SOUTH AFRICAN SUGAR INDUSTRY

AGRONOMISTS' ASSOCIATION

EXPERIMENT RESULT

Code: Cane quality 01/91/SW UBO
CAT.NO.: 1833

CHANGES IN CANE YIELD AND QUALITY WITH INCREASING DELAY BETWEEN BURNING AND MILLING

1. PARTICULARS OF PROJECT

This crop : 4th ratoon

Site : Ubombo Ranches estate, field Tambuti 2

Region : Northern irrigated (Swaziland)

Design : Observation, 9 or 12 replicates

Variety : N 14

Burnt : 18/11/91

Harvested : 19/11/91

Age : 11.4 months

2. OBJECTIVES

* To measure changes in cane weight and quality when sugarcane remains either in the windrow in the field, or in bundles for several days after cutting.

* To try to relate any changes measured to weather conditions during the experiment.

3. TREATMENTS

A Cane samples left in windrows in field for 8 days - 9 replicates per day

B Cane samples put into commercial bundles and stored on a loading zone for 7 days - 12 replicates per day

4. SAMPLING PROCEDURE

A uniform area of a field was selected, the cane cut commercially and samples of 20 stalks selected for uniformity and weighed. Sufficient samples were made up for the whole period of the experiment and labelled so that they could be weighed again at the time of analysis. Samples of windrowed cane did not come from the same windrow as that for bundled cane.

Windrow samples were replaced as naturally as possible into a commercial windrow and bundle samples were put into the centre of a commercial bundle. Unfortunately, samples of bundled cane for any one sampling date had to be put into the middle of the same bundle, so they were not completely independent. One commercial bundle was broken open each day and the samples recovered.

The first samples of windrowed cane were taken shortly after cutting on 19 November, 12 hours after burning, which took place in the evening of 18 November. The first bundled samples were taken after 36 hours, when the cane was made up into bundles from the windrows.

Samples were taken to the mill laboratory at the same time each day and were analysed as soon as possible. All samples were analysed within 2.5 to 3.5 hours of being taken from the field.

5. RESULTS

Cane weight

There was a weight loss of about 2 percent within one day of burning (Figure 1), assuming that the initial value of 4% for day one was an aberrant value. There was then a gradual loss in weight down to a loss of between 10 and 12 percent 7.5 days after burning. The data indicate that bundled cane possibly lost weight at a slower rate than windrowed cane between 3.5 and 5.5.days, and then at a faster rate thereafter. These differences could also be caused by sample variation but they do correspond to variations in weather conditions.

Cane quality

There was a difference in the quality of windrowed and bundled cane 1.5 days after burning, before the bundles were made up, and before the treatments began (Figures 3 and 4). An adjustment has been made, for this difference, therefore, as it was probably due to the fact that the samples did not come from the same windrows.

The pattern of change in sucrose percent cane (S%c) between windrowed and bundled cane was different (Figure 3), and was not affected by adjusting for the apparent initial quality differences. There was a marked drop in the S%c of bundled cane between 1.5 and 2.5 days after burning (the first day in the bundle), after which S%C gradually increased to 7.5 days, eventually regaining a value similar to that of windrowed cane which did not change appreciably over this period. Changes in estimated recoverable sugar percent cane (Ers%c) (Figure 4) followed a similar pattern to those of S%c because there was a similar gradual decline in juice purity for both treatments (Figure 2).

Sucrose yields

Changes with time in weight of sucrose and weight of Ers and differences between the treatments were similar (Figures 5 and 6).

There was a larger initial loss in weight of sucrose in bundled cane compared with windrowed cane (Figure 5), which appeared to be a true difference as it occurred when there was little difference in stalk weight between the two treatments and when there was a marked drop in the S%c of bundled cane. The rate of loss was then less in bundled cane than in windrowed cane so that after 7.5 days both treatments reflected similar losses of about 8% for sucrose and about 10% for Ers.

Assuming that the apparent losses for windrowed cane of over 5% on day one and less than 1% after 1.5 days reflect differences due to sampling variation, there appeared to be a sucrose loss of about 2% within 1 day of burning, which increased to a loss of at least 4% for bundled cane 2.5 days after burning (1.5 days after the bundles had been made). The average loss over the 7.5 day period was about 1% sucrose and 1.5% Ers per day.

Weather conditions

Weather conditions varied appreciably during the course of the experiment. Prior to the start of the experiment and for the first 3 days of the experiment temperatures were high, averaging 32 degrees maximum and 20.6 to 21.4 minimum (Table 1). There were then three cooler days when the maximum averaged 28.8 and the minimum temperature 14.9 degrees, followed by two days when temperatures returned to their previous levels.

6. DISCUSSION

The results of this work confirm that cane deterioration begins as soon as cane is cut. There was a similar average loss for bundled and windrowed cane over a period of a week, averaging a loss of 1% per day for sucrose and 1.5% per day for Ers, which agrees with results obtained in Natal under similar temperature conditions. However, the initial sucrose weight loss was greater in bundled cane than in cane left in windrows. The rate of sucrose loss then appeared to be greater from windrowed cane.

It is not possible to say whether these are true differences between bundled and windrowed cane because they could be related to the pattern of change in the weather during the experiment. Possibly the 'insulating' effect of the bundles meant that during the latter part of the experiment when night temperatures were lower the cane in the bundles did not heat up as quickly during the day, and so did not deteriorate as fast as cane still in the windrows. If this is so then one could expect even faster rates of deterioration, particularly in bundled cane, when temperatures were consistently high.

The difference between bundled and windrowed cane is of rather academic interest, however, because it is advisable to get cane to the factory as fast as possible to minimise sucrose losses, and this invariably means bundling the cane in order to transport it to the factory.

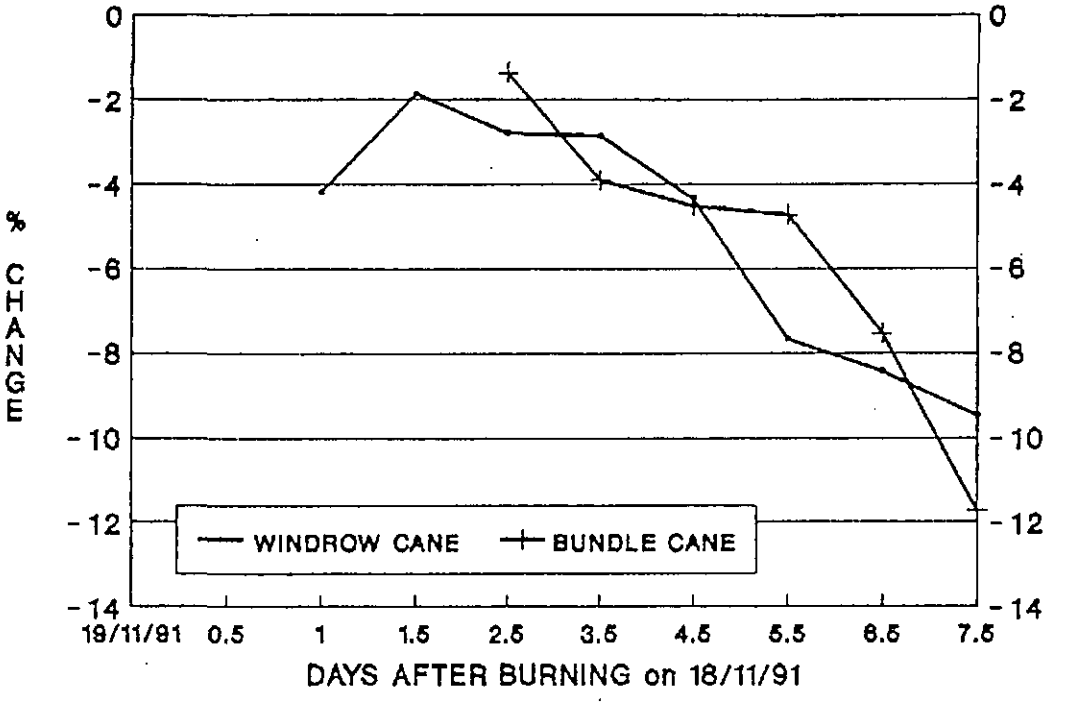
It is of interest to note that the average cane deterioration over a period of one week was appreciably greater when measured in terms of Ers rather than sucrose. Table 1

Table 1: Meteorological data

Date	Max. temp.	Min. temp.	Rain (mm)	Et (mm)
11/11	36.4	22.6	2.5	9.5
12/11	31.1	20.8	29.0	8.5
13/11	29.9	21.0	4.0	4.0
14/11	31.6	20.6	26.2	12.7
15/11	31.6	19.6	-	7.0
16/11	29.7	19.1	-	5.9
17/11	30.9	19.4	-	7.0
18/11	32.8	21.5	4.8	7.5
Total/mean (11 - 18/11)	31.8	20.6	66.5	7.8
19/11	37.1	20.2	4.0	9.4
20/11	34.5	22.5	-	7.6
21/11	24.5	21.5	1.0	4.8
Total/mean (19 - 21/11)	32.0	21.4	5.0	7.3
22/11	25.0	14.6	-	9.2
23/11	28.0	17.0	-	8.6
24/11	33.3	13.0	-	8.6
Total/mean (22 - 24/11)	28.8	14.9	0.0	8.8
25/11	32.7	17.6	-	9.7
26/11	31.0	17.0	-	8.6
Total/mean (25 - 26/11)	31.9	17.3	0.0	9.2

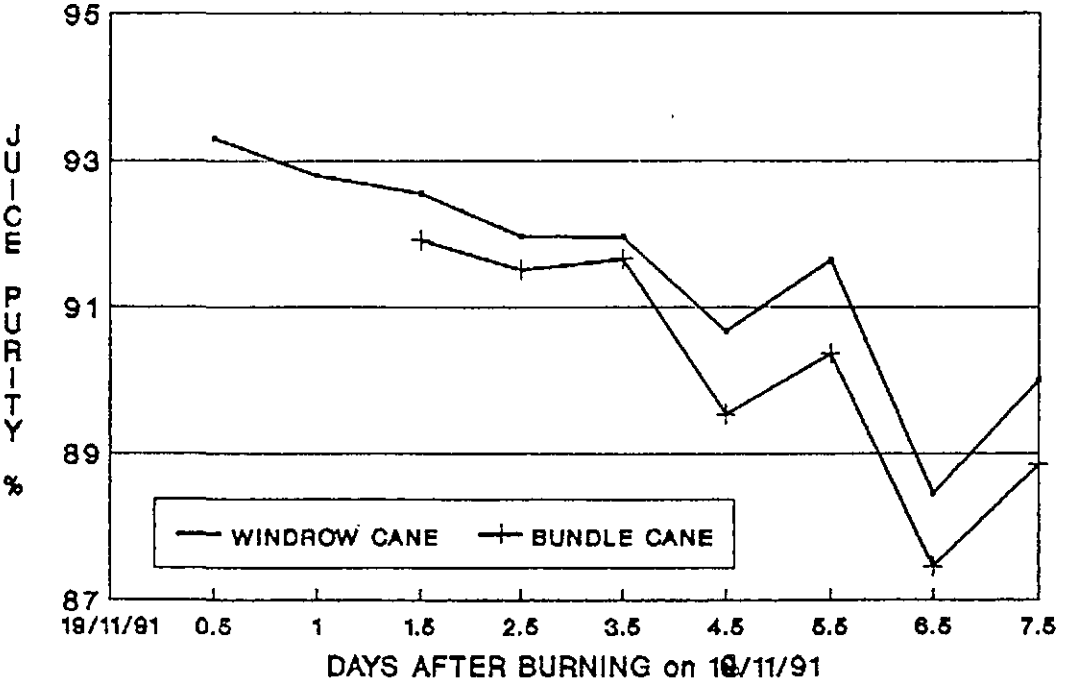
HR/vnm
15.04.92

Figure 1
CANE DETERIORATION - CANE WEIGHT LOSS



Q191CALO

Figure 2
CANE DETERIORATION - JUICE PURITY

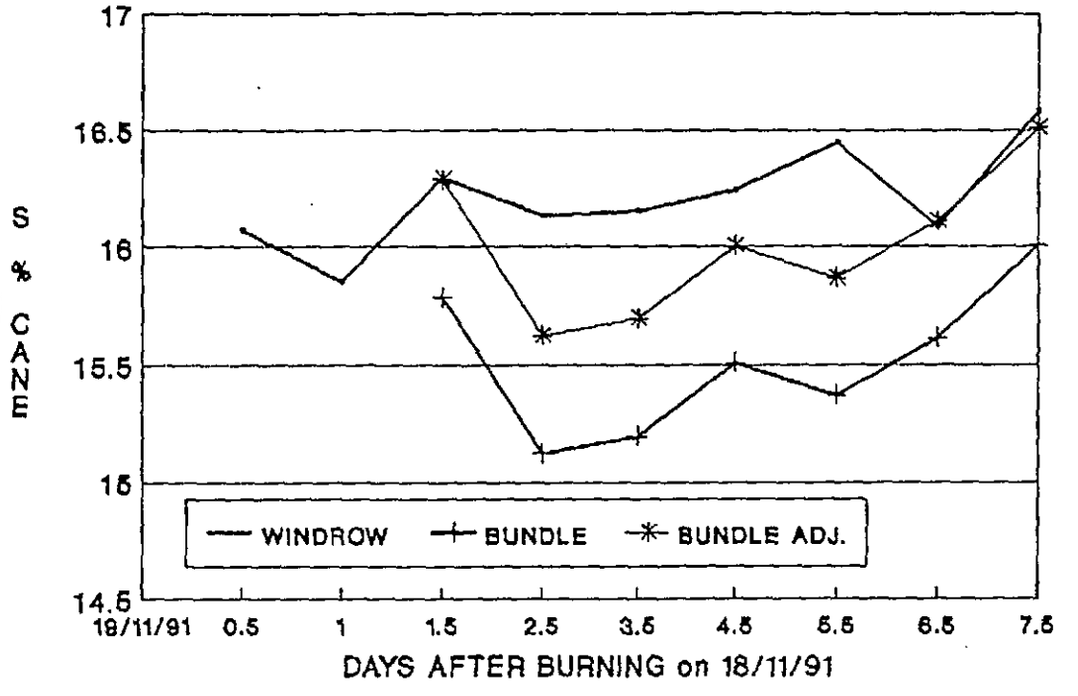


Q191PURY

Figure 3

CANE DETERIORATION - SUCROSE % CANE

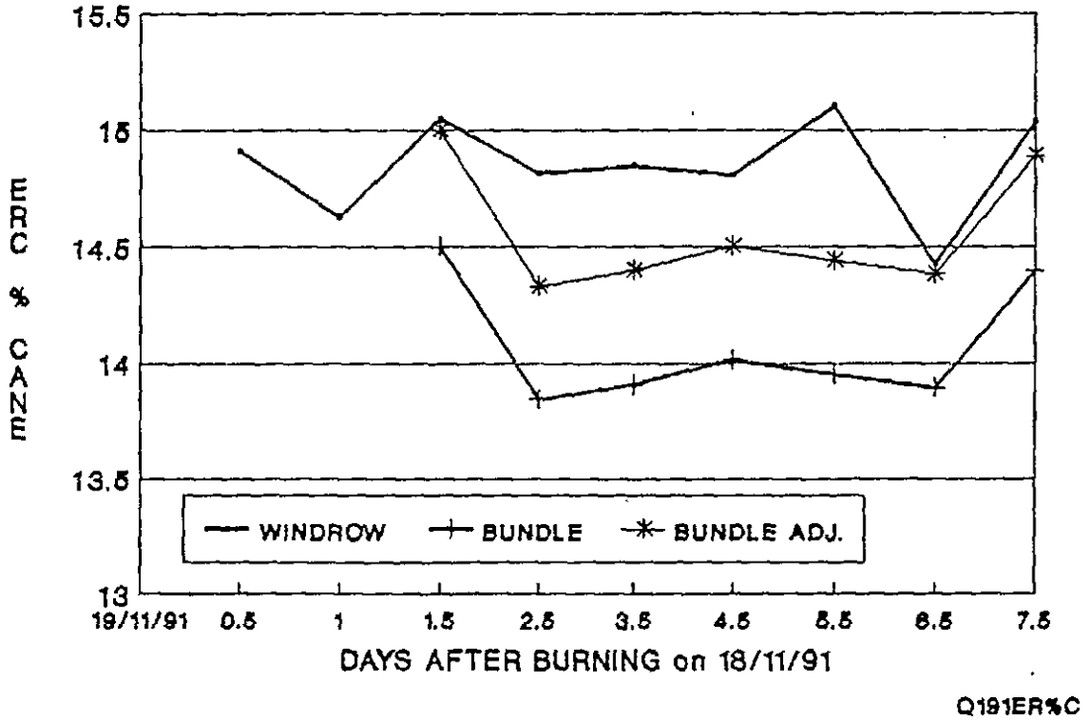
Bundle adjusted for apparent initial S%C differences



Q191S%C

Figure 4

CANE DETERIORATION - ERC % CANE

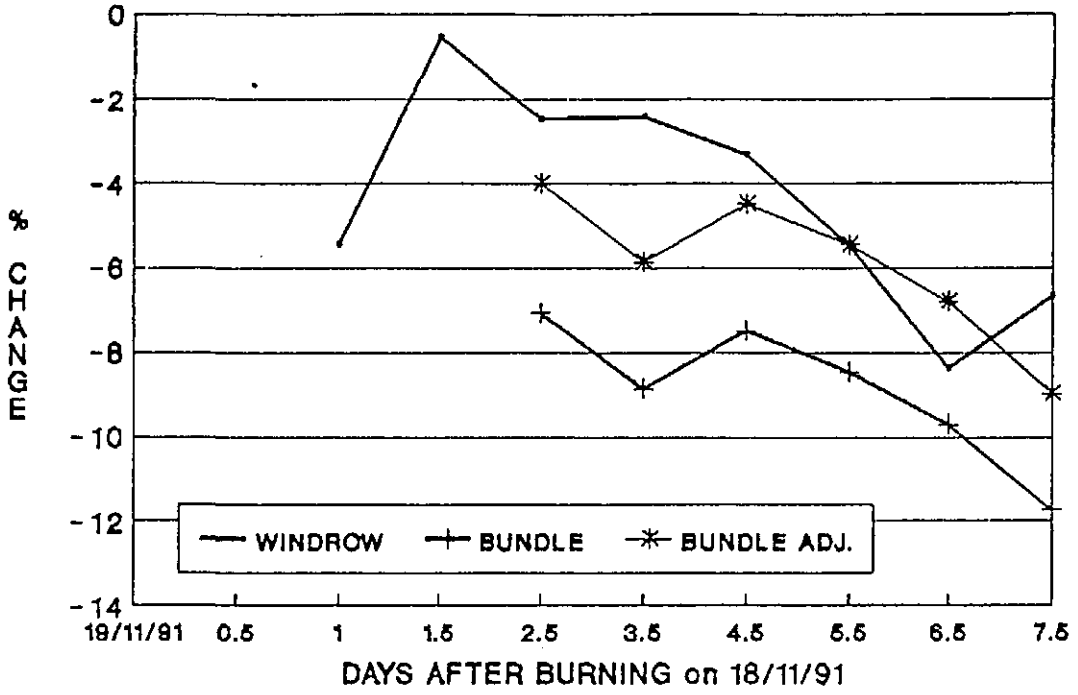


Q191ER%C

Figure 5

CANE DETERIORATION - SUCROSE WEIGHT LOSS

Bundle adjusted for apparent initial S%C differences

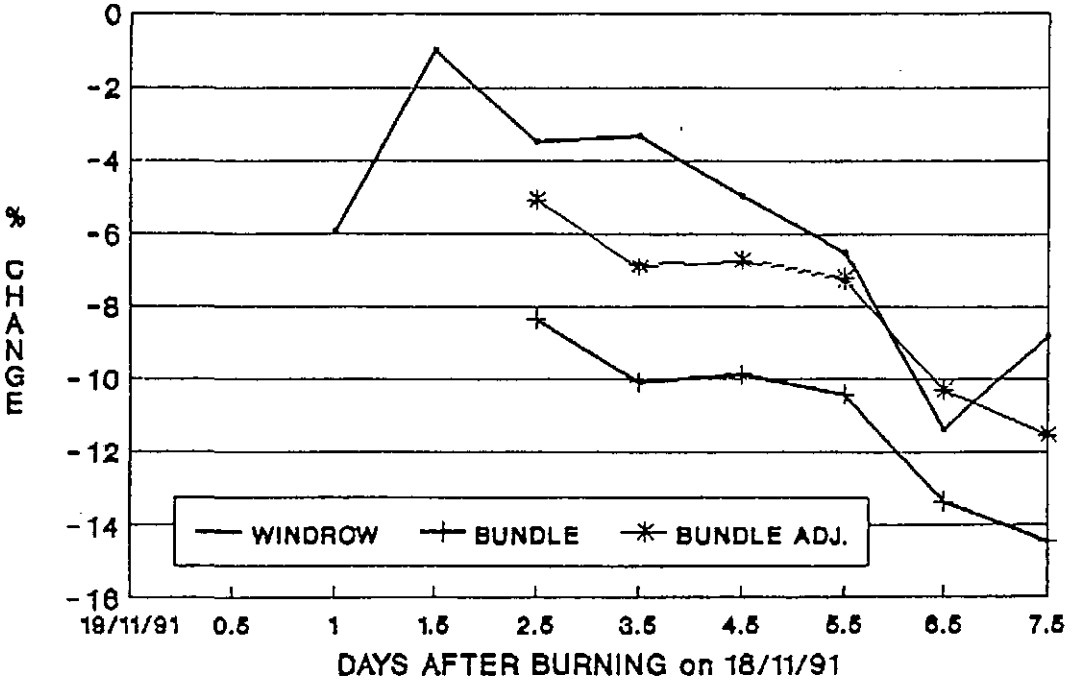


Q191SULO

Figure 6

CANE DETERIORATION - ERC WEIGHT LOSS

Bundles adjusted for apparent initial S%C differences



Q191ERLO

SUMMARY OF RESULTS

Windrow cane

Code	Sample	Weight (kg/20 stalks) Initial	Final	Change	%	S%c	%	Purity	%	Suc weight (g/20 stalks) Initial	Final	Change	%	Erc %	Erc weight (g/20 stalks) Initial	Final	Change	%
1	0.5	23.3	-	-	-	16.1	-	93.3	-	3.7	-	-	-	14.9	3.5	-	-	-
2	1.0	24.0	22.9	-1.0	-4.2	15.9	-1.4	92.8	-0.5	3.8	3.6	-0.21	-5.4	14.6	3.6	3.4	-0.21	-6.0
3	1.5	21.8	21.4	-0.4	-1.9	16.3	1.4	92.5	-0.8	3.5	3.5	-0.02	-0.5	15.0	3.3	3.2	-0.03	-1.0
4	2.5	20.5	19.9	-0.6	-2.8	16.1	0.4	92.0	-1.5	3.3	3.2	-0.08	-2.5	14.8	3.1	2.9	-0.11	-3.5
5	3.5	22.9	22.2	-0.7	-2.9	16.2	0.5	92.0	-1.5	3.7	3.6	-0.09	-2.4	14.8	3.4	3.3	-0.11	-3.3
6	4.5	22.7	21.7	-1.0	-4.4	16.2	1.1	90.7	-2.9	3.6	3.5	-0.12	-3.3	14.8	3.4	3.2	-0.17	-5.0
7	5.5	24.3	22.5	-1.9	-7.7	16.4	2.3	91.6	-1.8	3.9	3.7	-0.21	-5.5	15.1	3.6	3.4	-0.24	-6.5
8	6.5	23.2	21.3	-2.0	-8.4	16.1	0.1	88.5	-5.5	3.7	3.4	-0.31	-8.4	14.4	3.5	3.1	-0.39	-11.4
9	7.5	22.1	20.0	-2.1	-9.5	16.6	3.1	90.0	-3.6	3.5	3.3	-0.24	-6.7	15.0	3.3	3.0	-0.29	-8.8

Bundle cane (adjusted)

Code	Sample	Weight (kg/20 stalks) Initial	Final	Change	%	S%c	%	Purity	%	Suc weight (g/20 stalks) Initial	Final	Change	%	Erc %	Erc weight (g/20 stalks) Initial	Final	Change	%
1	0.5	23.3	-	-	-	16.1	-	93.3	-	3.7	-	-		14.9	3.5	-	-	-
2	1.0	-	-	-	-	-	-	-	-	-	-	-		-	-	-	-	-
3	1.5	-	24.8			16.3	1.4	91.9	-1.5	-	4.0	-		15.0	-	3.7	-	-
4	2.5	25.2	24.8	-0.3	-1.4	15.6	-2.8	91.5	-1.9	4.0	3.9	-0.16	-4.0	14.3	3.8	3.6	-0.19	-5.1
5	3.5	25.1	24.2	-0.9	-3.9	15.7	-2.3	91.7	-1.8	4.0	3.8	-0.24	-5.9	14.4	3.7	3.5	-0.26	-6.9
6	4.5	25.6	24.5	-1.1	-4.5	16.0	-0.4	89.5	-4.0	4.1	3.9	-0.18	-4.5	14.5	3.8	3.6	-0.26	-6.7
7	5.5	25.7	24.6	-1.1	-4.7	15.9	-1.2	90.4	-3.1	4.1	3.9	-0.23	-5.5	14.4	3.8	3.6	-0.28	-7.3
8	6.5	25.0	23.3	-1.8	-7.6	16.1	0.2	87.5	-6.2	4.0	3.7	-0.27	-6.8	14.4	3.7	3.3	-0.38	-10.3
9	7.5	24.0	21.2	-2.7	-11.7	16.5	2.7	88.8	-4.8	3.9	3.5	-0.35	-9.0	14.9	3.6	3.2	-0.41	-11.5

Code means.....

1 Weighed initially (3 hours post cut), analysed 12.30 to 14.03
2 Weighed 7 hours post cut (19/11/91), analysed 19.05 to 20.26
3 Weighed 24 hours post cut (1 day - 20/11/91), analysed 09.15 to 11.25
4 Weighed 48 hours post cut (2 days - 21/11/91), analysed 08.20 to 10.26
5 Weighed 72 hours post cut (3 days - 22/11/91), analysed 08.23 to 10.24
6 Weighed 96 hours post cut (4 days - 23/11/91), analysed 07.58 to 13.36
7 Weighed 120 hours post cut (5 days -24/11/91), analysed 08.04 to 10.30
8 Weighed 144 hours post cut (6 days - 25/11/91), analysed 09.34 to 12.02
9 Weighed 144 hours post cut (7 days - 26/11/91), analysed 09.21 to 11.32