DARNALL DELIVERY MONITORING SYSTEM

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Abstract

A task group was formed in 1996 to monitor the efficiency of cane delivery and the transport system at the Darnall mill. This was a result of a high percentage of no-cane stops in previous seasons.

The task group set out to establish information flows to assist in the monitoring of weak links in the delivery chain. Autolab undertook the programming and writing of these reports. A series of reports were generated daily and weekly by Cane Testing Services, which highlighted poor performers.

All aspects of the transport and milling operations were considered when identifying problem areas, and results were monitored to identify any improvements or reductions in the efficiencies of the delivery chain.

Introduction

The poor utilisation of milling capacity in previous seasons, resulting in high no cane stops, promoted a joint review of the delivery system at the Darnall mill. Growers, millers and hauliers held meetings to discuss ways of improving efficiencies for the future season.

The Darnall Delivery Task Group was then formed to identify inefficiencies in the delivery chain. Several of the common allegations were:

- Preferential treatment of one haulier over another at the mill
- Inappropriate light system
- Hauliers queuing outside the mill
- Delays at zones
- Window scheduling at the mill is not efficient
- Under utilisation of loading crews at the zones.

These factors had the effect of not maximising milling capacity. Hauliers not operating with optimal efficiencies, growers subjected to longer milling seasons, and the full crop not being crushed ([1]personal communication).

With the identification of the allegations by the Task Group, it was agreed that information would be collated, and reports would then be generated through Autolab, to assess the impact of the allegations.

The time efficiencies at various points of the delivery chain were measured against predetermined standards. Year-to-date average time effiencies were benchmarked to measure against coming seasons.

Method

For sound conclusions to be drawn from an inefficient link in the operation, a full understanding of the delivery chain was required. The cycle of the chain started as the vehicle departed from the mill, (not the tare time at the weighbridge). When a vehicle was required to go to the hauliers' depot, the time of its departure from the depot was noted. The next entry was the zone arrival, followed by the time the vehicle was loaded with cane. Departure time from the zone for the mill, and arrival time at the mill, were recorded. All the above-mentioned times were captured on the consignment note by the driver. The weighbridge computer generated the gross and tare times. The last link in the delivery chain was tare time at the weighbridge.

The whole system relied on the information captured on the consignment note, so co-operation from the drivers was critical for accurate results. Zone crews or individual growers may complete vehicle arrival time at the zone, zone loading and zone departure times on the consignment note, to prevent drivers from altering the consignment note to make up time lost, i.e. travelling to and from the zone.

Overall, the Darnall delivery system generated two types of reports. One type was produced daily for the previous day's information and a second type was generated weekly, compiling season-to-date averages.

Autolab

The Task Group requested Auotlab to compile the specified reports. Autolab used existing and new databases in a set of programmes, for the generation of the reports. The average delay reports were written in Clipper 5.2 and the database files used are Clipper databases, which are identical to DBASE 4 standard. Modular programming techniques were used, where each programme could report a separate item, thereby ensuring more efficient use of computer memory. This system was written specifically to run on a Novell network, where many users can access the information concurrently ([2]personal communication).

The Darnall delivery system was set up so that the weighbridge programme, which records delivery information, would request additional information from the weighbridge clerk regarding arrival and loading times. A detailed time history file was created to archive time related information for each delivery.

[1]Q Hildebrand, SA Cane Growers' Association
[2]M Marais, Autolab

Report: Composite delivery

This report provided the reader with relevant information for each consignment note that day. An example of this report can be seen in Table 1. All the times specific to each consignment note were available. A common problem that arose was a 24-hour notation, whereby drivers completing the consignment note were not using this. A glance at the delivery note and mill arrival times would confirm whether an error had been made within the 24-hour notation. Any exceptions generated from this report could be amended to reflect the true situation.

Report: List of contractors lacking times captured

This report refers to the information on the consignment note and, should any information be outstanding, this would be reported. As shown in Table 2, any missing information could be clearly identified. This may have been due to the lack of information captured into the computer, or detail missing on the consignment note. The original consignment note would detail which party was at fault (weighbridge clerk or driver). This allowed a follow-up procedure to ensure the situation did not continue.

As all the information was generated from the consignment note, this exception report was vital in ensuring that all information was captured accurately.

Report: List of contractor deliveries per hour

This report reflected the crush rate per hour and the number of vehicle deliveries per hour daily. Table 3 shows the number of vehicles reported, per contractor that delivered cane to the mill, on an hourly basis. Contractors could monitor their vehicle deliveries to the mill as well as those of other contractors, ensuring that no favouritism had occurred. The report allowed for a comparison between hourly crush rates and vehicle deliveries. An erratic crush rate by the mill affects the number of vehicles required to supply cane. The converse is also true, where an erratic supply of vehicles disrupts the constant crush rate of the Mill.

The mill is obliged to crush at a set rate, with given parameters. Hauliers are obliged to deliver cane at a set rate to the mill. This report would highlight any discrepancies.

Table 1. Composite delivery report.

Vehicle	Driver code	Consignment note	Grower CD	Delivery date	Mill dept	Arrival (zone)	Load	Depart	Mill arrival
H8122	4523	D371093	673100364A	971219 06:29.08	4:25	4:50	5:00	5:50	6:20
H8122	5532	D371024	673600301A	971219 10:14.05	7:50	8:30	8:30	9:20	10:05
H8122	5532	D369753	673101472A	971219 12:43.04	10:55	11:30	11:30	11:50	12:35
H8122	5532	D369755	673101472A	971219 20:16.47	14:00	14:30	14:30	14:55	15:45
H8122	5823	D364621	672100011D	971219 23:02.53	20:45	21:05	21:05	22:00	22:30

Table 2. Listing of contractors lacking time captures.

Vehicle	Consignment note	Driver number	Grower name	Arrival (zone)	Load	Depart	Arrival (mill)	Depart
H8219	D349106	4716	A. Grower	4:45	4:45	6:10		4:15
H8200	D371156	4538	A. Grower	9:10	9:10	10:00		8:35
H8217	D369754	4562	A. Grower	12:10		12:40	13:25	11:35

Table 3. Listing of contractors deliveries per hour.

Hour	Crushed mass	Delivery mass (tons cane)	Yard stock (tons cane)	No. of deliveries for contractor (105)	No. of deliveries for contractor (3004)	No. of deliveries for contractor (other)
5-6	311	340	1 469	4	8	3
6-7	287	474	1 656	4	7	17
7-8	306	369	1 719	4	4	17
8-9	253	535	2 000	2	5	35
9-10	274	458	2 184	1	8	29

Report: Travel time exception by route

A vehicle taking time to travel to the mill or zone, that was 10% greater than the set parameters, was reported. This enabled the reader to identify routes that were continuously being reported. In Table 4, the actual time taken is measured against the standard time set. The parameters for travel time for each route were set, using season-to-date actual travel times, and these were updated weekly.

Report: Travel time exception by route

This was the same report as the above mentioned, but identified the driver, as opposed to the route, as the exception. Table 5 shows drivers that have been reported as exceptions. A driver may have taken excessive time on various routes during the day, which may not have been noticeable in the previous report and was highlighted in this report.

Report: Payload exception

The various vehicle types that delivered to Darnall mill were identified and parameters on payloads set for each vehicle type. This allowed for exceptions to be generated on both under and over loading of vehicles. As can be seen in Table 6, payloads are reported per vehicle type, which the reader can easily identify as under or over loading.

This has significant bearing on the hauliers' optimal efficiencies, as well as wear and tear on vehicles. Smaller payloads entering the mill will result in less cane being delivered and subsequently the cane supply will be affected.

Growers under or over loading vehicles can easily be identified. The daily monitoring of reports ensured prompt feedback to relevant parties. Weather conditions had a bearing on infield payloads. Thus, although exceptions were generated, there was an explanation for this.

Report: Loading time exception

The time lapse between a vehicle arriving at the zone and its subsequent departure was captured, and variances greater than 10% of the set 50 minute parameter appeared in the report.

Both individual growers and zones were identified, as certain growers use common zones. A delay at the zone may have a knock-on effect, as the hourly number of vehicle arrivals at the mill must be met by the hauliers to ensure rateable delivery.

Reductions in the number of exceptions assists in reducing turnaround time of vehicles.

Exceptions were split into day and night loading. This allowed the reader to see any differences between time taken to load at night compared with day. If night loading generated more delays, possible corrective action could be employed.

A second report was generated comparing these exceptions as a percentage against the total number of deliveries. This was for both the day and night deliveries. For example, 14 vehicles reported as night loading exceptions is meaningless, but 27% of total night deliveries provides more clarity on the situation. The reader may then deem this excessively high and investigate the matter.

Report: Mill arrival to gross time

Any vehicles queuing for more than 15 minutes outside the mill yard were reported as exceptions. This report indicated the overall inefficiencies in the delivery chain. From Table 7, excessive delays are easily identified. Theoretically, no vehicle should be delayed for more than 15 minutes. In reality this is practically impossible; however, excessive numbers of vehicles being delayed indicates exceptions in the delivery chain.

Table 4. Travel time exception by route.

Route No.	Driver No.	Vehicle No.	Consignment note	Delivery date 97/12/19	Outward time (min)	Inward time (min)	Std time (min)	Outward error (%)	Inward error (%)
6705	4766	H8344	D371151	06:10.44	25	45	39	64	115
6743	5783	H8201	D371161	19:20.07	40	289	44	91	657
6777	5579	H8217	D367902	00:19.39	25	40	33	76	121
6783	5829	H8200	D364620	21:06.42	40	30	30	133	100
9831	5825	H8218	D370049	12:41.25	145	310	159	91	195

Table 5. Travel time exception by driver.

Driver No.	Route No.	Vehicle No.	Consignment note	Delivery date 97/12/19	Outward time (min)	Inward time (min)	Std time (min)	Outward error (%)	Inward error (%)
4642	9877	H8201	D347048	05:40.00	40	55	35	129	157
4653	9838	H8356	D346332	19:21.06	45	125	65	85	192
4728	9969	H8356	D369751	07:51.04	55	50	45	67	111
4766	6705	H8344	D371151	06:10.44	30	45	39	64	115
5532	9969	H8122	D369755	20:16:47	25	50	45	67	111

Table 6. Payload exception report.

Grower CD	Grower name	Zone	Driver No.	Vehicle No.	Vehicle type	Consignment note	Payload (tons)
672100011D	A. Grower	6783	5829	H8200	41	D364620	29,15
672100011K	A. Grower	9877	5672	H8221	42	D347050	24,45
675100731A	A. Grower	6851	4749	H8220	42	D371155	37,25
674700021A	A. Grower	6873	999	H007	43	D369174	27,60

Table 7. Gross – mill arrival > 15 minutes.

Vehicle No.	Driver No.	Consignment note	Grower CD	Mill arrival time	Gross time 97/12/19	Delay (min)
U222	973	P125811	673100272A	06:40	07:16:38	36
U223	433	P125813	673100751A	22:25	23:08:28	43
U224	405	P100955	673600242A	11:10	11:42:44	32
U250	362	P135241	673101161A	10:50	11:39:52	49
U250	435	P135246	673101161A	21:05	22:04:05	59

Summary of 1997-98 season

Average weekly times for mill departure to zone arrival; zone loading; zone departure to mill arrival; mill arrival to gross time and gross to tare time were collated, and are presented in Figures 1 and 2. Although the travel times to and from all the zones were used, it provided an overall indication on the time taken to complete one delivery cycle. The actual average time taken per zone was available from the database, but required a special report to print out all zones.

Conclusion

The function of the Darnall Delivery Task Group was to provide reports enabling information to be generated that would confirm or reject allegations made by growers, millers and hauliers. Each report dealt with specific information that allowed for the monitoring of any discrepancies that arose during the season.

A direct result of this monitoring has been the investigation into the delays within the Darnall mill yard. Proposals are currently being made to implement an electronic sensor system within the mill yard, to identify where vehicles are being delayed. The average delay outside the mill yard was 27 minutes, and within the mill yard was 31 minutes. This implies that a vehicle is tied up for 58 minutes while offloading cane. The overall average loading time at the zones was 54 minutes, as opposed to the set parameter of 50 minutes. This implies that loading times can be further improved to reduce vehicle turnaround times.

Overall the Darnall Monitoring System has been successful in providing reports for all interested parties to view and make accurate comments on events that have occurred. The ability to make unsubstantiated allegations has been significantly reduced.

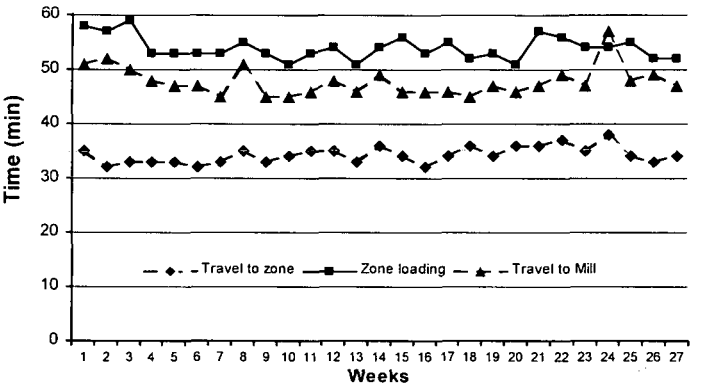

Figure 1. Travel and loading times per week.

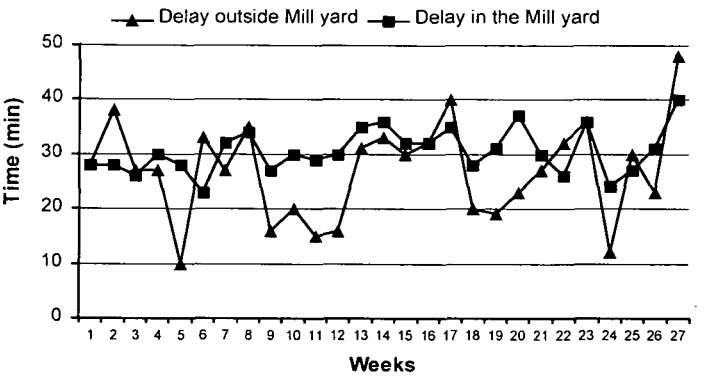

Figure 2. Mill and millyard delays.

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