist (turns per metre)	872.50
Single end strength (g)	236.66
Extension at break (%)	5.85
Coefficient of friction (mu)	0.13
Twist liveliness (tpm)	51.75
Yarn Count (Ne)	28.92
Turns per inch	22.16
Twist Factor - alpha Tex	39.42
Twist Factor - English	4.12
Tenacity (g./Tex)	11.59

ATKINS
FILS/OE

Sample no.	3
Yarn count (Tex)	19.97
Twist (turns per metre)	805.00
Single end strength (g)	236.24
Extension at break (%)	5.63
Coefficient of friction (mu)	0.12
Twist liveliness (tpm)	38.55
Yarn Count (Ne)	29.58
Turns per inch	20.45
Twist Factor - alpha Tex	35.97
Twist Factor - English	3.76
Tenacity (g./Tex)	11.83

ATKINS - SINGLE JERSEY - YARN FROM 3 SOURCES
GREY FABRIC

Lab ref no 1129
MARCH 1985

Sample no.	1	2	3
Length shrinkage, TD			
Width shrinkage, TD			
Length shrinkage, 5x			
Width shrinkage, 5x			
Weight (gsm)BW	126.60	134.48	130.94
Weight (gsm)AW	167.74	172.10	170.31
Courses per 3cm BW	57.60	60.00	59.20
Courses per 3cm TD			
Courses per 3cm AW	63.80	66.00	64.60
Wales per 3cm BW	34.20	33.00	33.40
Wales per 3cm TD			
Wales per 3cm AW	47.40	44.60	43.60
Stitch length (mm) BW	2.80	2.81	2.82
Stitch length (mm) AW	2.78	2.77	2.78
Burst strength, BW	574.40	444.50	504.90
Burst strength, AW	617.00	444.10	495.30
Distension at burst, BW	16.13	15.68	16.61
Distension at burst, AW	20.42	21.36	20.81
Angle of spirality, BW	12.10	9.28	7.95
Angle of spirality, AW	22.26	14.47	15.48
Width, BW	49.60	50.47	51.57
Yarn strength, BW	281.15	198.09	212.09
Yarn strength, AW	256.84	190.57	203.57
Yarn extension at break, BW	6.89	6.47	5.95
Yarn extension at break, AW	7.55	7.38	7.20
Yarn count (tex), BW	19.50	20.26	20.26
Yarn count (tex), AW	18.98	20.00	19.85
Thickness, BW	565.20	658.10	620.70
Thickness, AW	796.10	829.40	779.30
Turns per metre	820.00	877.50	803.00
Free Formaldehyde (p.p.m.)			
Total Nitrogen (%)			
Fixed Nitrogen (%)			
Colour - R value			
Colour - G value			
Colour - B value			

ATKINS - SINGLE JERSEY - YARN FROM 3 SOURCES
DYED ONLY

Lab ref no 1129
MARCH 1985

Sample no.	1	2	3
Length shrinkage, TD	10.53	11.92	10.76
Width shrinkage, TD	10.26	8.56	8.82
Length shrinkage, 5x	11.03	12.36	11.83
Width shrinkage, 5x	9.70	8.16	8.12
Weight (gsm)BW	123.13	129.19	127.69
Weight (gsm)AW	153.24	155.48	154.08
Courses per 3cm BW	53.80	53.60	53.60
Courses per 3cm TD	59.20	60.00	59.20
Courses per 3cm AW	60.20	62.40	61.20
Wales per 3cm BW	41.00	39.40	40.80
Wales per 3cm TD	45.40	44.20	44.40
Wales per 3cm AW	46.60	44.00	44.40
Stitch length (mm) BW	2.78	2.76	2.77
Stitch length (mm) AW	2.74	2.75	2.77
Burst strength, BW	574.20	453.80	532.00
Burst strength, AW	605.20	483.00	519.10
Distension at burst, BW	16.05	16.12	15.28
Distension at burst, AW	19.01	18.92	18.33
Angle of spirality, BW	10.32	10.88	7.49
Angle of spirality, AW	19.29	13.39	12.19
Width, BW	43.67	44.53	44.60
Yarn strength, BW	317.00	234.01	273.24
Yarn strength, AW	309.16	249.99	259.65
Yarn extension at break, BW	6.37	6.20	6.02
Yarn extension at break, AW	6.38	5.64	5.59
Yarn count (tex), BW	18.09	19.53	19.37
Yarn count (tex), AW	18.57	19.29	19.21
Thickness, BW	524.10	570.50	537.80
Thickness, AW	724.50	741.60	691.40
Turns per metre			
Free Formaldehyde (p.p.m.)	244.52	112.85	126.79
Total Nitrogen (%)	0.04	0.05	0.05
Fixed Nitrogen (%)	0.06	0.07	0.07
Colour - R value	74.90	73.79	74.92
Colour - G value	60.14	58.41	60.29
Colour - B value	59.79	58.11	59.49

DATA CHECKS

Calc/Obs Wt BW	1.00	0.98	1.02
Calc/Obs Wt AW	1.04	1.04	1.04
Calc/Obs Courses/3cm AW	1.00	0.98	0.99
Calc/Obs Wales/3cm AW	0.97	0.97	1.00

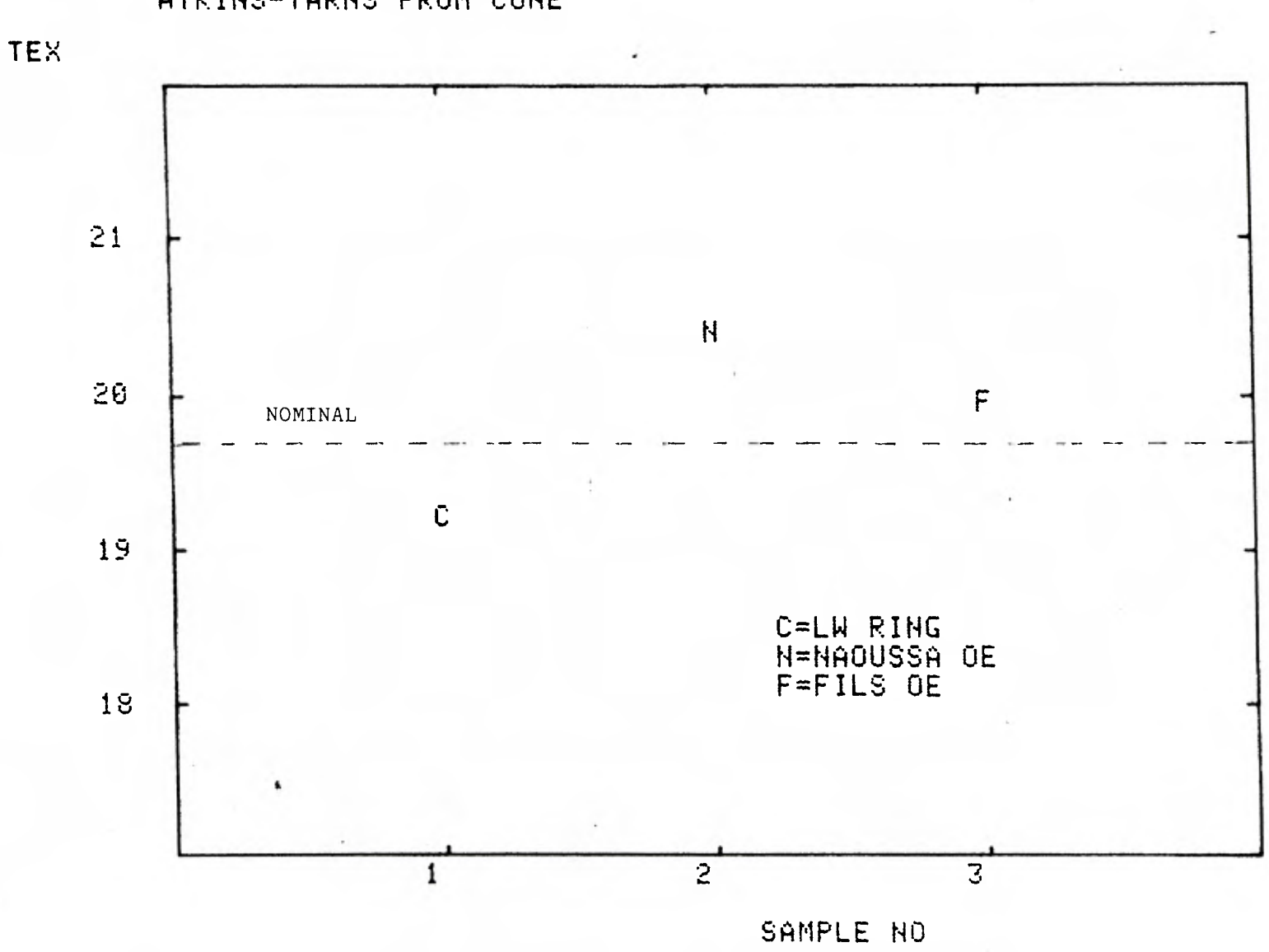
ATKINS - SINGLE JERSEY - YARN FROM 3 SOURCES
RESIN FINISHED

Lab ref no 1129
MARCH 1985

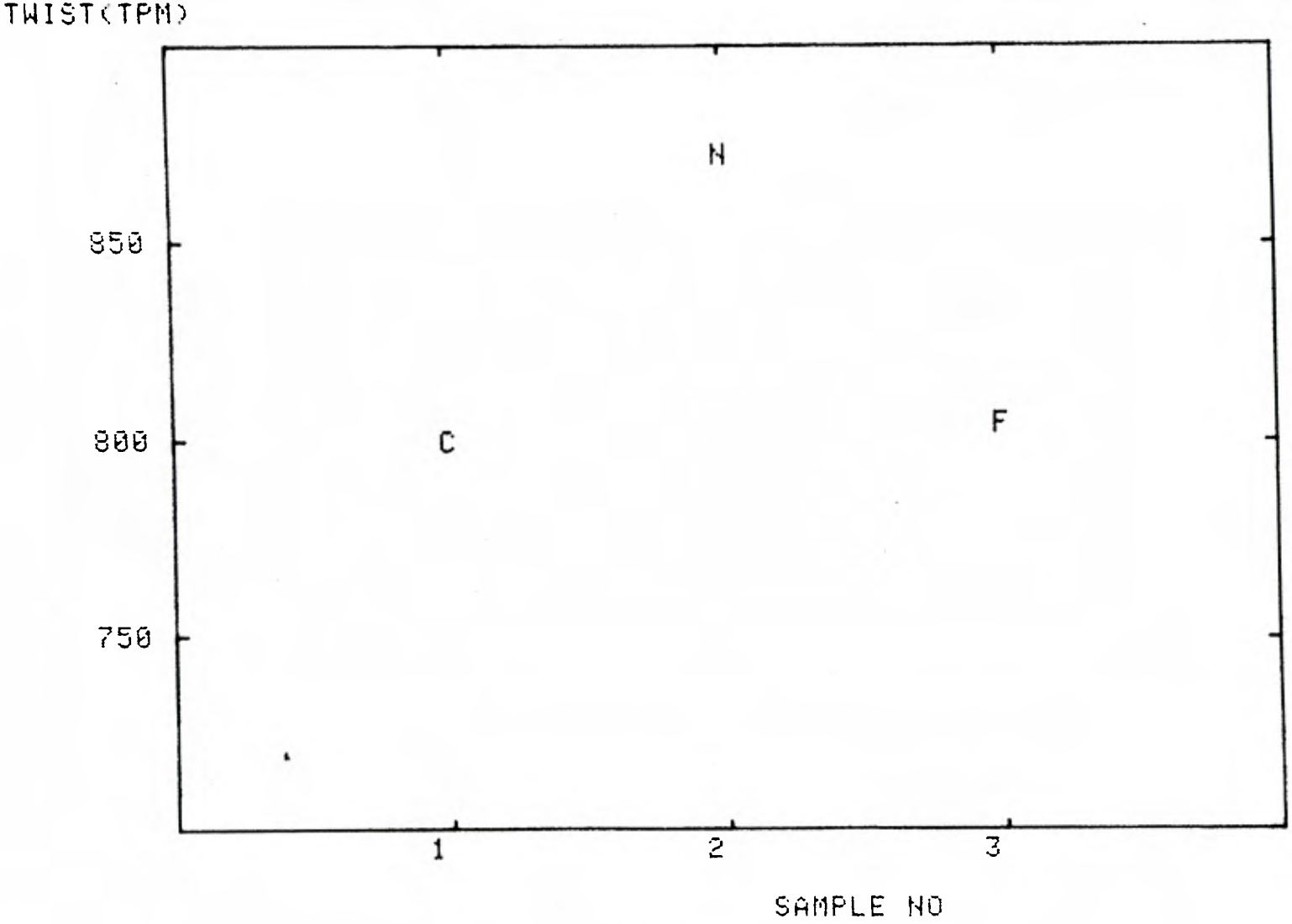
Sample no.	1	2	3
Length shrinkage, TD	7.03	6.86	6.65
Width shrinkage, TD	7.71	5.97	6.33
Length shrinkage, 5x	7.03	6.86	6.51
Width shrinkage, 5x	8.16	5.68	6.17
Weight (gsm)BW	123.60	127.79	127.60
Weight (gsm)AW	141.13	141.20	141.48
Courses per 3cm BW	54.60	55.20	54.60
Courses per 3cm TD	58.00	58.60	57.60
Courses per 3cm AW	58.60	60.20	58.00
Wales per 3cm BW	39.60	39.00	39.20
Wales per 3cm TD	42.60	40.20	41.80
Wales per 3cm AW	42.40	41.80	41.60
Stitch length (mm) BW	2.76	2.77	2.78
Stitch length (mm) AW	2.78	2.78	2.78
Burst strength, BW	426.60	326.20	371.80
Burst strength, AW	437.40	373.10	379.40
Distension at burst, BW	15.28	15.75	15.59
Distension at burst, AW	18.04	18.06	17.02
Angle of spirality, BW	10.19	9.87	9.41
Angle of spirality, AW	14.79	12.49	11.09
Width, BW	46.03	46.57	46.17
Yarn strength, BW	209.12	151.83	161.91
Yarn strength, AW	191.01	151.53	163.39
Yarn extension at break, BW	5.07	4.76	4.70
Yarn extension at break, AW	5.10	5.03	4.76
Yarn count (tex), BW	18.88	19.78	19.79
Yarn count (tex), AW	19.35	18.89	19.32
Thickness, BW	521.80	554.30	525.80
Thickness, AW	648.00	689.30	624.60
Turns per metre			
Free Formaldehyde (p.p.m.)	2591.25	2658.88	2010.76
Total Nitrogen (%)	0.36	0.40	0.40
Fixed Nitrogen (%)	0.30	0.34	0.33
Colour - R value	75.19	74.09	74.25
Colour - G value	61.24	59.13	59.81
Colour - B value	60.42	58.82	59.23

DATA CHECKS

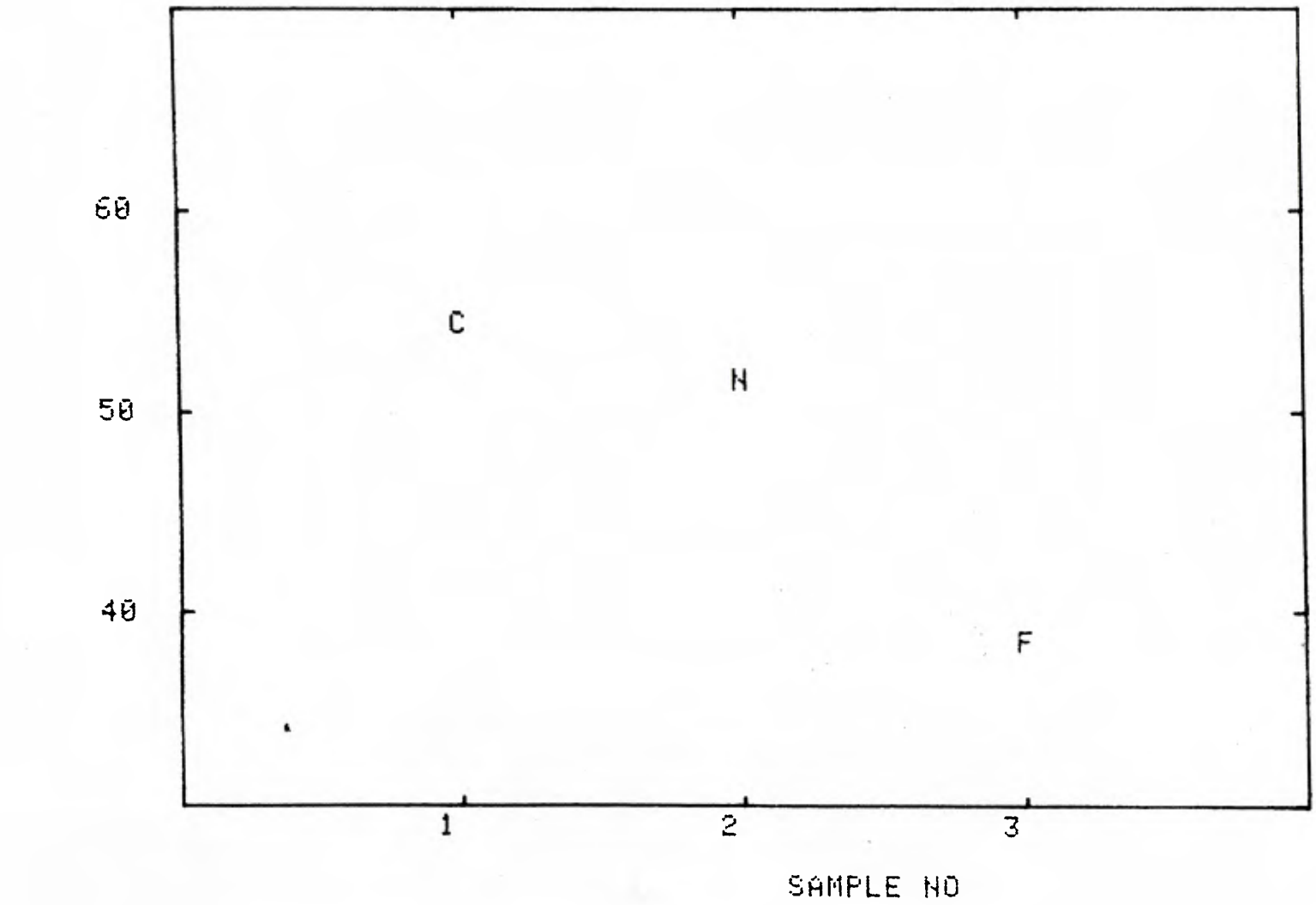
Calc/Obs Wt BW	1.01	1.03	1.03
Calc/Obs Wt AW	1.05	1.04	1.02
Calc/Obs Courses/3cm AW	1.00	0.98	1.01
Calc/Obs Wales/3cm AW	1.02	0.99	1.00

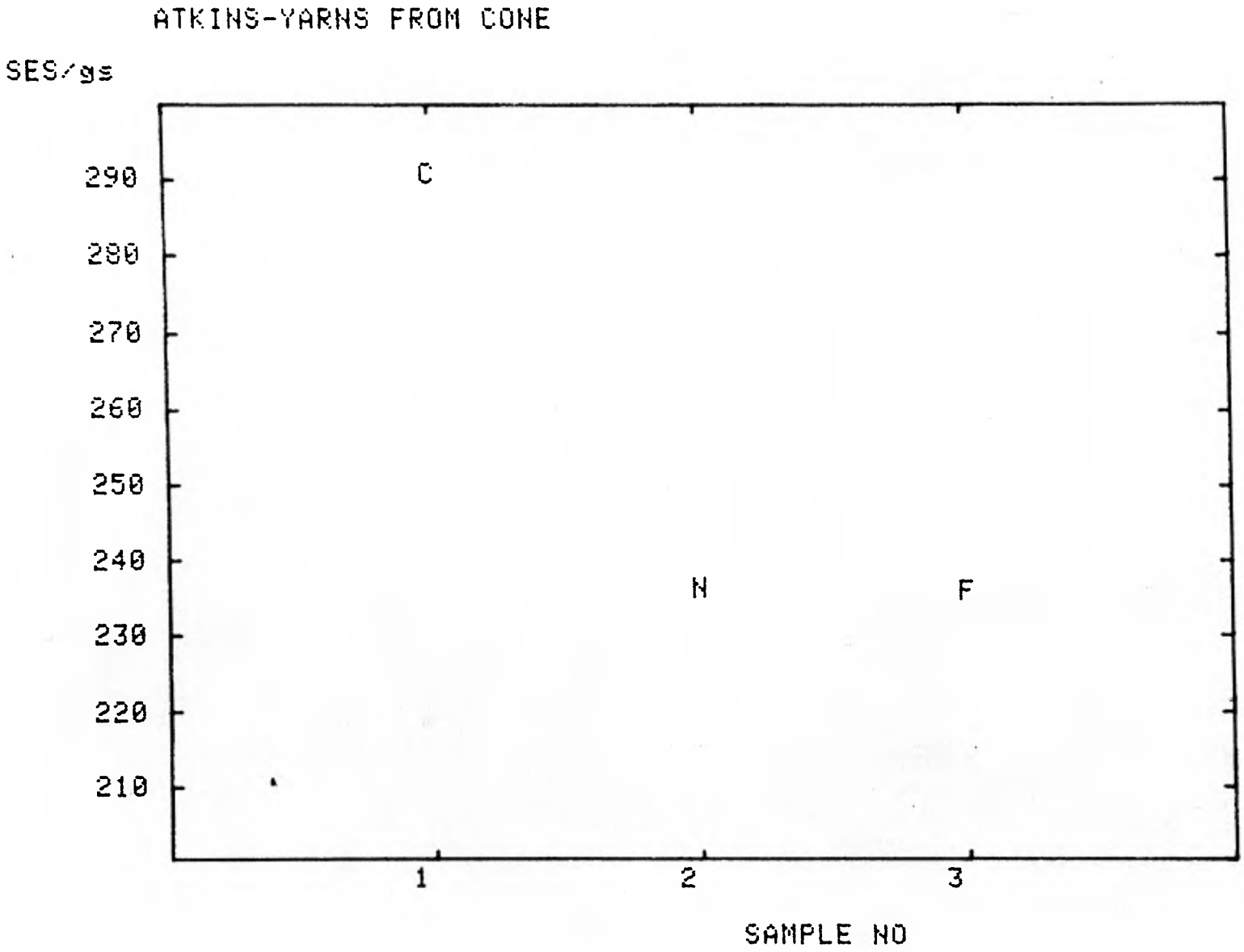

ATKINS-YARNS FROM CONE
TEX
21
20
19
18
NOMINAL
N
F
C
C=LW RING
N=NAOUSSA OE
F=FILS OE
1
2
3
SAMPLE NO

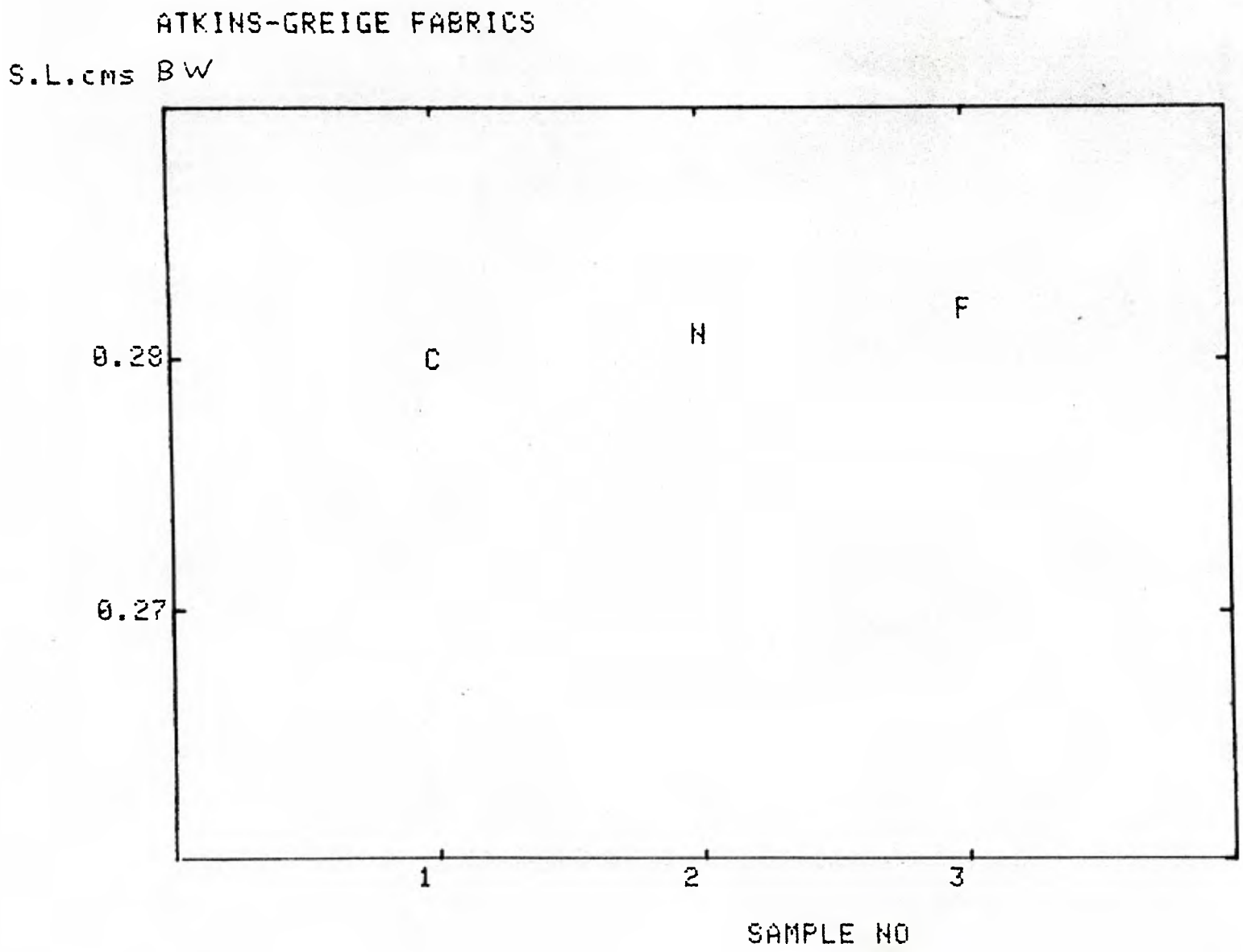
ATKINS-YARNS FROM CONE



ATKINS-YARN FROM CONE (T.L=TWIST LIVELINESS)

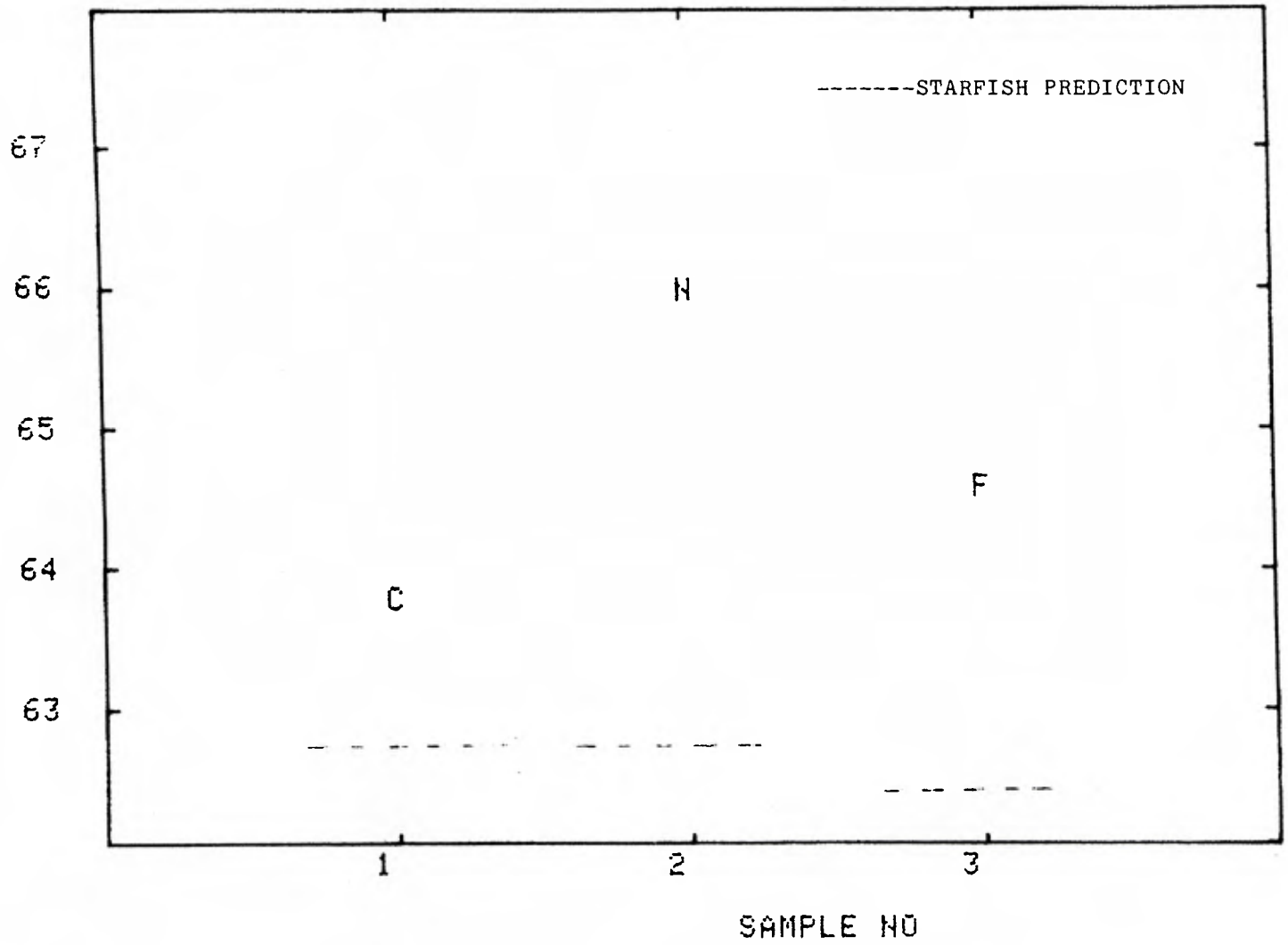



ATKINS-YARNS FROM CONE
SES/gs
290
280
270
260
250
240
230
220
210
C
N
F
1
2
3
SAMPLE NO


ATKINS-GREIGE FABRICS
S.L.cms B W
0.28
0.27
C
N
F
1
2
3
SAMPLE NO

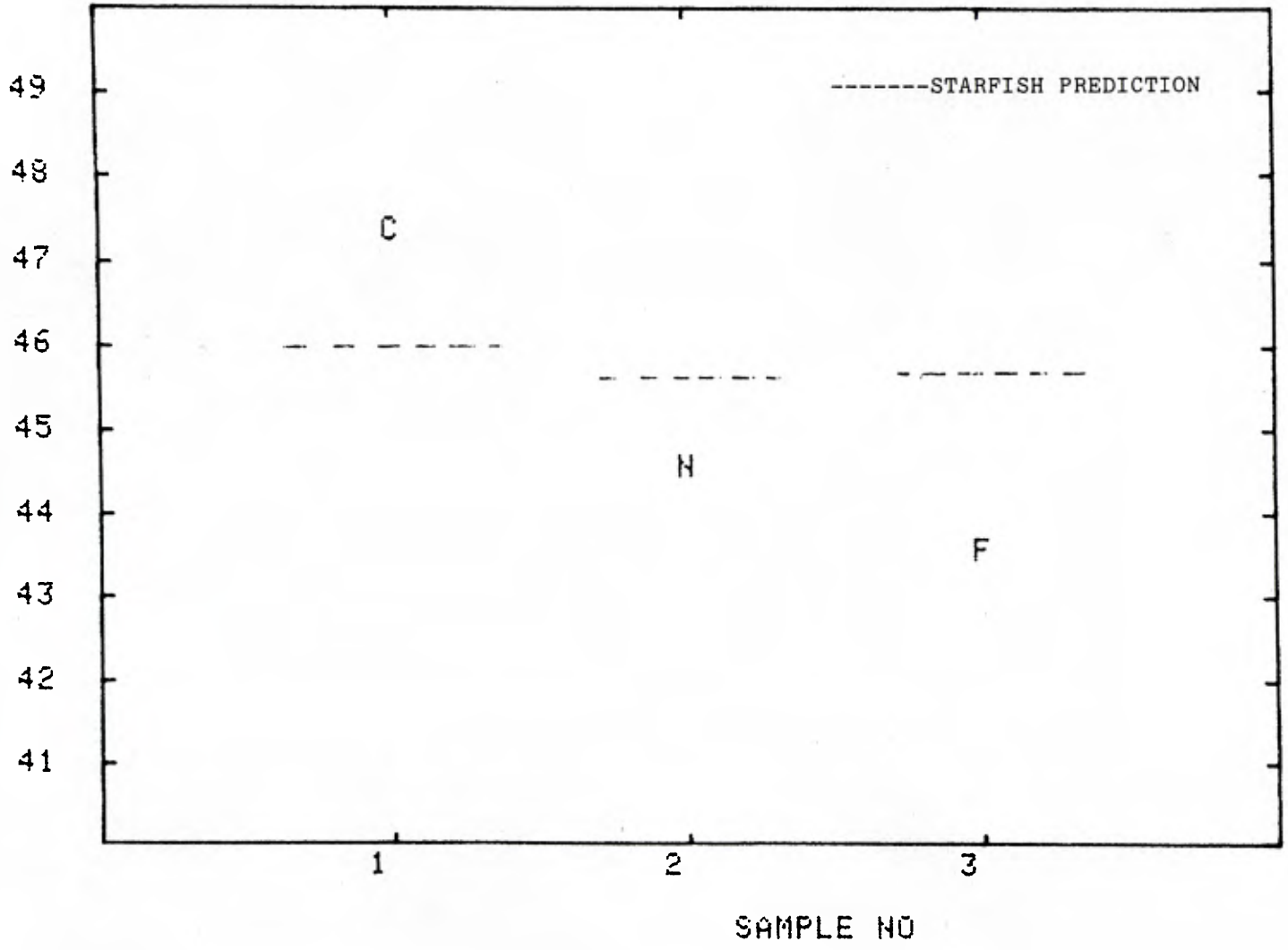
ATKINS-GREIGE FABRICS

COURSES/3cms AW.

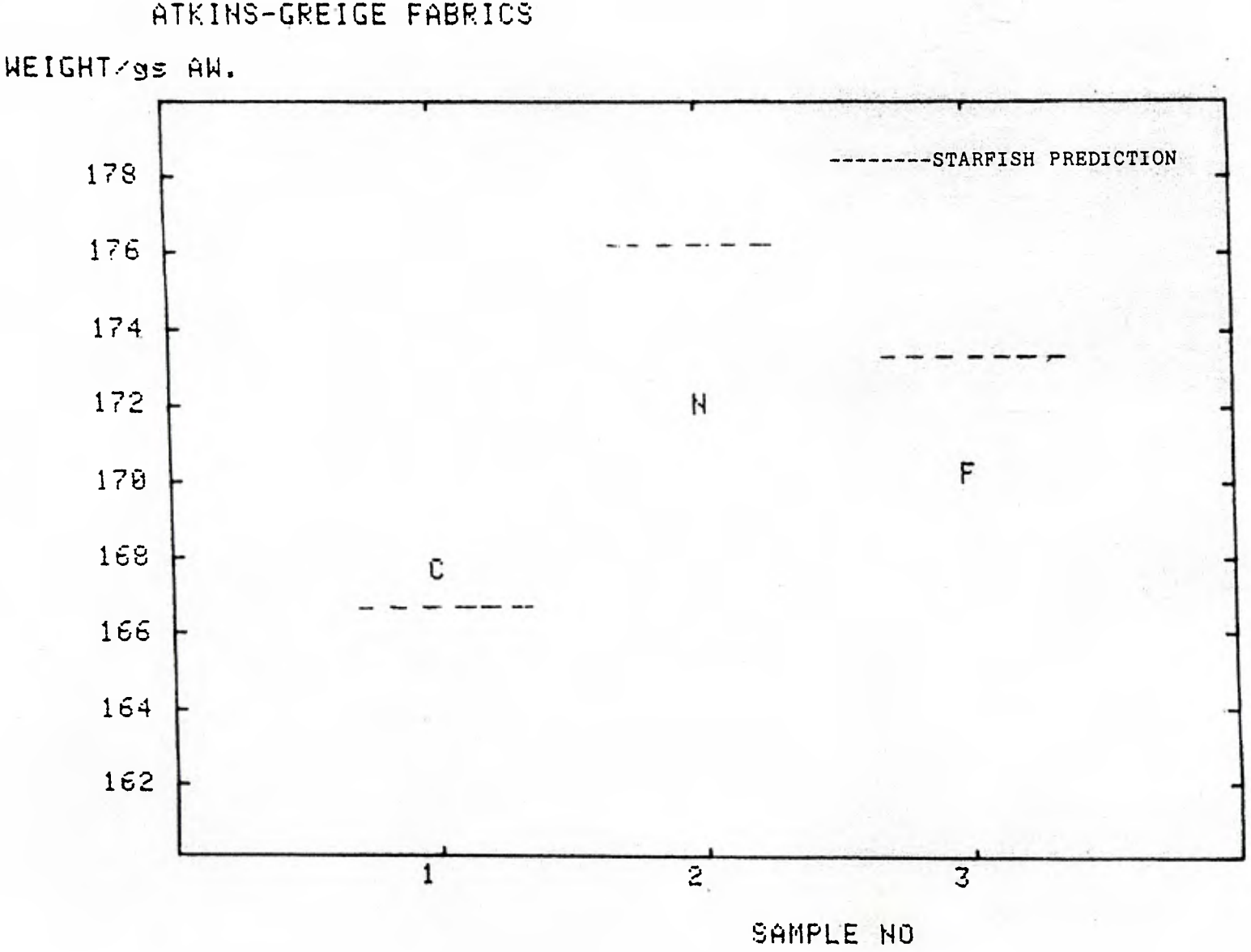


ATKINS-GREIGE FABRICS

WALES/3cms AW.

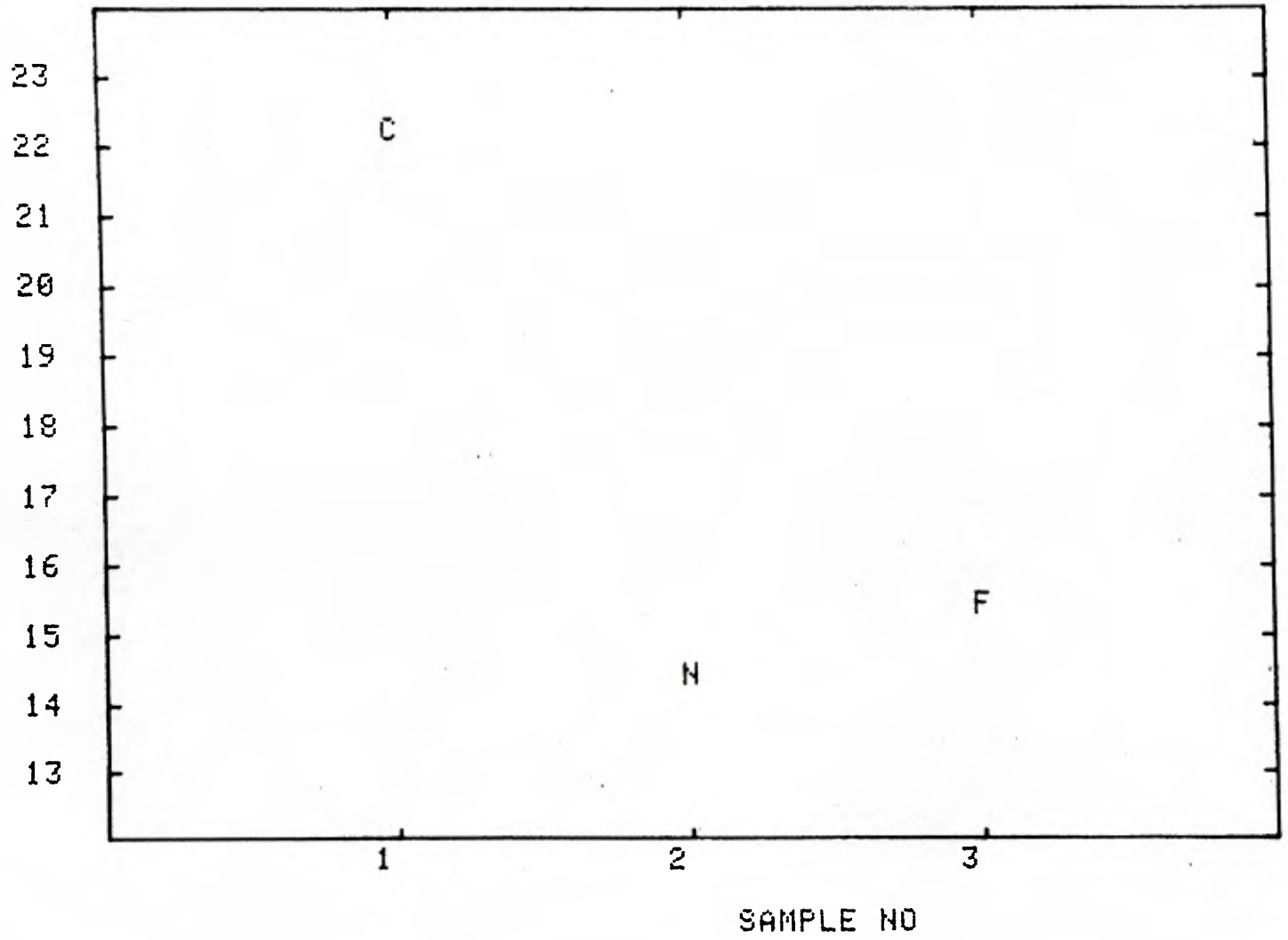


ATKINS-GREIGE FABRICS



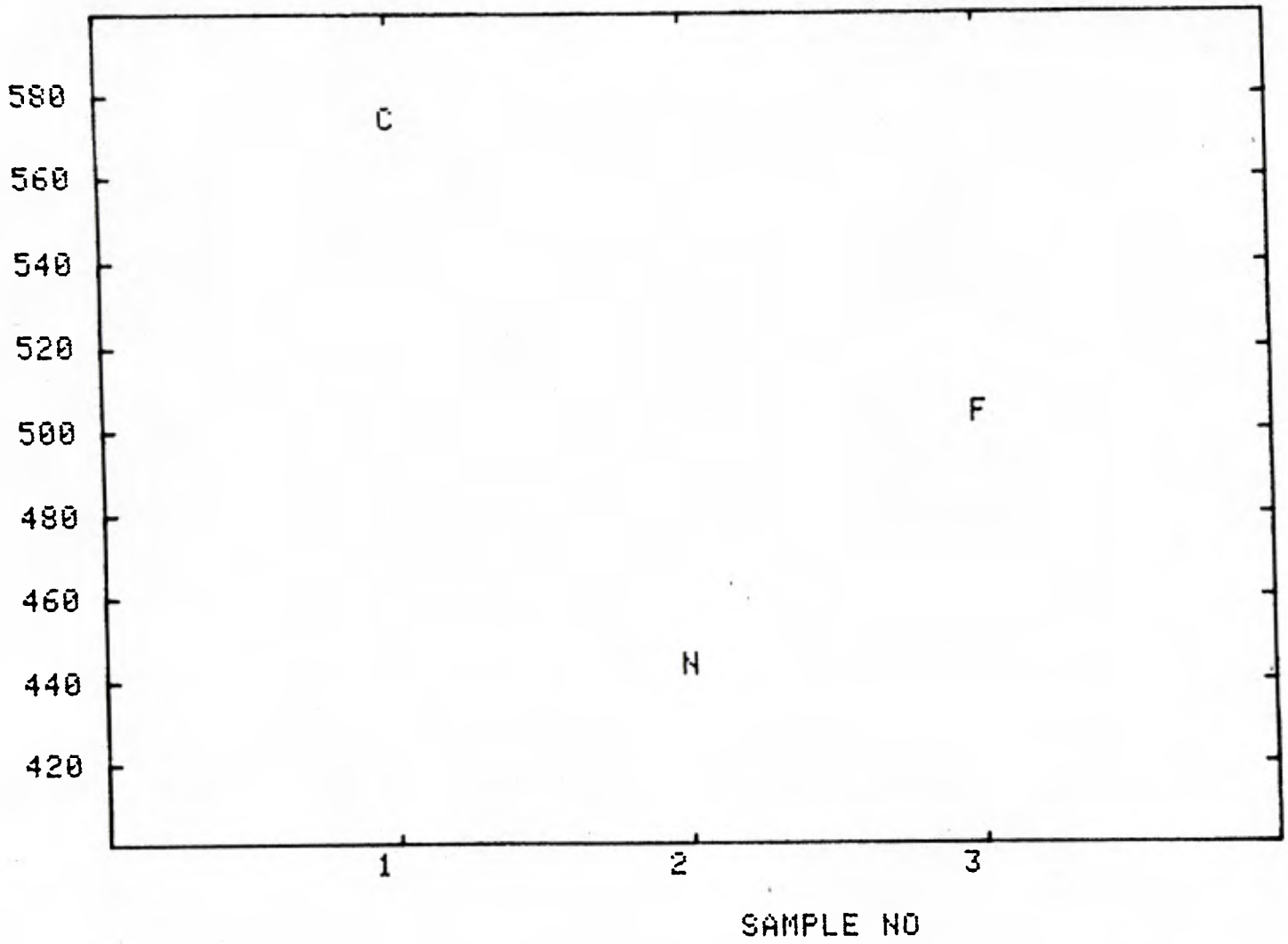
ATKINS-GREIGE FABRICS

SPIRALITY/ AW.



ATKINS-GREIGE FABRICS

BURST ST.BW.

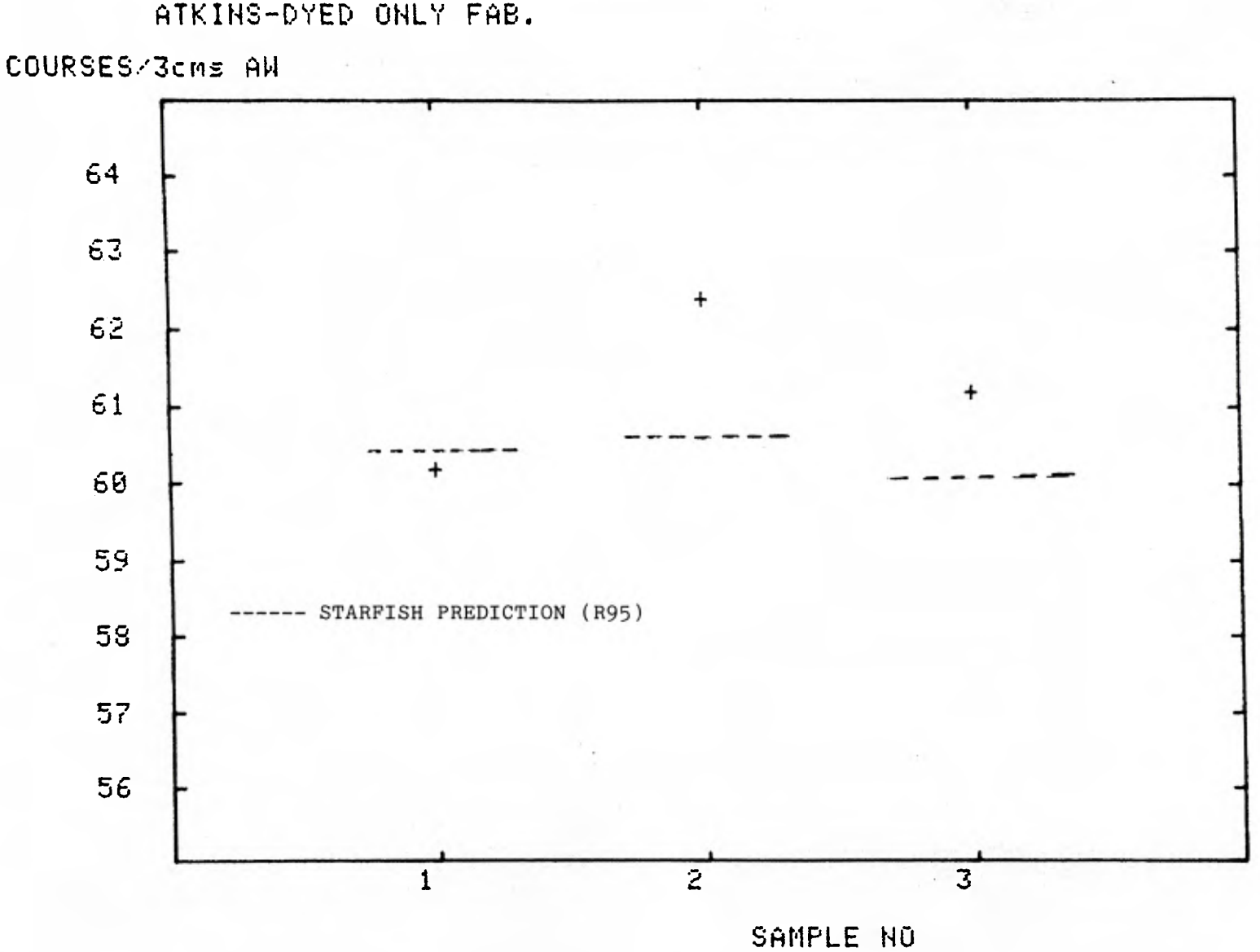


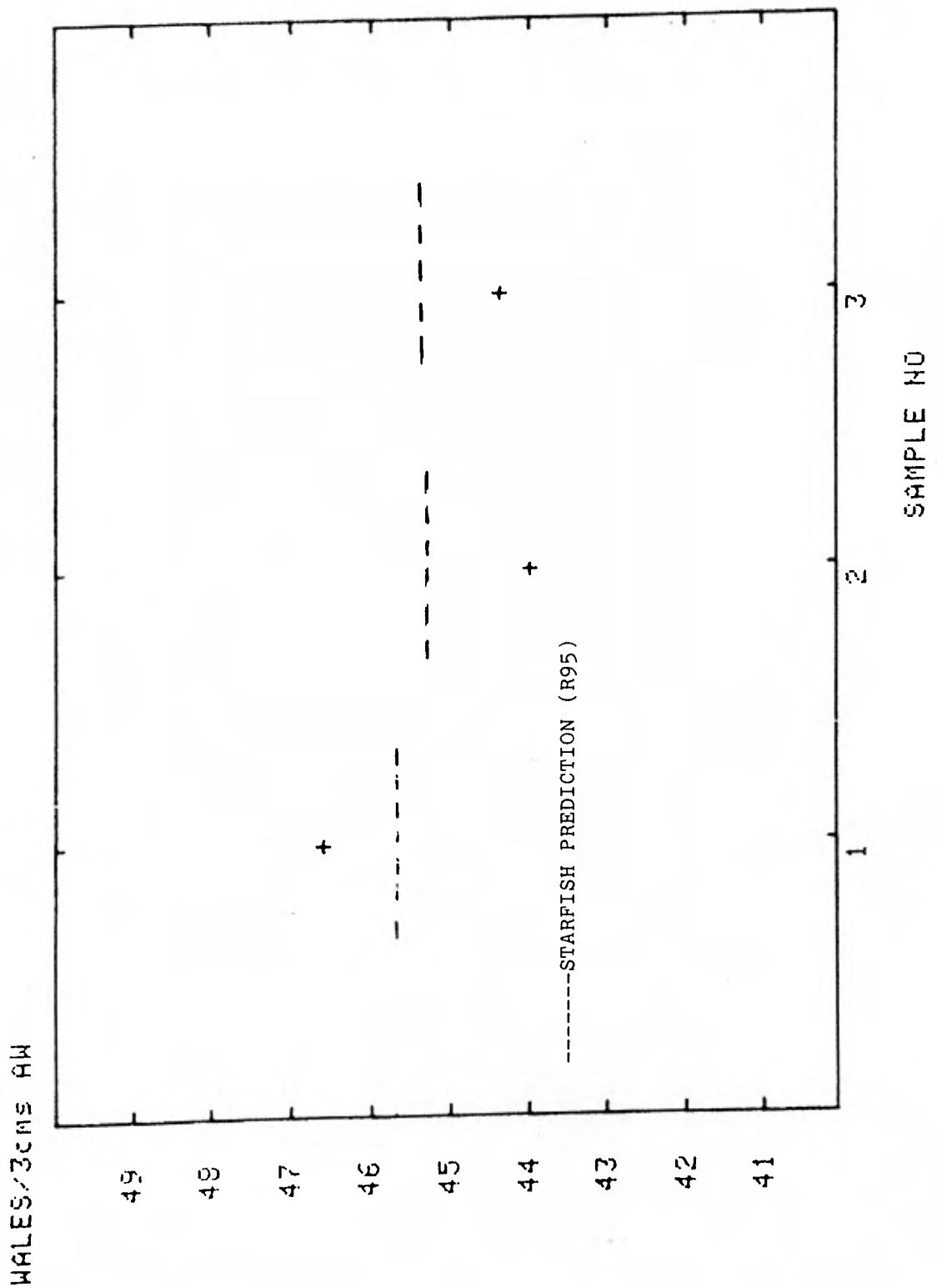
IIC -STARFISH 84- MODEL PREDICTIONS

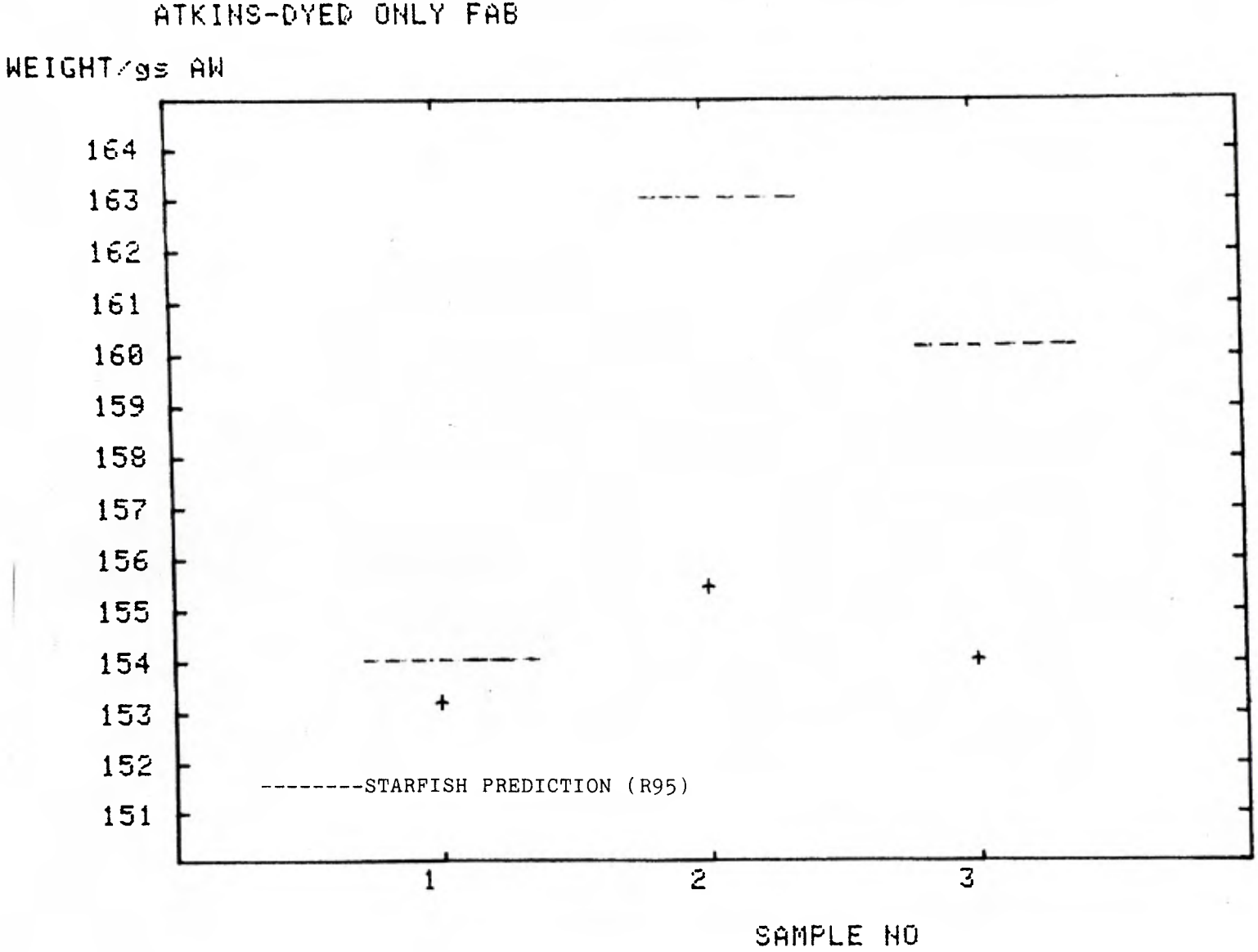
Plain Single Jersey - singles,combed ring yarns
24g 16in 1200 needles
Greige
Targets are Greige Length & Width Shrinkages 03-APR-85 10:10

Average as knitted				Average as delivered				Shrinkage (5 W&T)			
Yarn Tex	StLen cm	C.Len cm	Tness Fctr	courses 3cm	wales 3cm	weight g/sm	width cm(T)	Length %	Width %		
19.2	0.2800	336.0	15.6	62.7	46.0	167	39.1	0.0	0.0	*	Sample No 1
20.4	0.2810	337.2	16.1	62.7	45.5	176	39.6	0.0	0.0	*	Sample No 2
20.0	0.2820	338.4	15.9	62.4	45.5	173	39.6	0.0	0.0	*	Sample No 3

NB : Shrinkage convention is + for growth, - for contraction
: Qualities marked with * have unreasonable finishing targets
: Estimates are given in good faith but without liability
: Yarn counts are given as Resultant for folded yarns
: Tightness Factor is Root(Tex)/St.Len in cm


ATKINS-DYED ONLY FAB.
COURSES/3cms AW
64
63
62
61
60
59
58
57
56
------ STARFISH PREDICTION (R95)
1
2
3
SAMPLE NO


ATKINS-DYED ONLY FAB.
WALES/3cms AW
49
48
47
46
45
44
43
42
41
1
2
3
SAMPLE NO
------STARFISH PREDICTION (R95)


ATKINS-DYED ONLY FAB
WEIGHT/gs AW
164
163
162
161
160
159
158
157
156
155
154
153
152
151
--------STARFISH PREDICTION (R95)
1
2
3
SAMPLE NO

IIC -STARFISH 84- MODEL PREDICTIONS

Plain Single Jersey - singles,combed ring yarns
24g 16in 1200 needles
Winch dye (medium)
Targets are Finished Length & Width Shrinkages 02-APR-85 11:06

Yarn Tex	Average as knitted StLen cm	C.Len cm	Tness Fctr	Average as delivered courses 3cm	wales 3cm	weight g/sm	width cm(T)	Shrinkage (5 W&T) Length %	Width %	
19.2	0.2800	336.0	15.6	60.2	44.8	152	40.2	0.0	0.0	*

NB : Shrinkage convention is + for growth, - for contraction
: Qualities marked with * have unreasonable finishing targets
: Estimates are given in good faith but without liability
: Yarn counts are given as Resultant for folded yarns
: Tightness Factor is Root(Tex)/St.Len in cm

IIC -STARFISH 84- MODEL PREDICTIONS

Plain Single Jersey - singles,combed ring yarns
24g 16in 1200 needles
R-Jet95 (medium) + Tubular finish
Targets are Finished Length & Width Shrinkages 02-APR-85 11:06

Yarn Tex	Average as knitted StLen cm	C.Len cm	Tness Fctr	Average as delivered courses 3cm	wales 3cm	weight g/sm	width cm(T)	Shrinkage (5 W&T) Length %	Width %	
19.2	0.2800	336.0	15.6	60.3	45.7	154	39.4	0.0	0.0	*

NB : Shrinkage convention is + for growth, - for contraction
: Qualities marked with * have unreasonable finishing targets
: Estimates are given in good faith but without liability
: Yarn counts are given as Resultant for folded yarns
: Tightness Factor is Root(Tex)/St.Len in cm

IIC -STARFISH 84- MODEL PREDICTIONS

Plain Single Jersey - singles,combed ring yarns
24g 16in 1200 needles
Rotostream (medium) + Open width finish
Targets are Finished Length & Width Shrinkages 02-APR-85 11:07

Yarn Tex	Average as knitted StLen cm	C.Len cm	Tness Fctr	Average as delivered courses 3cm	wales 3cm	weight g/sm	width cm(T)	Shrinkage (5 W&T) Length %	Width %	
19.2	0.2800	336.0	15.6	59.3	45.4	152	39.6	0.0	0.0	*

NB : Shrinkage convention is + for growth, - for contraction
: Qualities marked with * have unreasonable finishing targets
: Estimates are given in good faith but without liability
: Yarn counts are given as Resultant for folded yarns
: Tightness Factor is Root(Tex)/St.Len in cm

IIC -STARFISH 84- MODEL PREDICTIONS

Plain Single Jersey - singles,combed ring yarns
24g 16in 1200 needles
Winch dye (medium)
Targets are Finished Length & Width Shrinkages 02-APR-85 11:09

Yarn Tex	Average as knitted StLen cm	C.Len cm	Tness Fctr	Average as delivered courses 3cm	wales 3cm	weight g/sm	width cm(T)	Shrinkage (5 W&T) Length %	Width %	
20.4	0.2810	337.2	16.1	60.5	44.1	160	40.8	0.0	0.0	*

NB : Shrinkage convention is + for growth, - for contraction
: Qualities marked with * have unreasonable finishing targets
: Estimates are given in good faith but without liability
: Yarn counts are given as Resultant for folded yarns
: Tightness Factor is Root(Tex)/St.Len in cm

IIC -STARFISH 84- MODEL PREDICTIONS

Plain Single Jersey - singles,combed ring yarns
24g 16in 1200 needles
R-Jet95 (medium) + Tubular finish
Targets are Finished Length & Width Shrinkages 02-APR-85 11:10

Yarn Tex	Average as knitted StLen cm	C.Len cm	Tness Fctr	Average as delivered courses 3cm	wales 3cm	weight g/sm	width cm(T)	Shrinkage (5 W&T) Length %	Width %	
20.4	0.2810	337.2	16.1	60.5	45.2	163	39.8	0.0	0.0	*

NB : Shrinkage convention is + for growth, - for contraction
: Qualities marked with * have unreasonable finishing targets
: Estimates are given in good faith but without liability
: Yarn counts are given as Resultant for folded yarns
: Tightness Factor is Root(Tex)/St.Len in cm

IIC -STARFISH 84- MODEL PREDICTIONS

Plain Single Jersey - singles,combed ring yarns
24g 16in 1200 needles
Rotostream (medium) + Open width finish
Targets are Finished Length & Width Shrinkages 02-APR-85 11:10

Yarn Tex	Average as knitted StLen cm	C.Len cm	Tness Fctr	Average as delivered courses 3cm	wales 3cm	weight g/sm	width cm(T)	Shrinkage (5 W&T) Length %	Width %	
20.4	0.2810	337.2	16.1	59.4	44.9	161	40.1	0.0	0.0	*

NB : Shrinkage convention is + for growth, - for contraction
: Qualities marked with * have unreasonable finishing targets
: Estimates are given in good faith but without liability
: Yarn counts are given as Resultant for folded yarns
: Tightness Factor is Root(Tex)/St.Len in cm

IIC -STARFISH 84- MODEL PREDICTIONS

Plain Single Jersey - singles,combed ring yarns
24g 16in 1200 needles
Winch dye (medium)
Targets are Finished Length & Width Shrinkages 02-APR-85 11:14

Yarn Tex	Average as knitted StLen cm	C.Len cm	Tness Fctr	Average as delivered courses 3cm	wales 3cm	weight g/sm	width cm(T)	Shrinkage (5 W&T) Length %	Width %	
20.0	0.2820	338.4	15.9	60.0	44.2	157	40.7	0.0	0.0	*

NB : Shrinkage convention is + for growth, - for contraction
: Qualities marked with * have unreasonable finishing targets
: Estimates are given in good faith but without liability
: Yarn counts are given as Resultant for folded yarns
: Tightness Factor is Root(Tex)/St.Len in cm

IIC -STARFISH 84- MODEL PREDICTIONS

Plain Single Jersey - singles,combed ring yarns
24g 16in 1200 needles
R-Jet95 (medium) + Tubular finish
Targets are Finished Length & Width Shrinkages 02-APR-85 11:15

Yarn Tex	Average as knitted StLen cm	C.Len cm	Tness Fctr	Average as delivered courses 3cm	wales 3cm	weight g/sm	width cm(T)	Shrinkage (5 W&T) Length %	Width %	
20.0	0.2820	338.4	15.9	60.1	45.2	160	39.8	0.0	0.0	*

NB : Shrinkage convention is + for growth, - for contraction
: Qualities marked with * have unreasonable finishing targets
: Estimates are given in good faith but without liability
: Yarn counts are given as Resultant for folded yarns
: Tightness Factor is Root(Tex)/St.Len in cm

IIC -STARFISH 84- MODEL PREDICTIONS

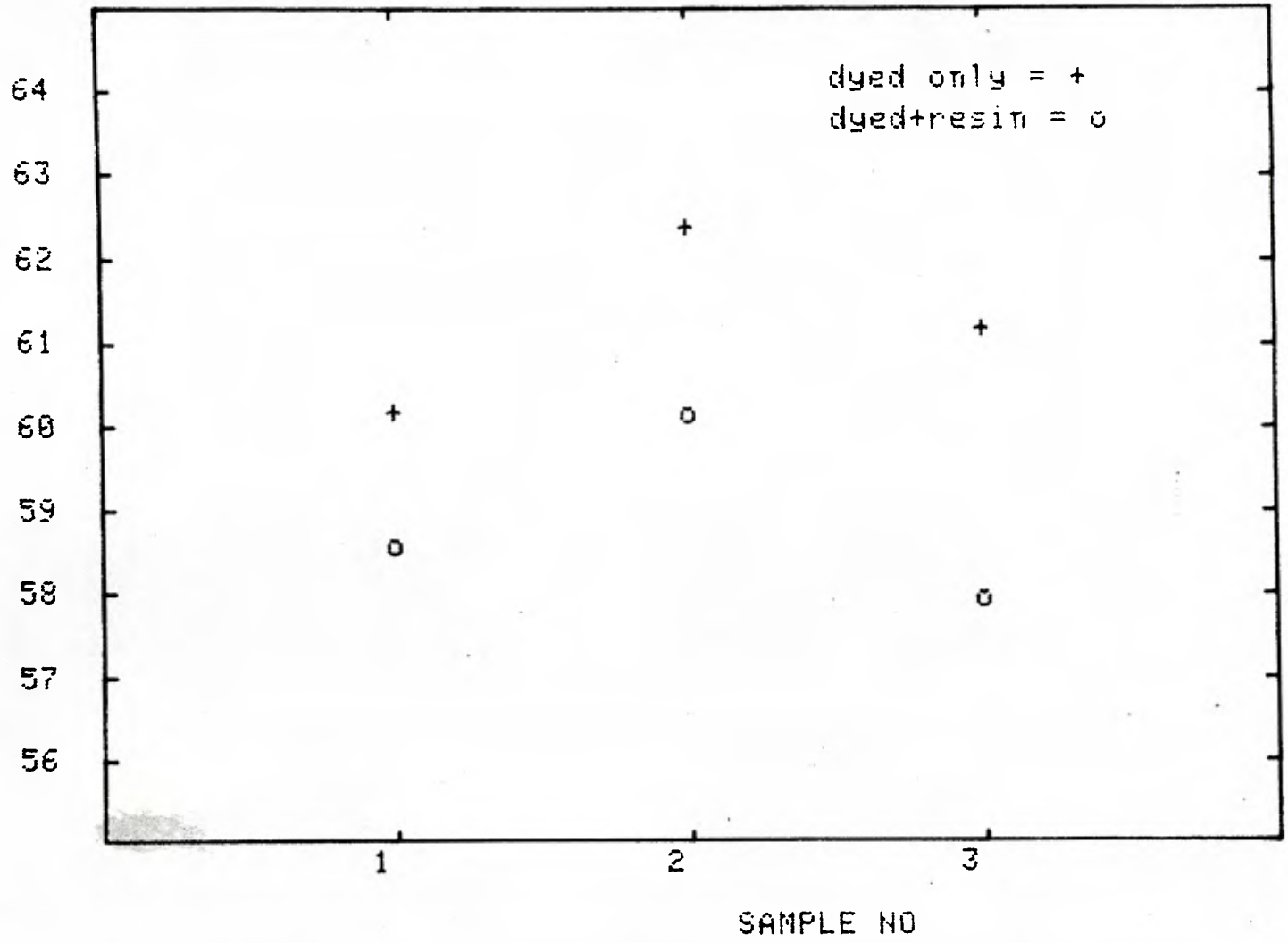
Plain Single Jersey - singles,combed ring yarns
24g 16in 1200 needles
Rotostream (medium) + Open width finish
Targets are Finished Length & Width Shrinkages 02-APR-85 11:15

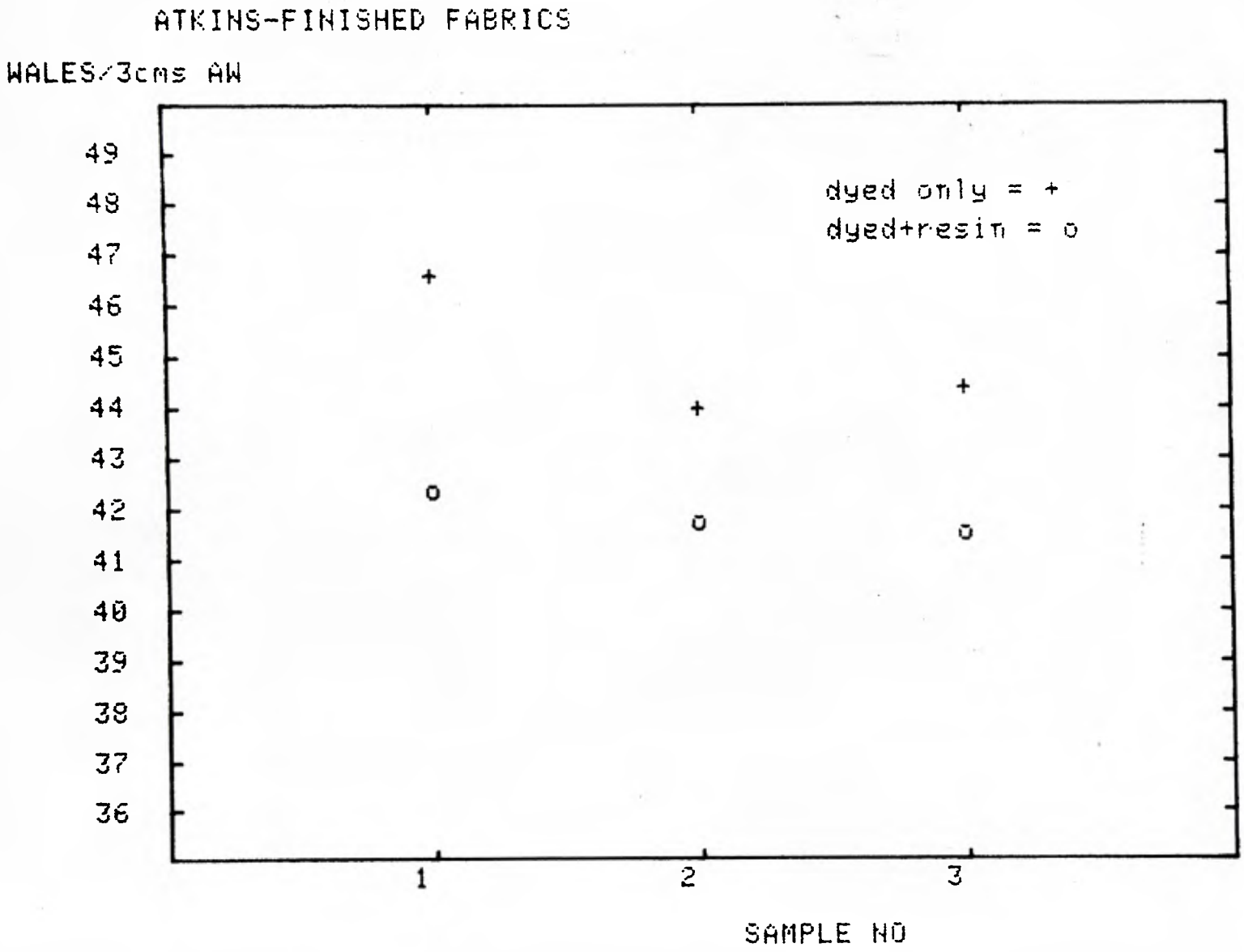
Yarn Tex	Average as knitted StLen cm	C.Len cm	Tness Fctr	Average as delivered courses 3cm	wales 3cm	weight g/sm	width cm(T)	Shrinkage (5 W&T) Length %	Width %	
20.0	0.2820	338.4	15.9	59.0	44.9	157	40.1	0.0	0.0	*

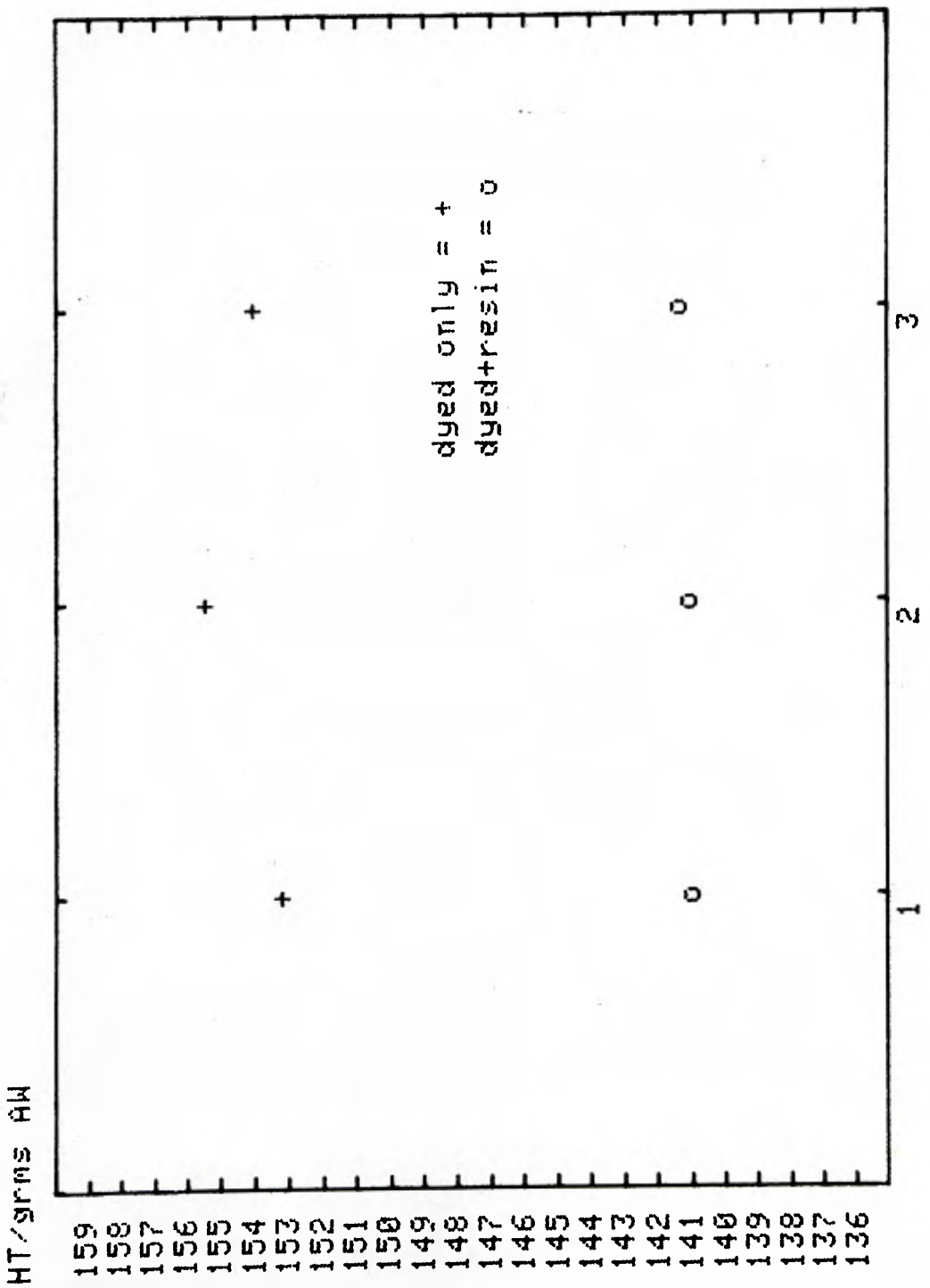
NB : Shrinkage convention is + for growth, - for contraction
: Qualities marked with * have unreasonable finishing targets
: Estimates are given in good faith but without liability
: Yarn counts are given as Resultant for folded yarns
: Tightness Factor is Root(Tex)/St.Len in cm

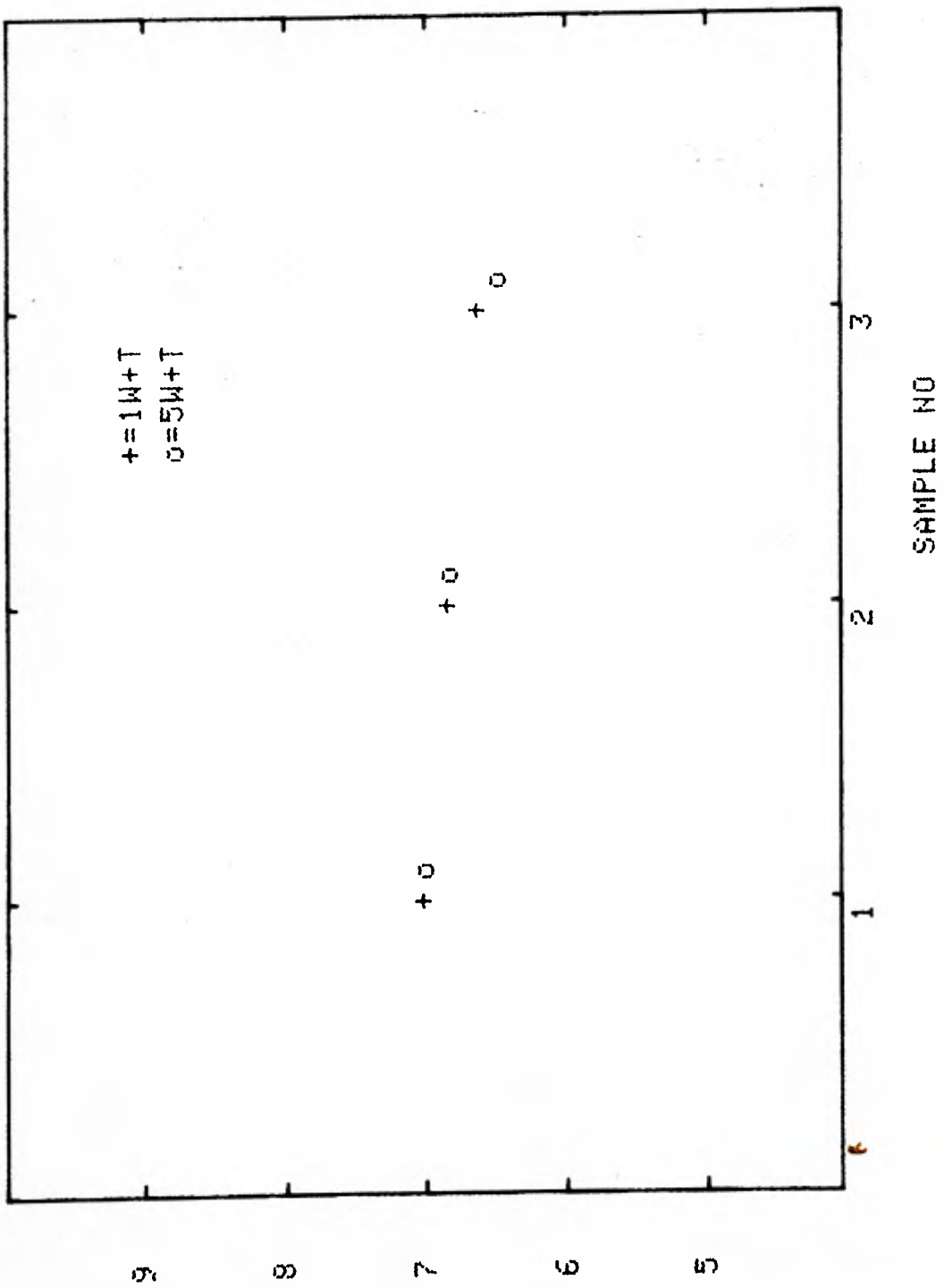
ATKINS-FINISHED FABRICS

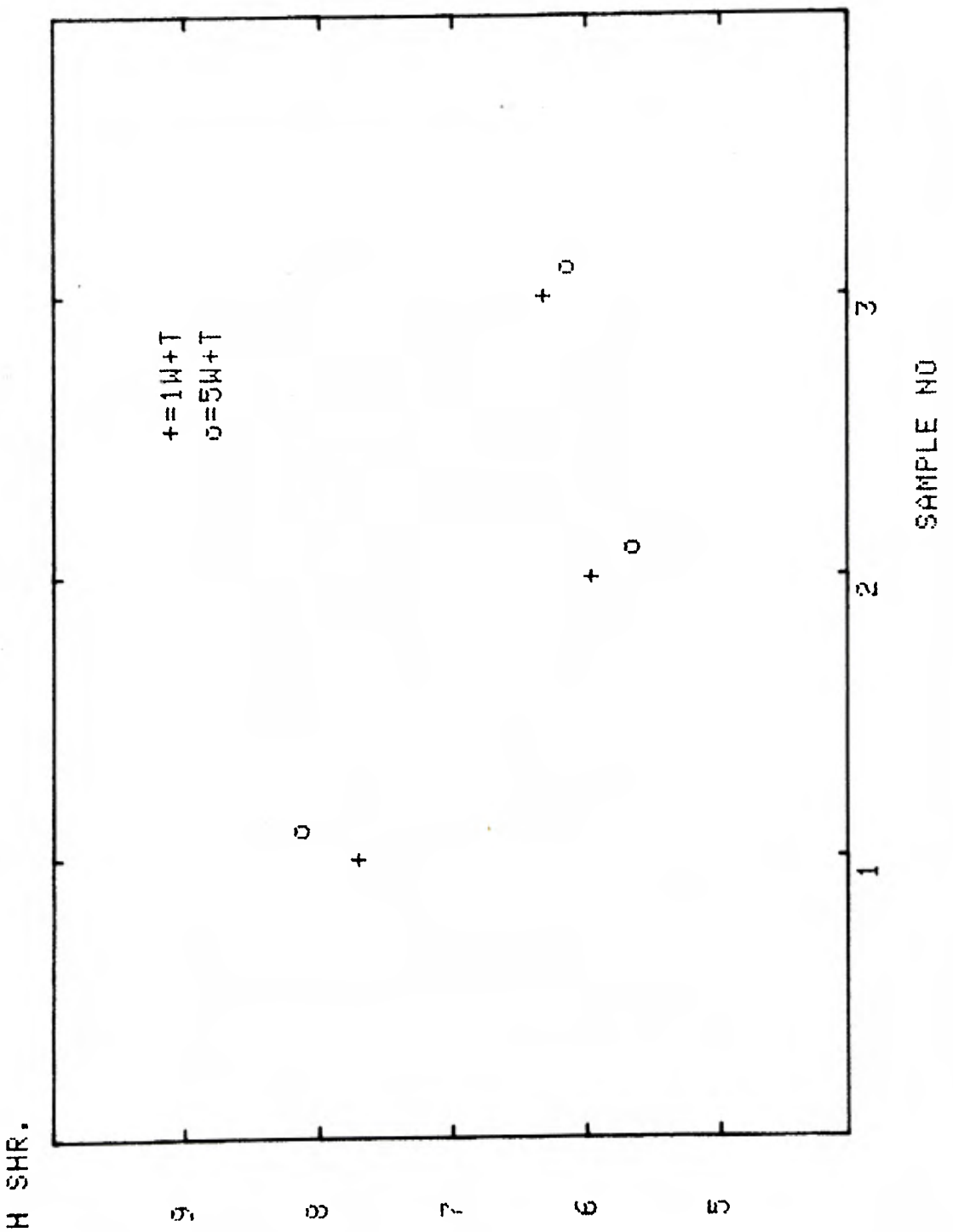
COURSES/3cms AW

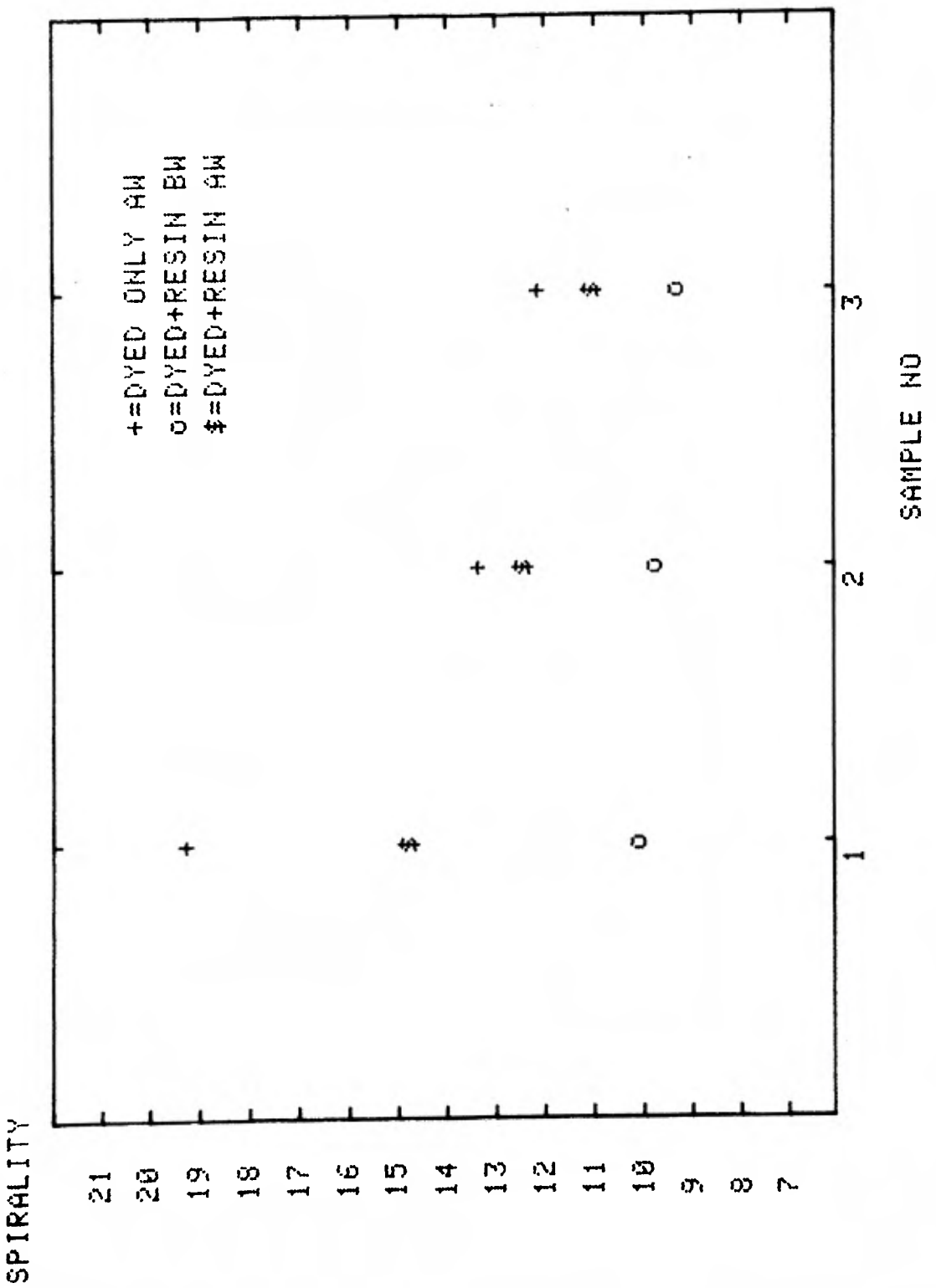



ATKINS-FINISHED FABRICS
WALES/3cms AW
49
48
47
46
45
44
43
42
41
40
39
38
37
36
dyed only = +
dyed+resin = o
1
2
3
SAMPLE NO


ATKINS-FINISHED FABRICS
WEIGHT/grms AW
159
158
157
156
155
154
153
152
151
150
149
148
147
146
145
144
143
142
141
140
139
138
137
136
dyed only = +
dyed+resin = o
1
2
3
SAMPLE NO

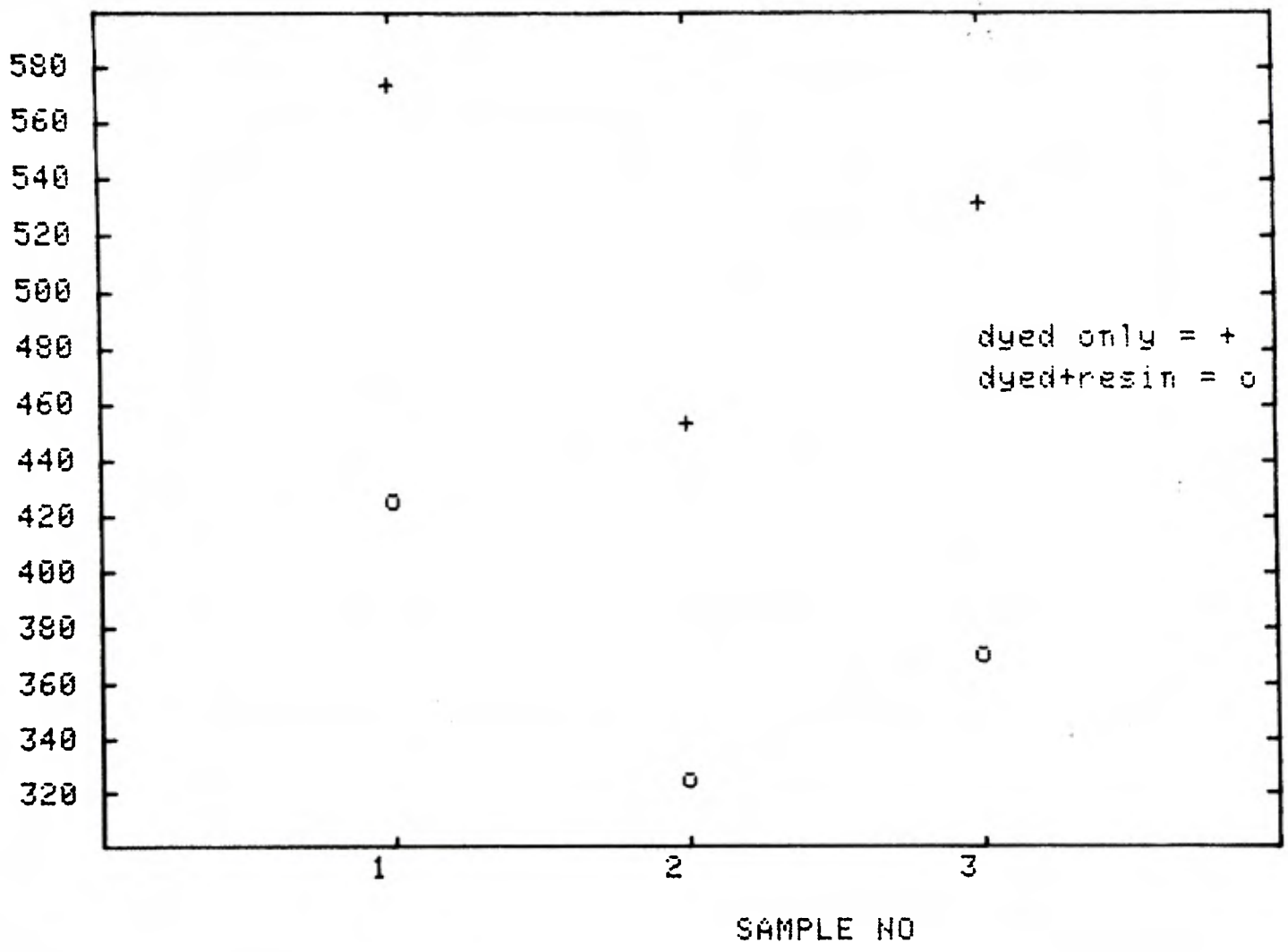

ATKINS-RESIN FINISHED FABRICS
LENGTH SHR.
+=1W+T
o=5W+T
SAMPLE NO
1
2
3
5
6
7
8
9

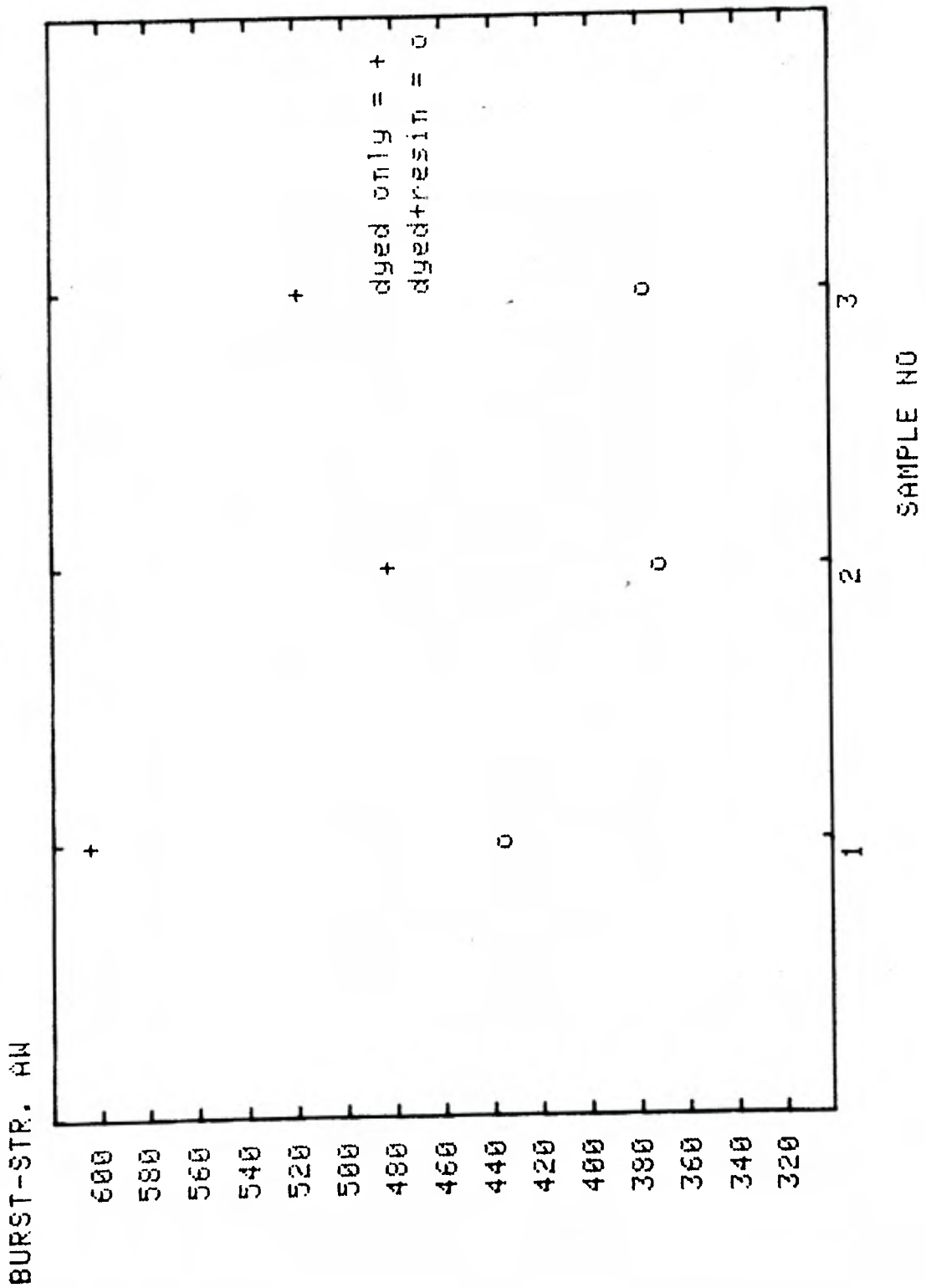

ATKINS-RESIN FINISHED FABRICS
WIDTH SHR.
+=1W+T
o=5W+T
SAMPLE NO
1
2
3
4
5
6
7
8
9
10

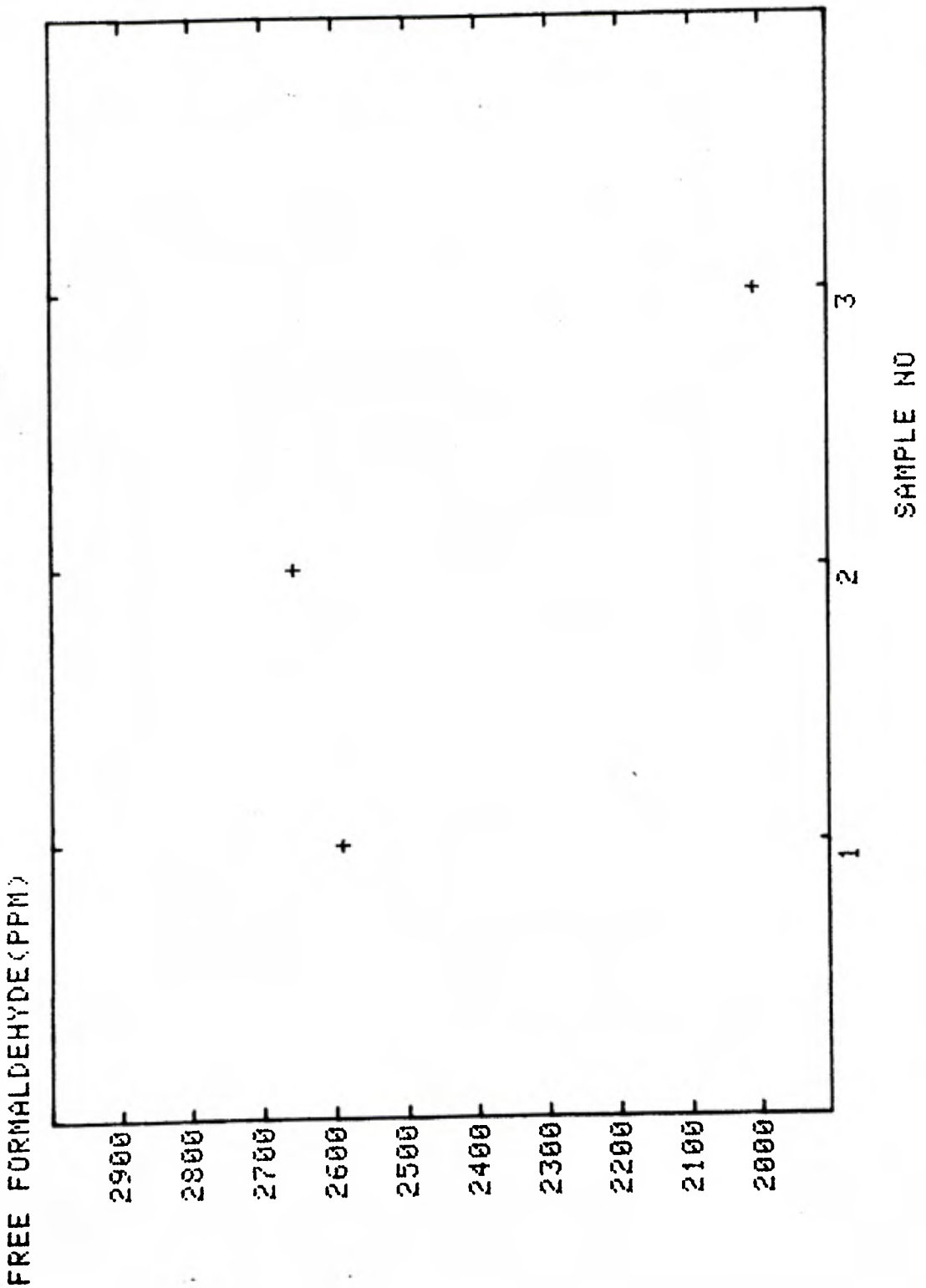

ATKINS-FINISHED FABRICS
SPIRALITY
21
20
19
18
17
16
15
14
13
12
11
10
9
8
7
+=DYED ONLY AW
o=DYED+RESIN BW
#=DYED+RESIN AW
1
2
3
SAMPLE NO

ATKINS-FINISHED FABRICS

BURST-STR. BW




ATKINS-FINISHED FABRICS
BURST-STR. AW
dyed only = +
dyed+resin = o
600
580
560
540
520
500
480
460
440
420
400
380
360
340
320
1
2
3
SAMPLE NO


ATKINS-RESIN FINISHED FABRICS
FREE FORMALDEHYDE(PPM)
2900
2800
2700
2600
2500
2400
2300
2200
2100
2000
1
2
3
SAMPLE NO