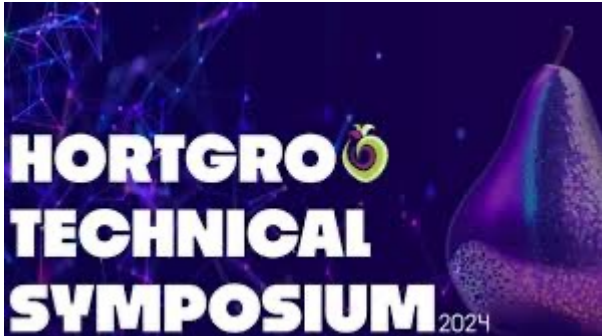




Insult to injury – losing fruit to bruising

Willie Kotze

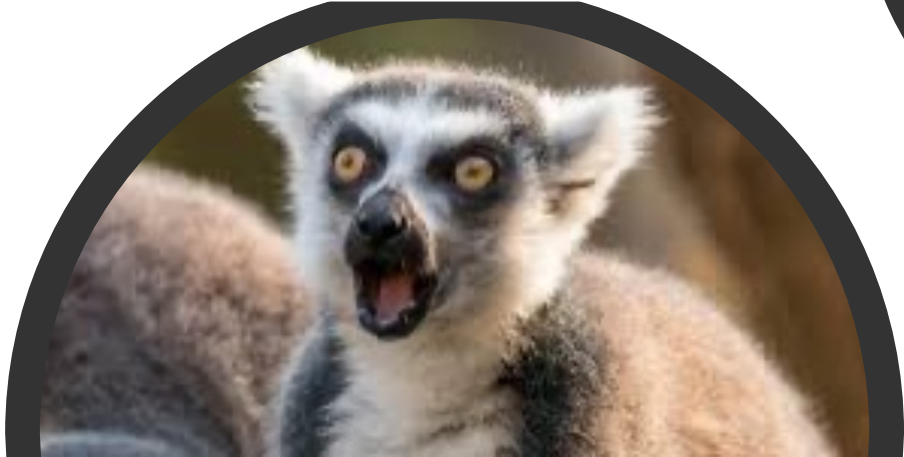
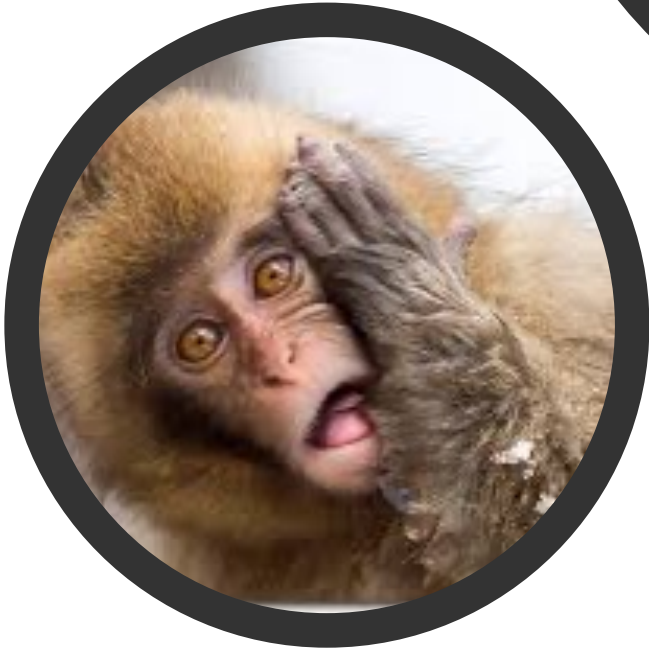
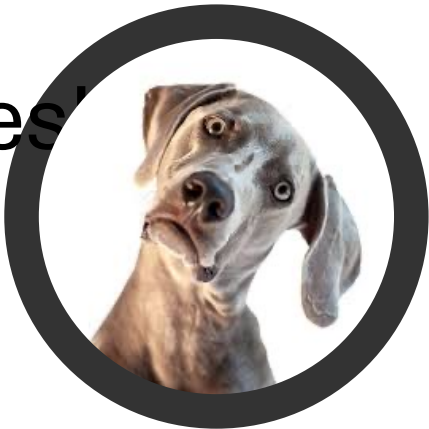
Dutoit Agri – Technical Pome



Let's solve bruising of apples!

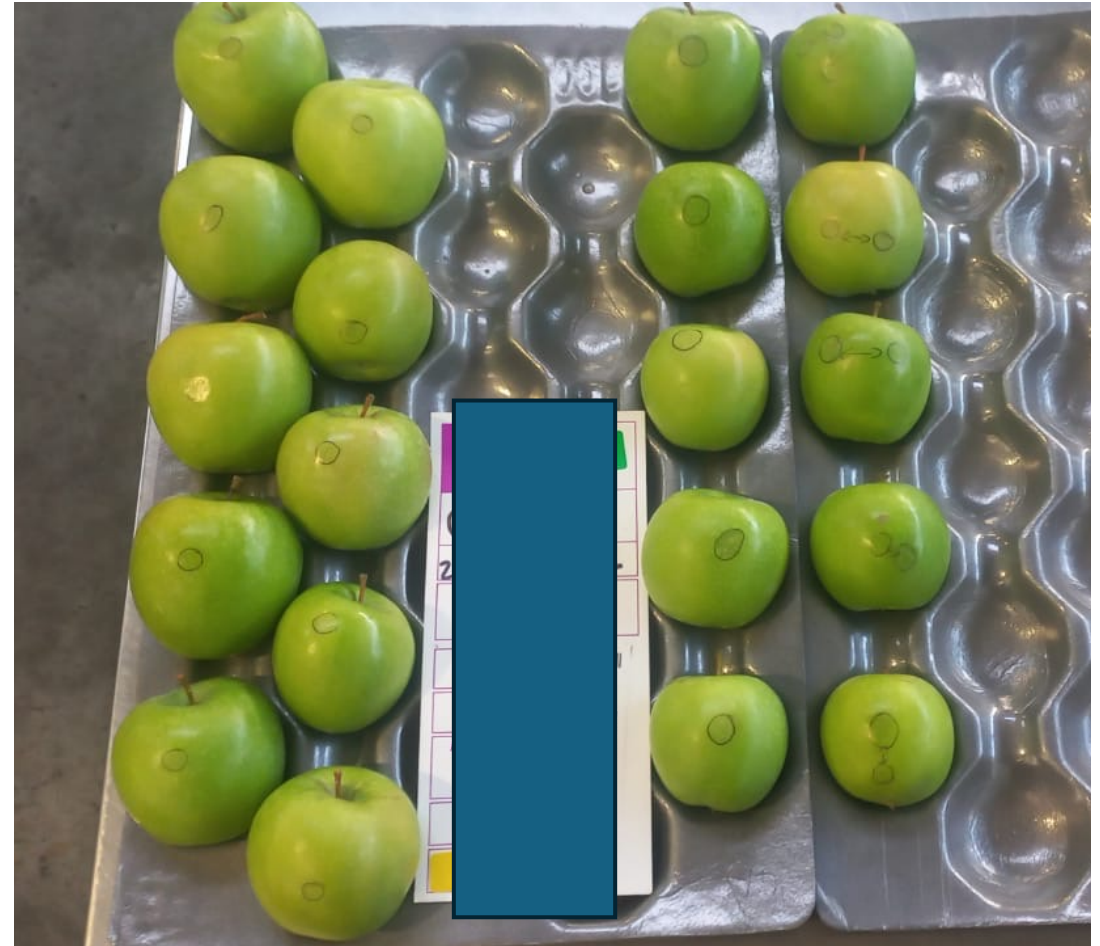


"What if we don't change at all ...
and something magical just happens?"



Why do the study?

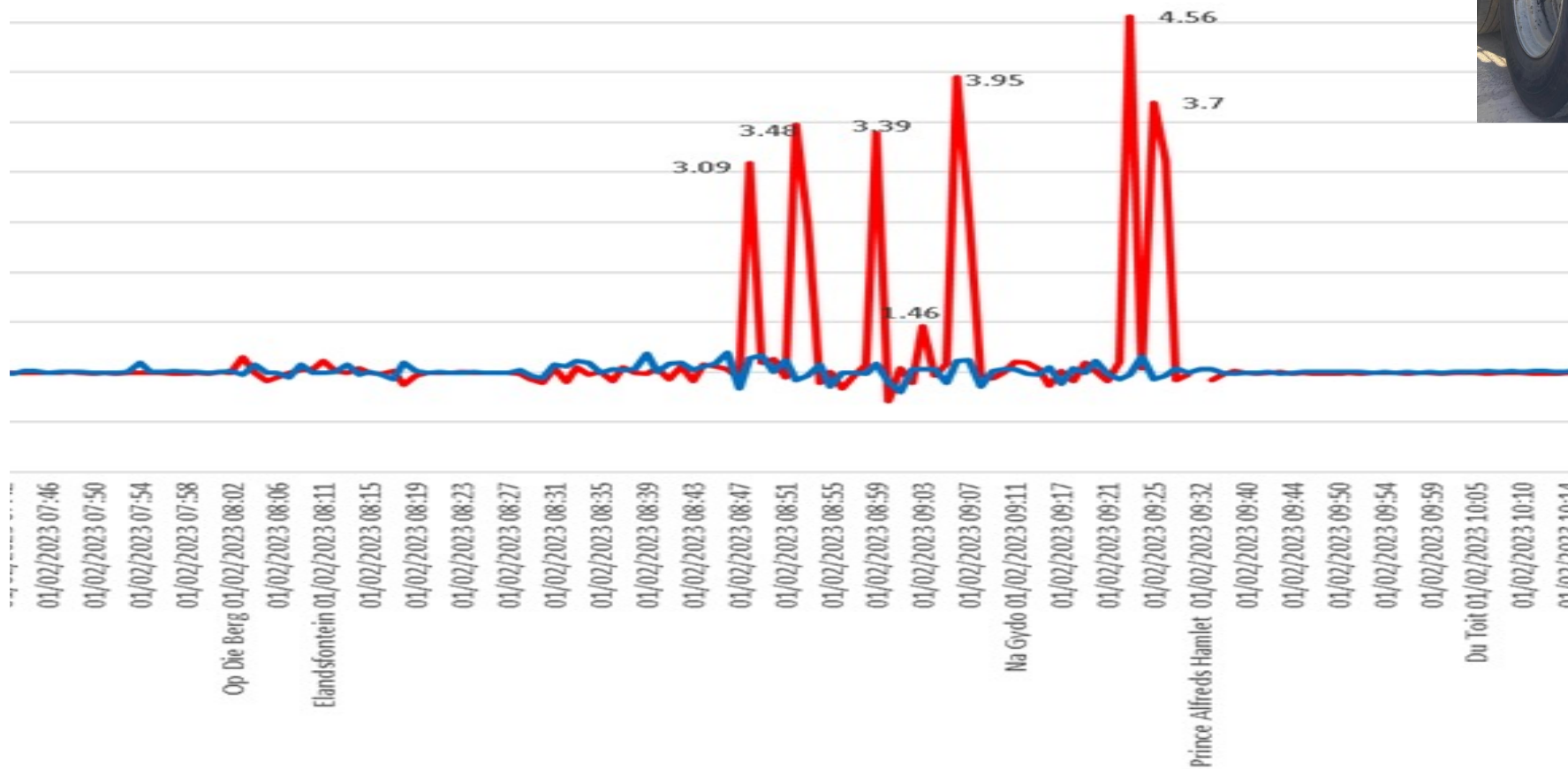
On the Farm	% of BIN	% NOT Bruised
Inside	74%	95%
Sides	15%	97%
Bottom	11%	95%
Total		95%



We know we bruise fruit in handling bins, we just don't know how much and where!

G-force measured inside the bin

G-FORCE: Vol kratte appels vervoer op teerpad, Lindeshof na Du Toit Pak



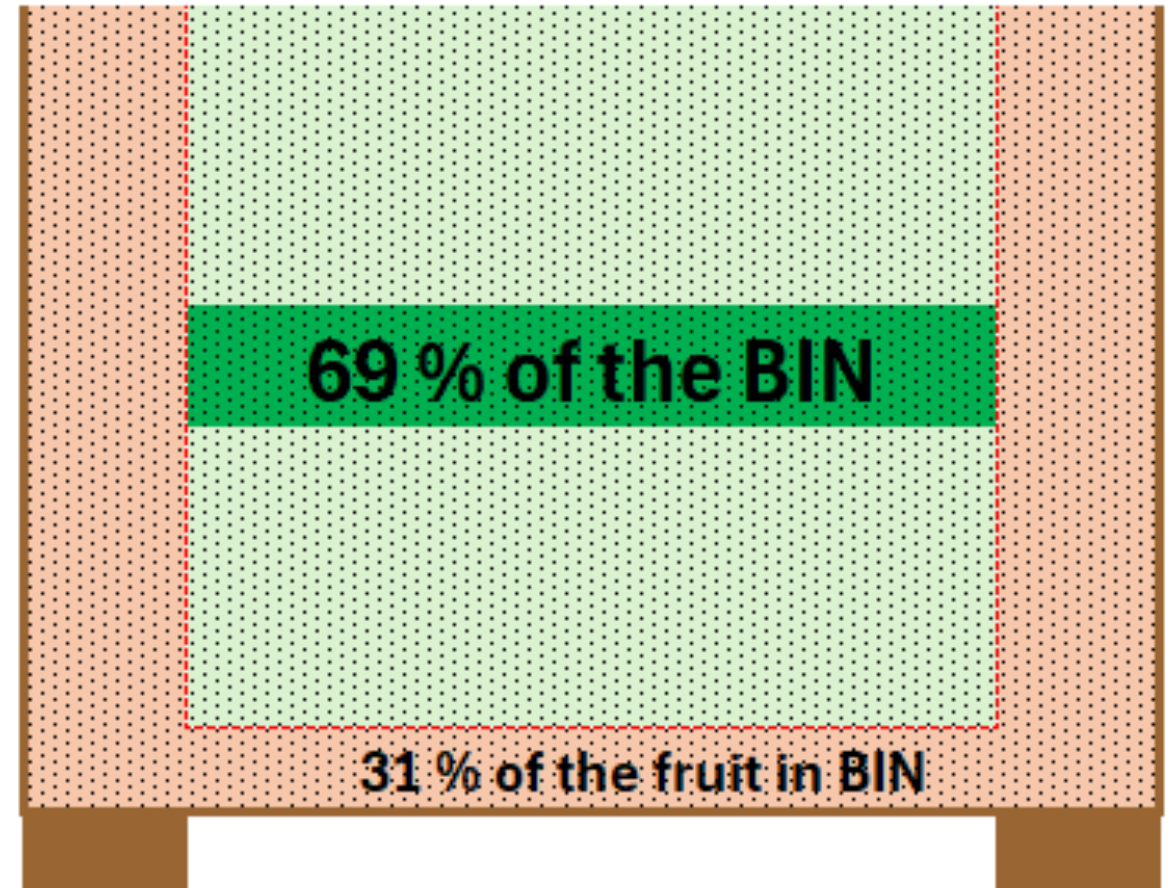
Logger placement

Forklifts should
always pick a bin
up evenly!!!





Bin Anatomy

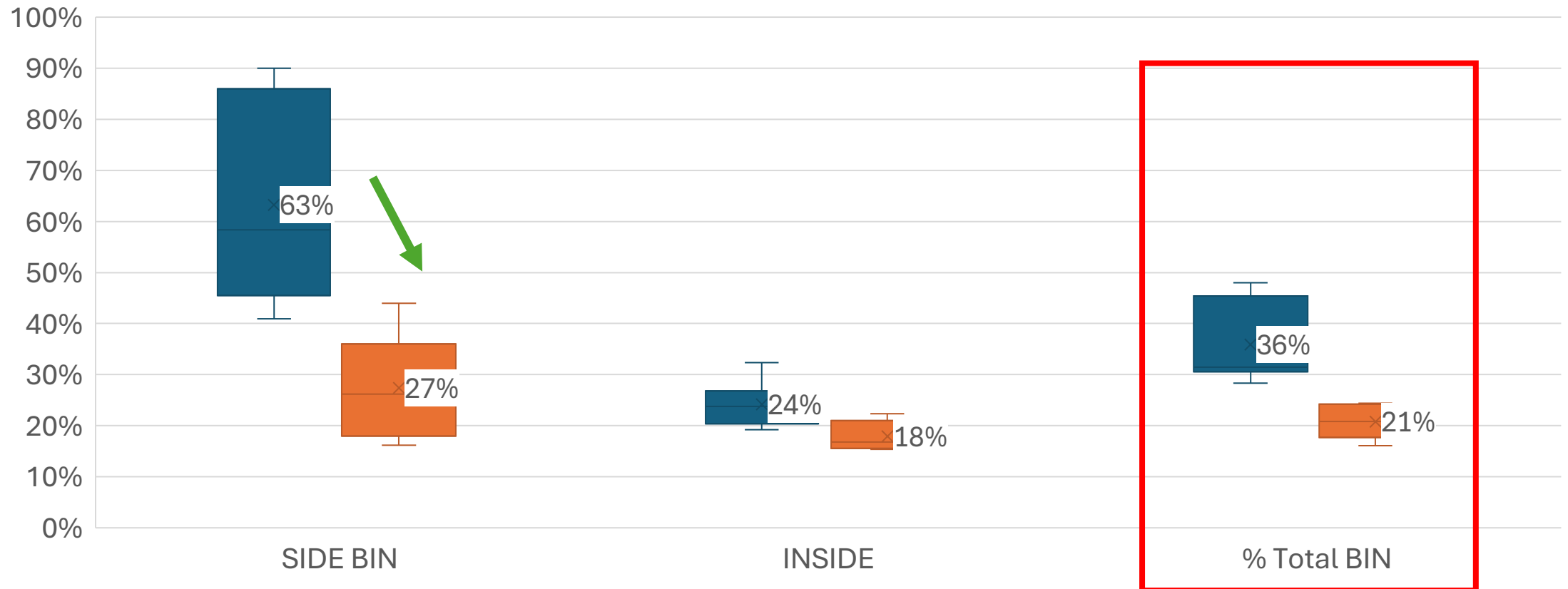


Bruise % between FG and CTR

After transport to pack house

15%	Less Bruise
2500	Apples / Bin
375	Apples
120	Count
3.1	Box / bin

% Apples bruised (PLD) FG vs CTR after transport to pack house



	<u>CTR</u>	<u>Fruitguard</u>
CL1	58%	67%
CL2	33%	26%
CL3	9%	7%
# Bins	<u>800</u>	<u>800</u>
Kg fruit/bin	345	345
Tot kg fruit	276 000	276 000
Kg/ Box	18.5	18.5
# Boxes	14 919	14 919
# CL1 Boxes	8 653	9 996
Diff # Boxes		1 343

Box CL1/ bin more

1.7

Goldens at Lindeshof – beste best pack out ever with FG!

Also”protects” quality of other investments like netted and reflective muchh

Orchard	t/Ha	Netted	OR%	% CL1
LS12	73.93		72%	77%
LW05	74.79	Drape net	83%	84%
LK04	111.48	Drape net	95%	79%
LK07	100.84	Drape net	88%	82%
LS18	77.04		75%	79%
			83%	80%

Farm QC – where sample is taken vs Packhouse



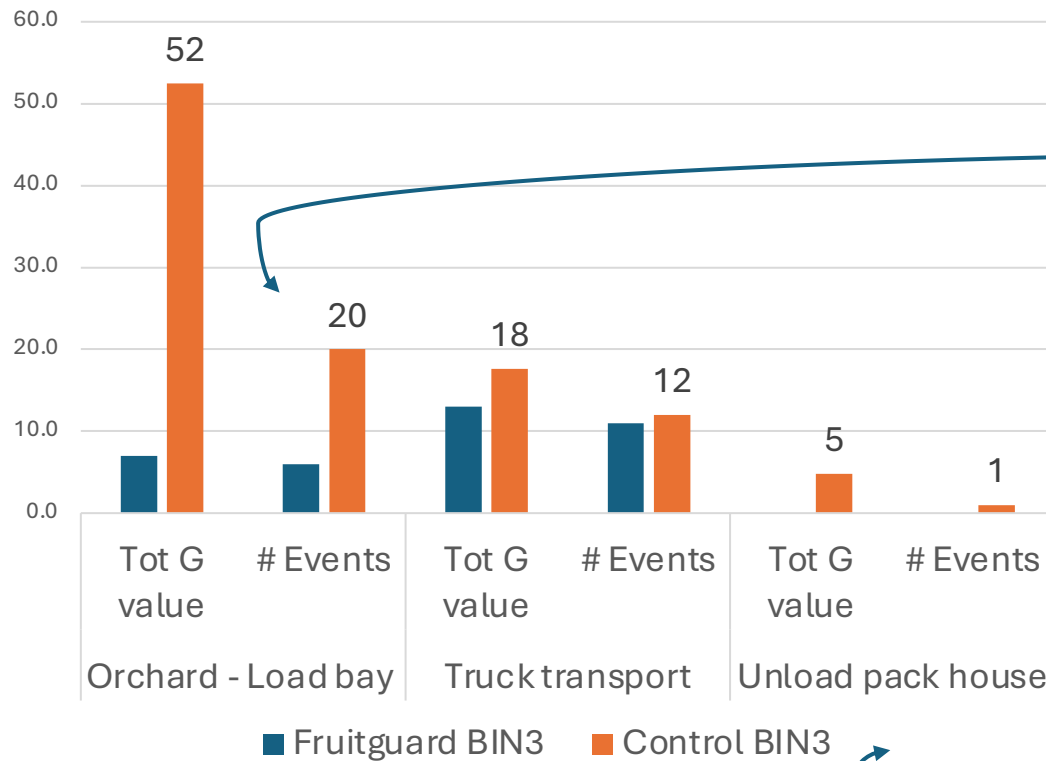
Bin position on trailer and in stack

Bin 3 = most of bins in trailer vs Bin1(We still see the impact, even thou we know it!)(SPEED and lack of suspension).

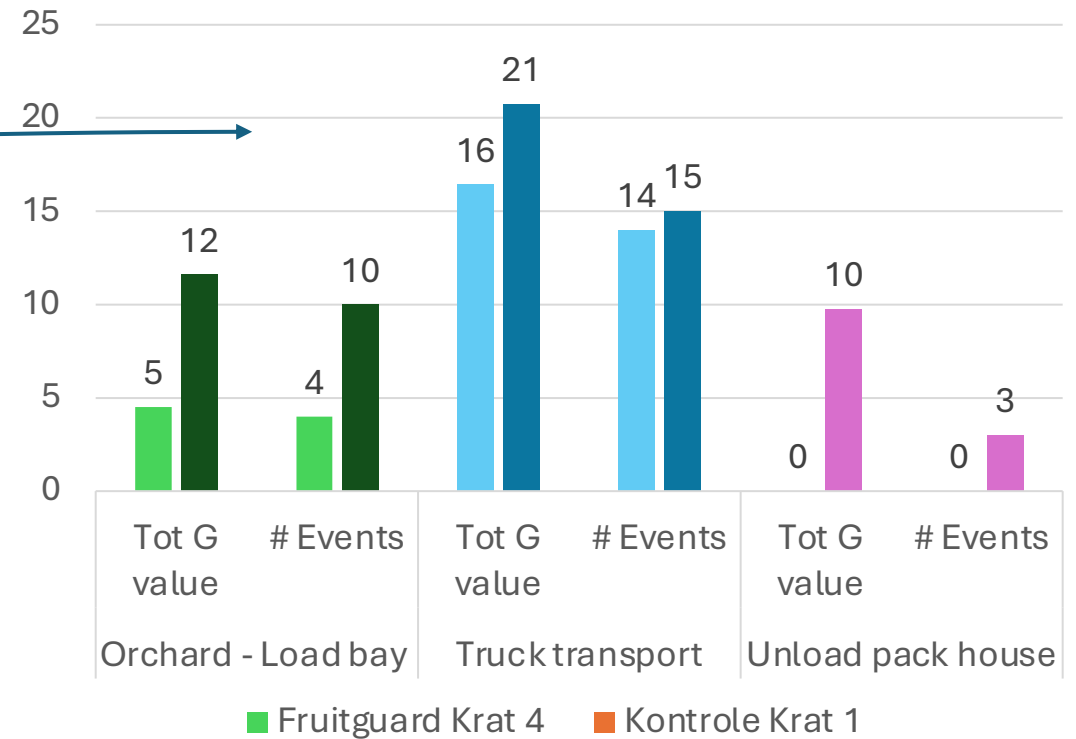
Bottom of the stack > more handling with forklift (high impact single event).

Forklift handling (on the farm and pack house).

Impackts inside the bins durring transport to pack house (FG vs CTR)(Bin 3 STD bin trailer)



Impackts inside the bins durring transport to pack house (FG vs CTR)(Bin 1 STD bin trailer)

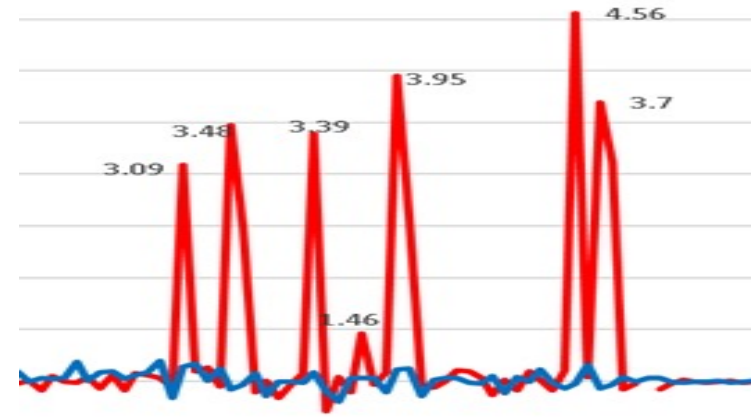


Speed adjustment

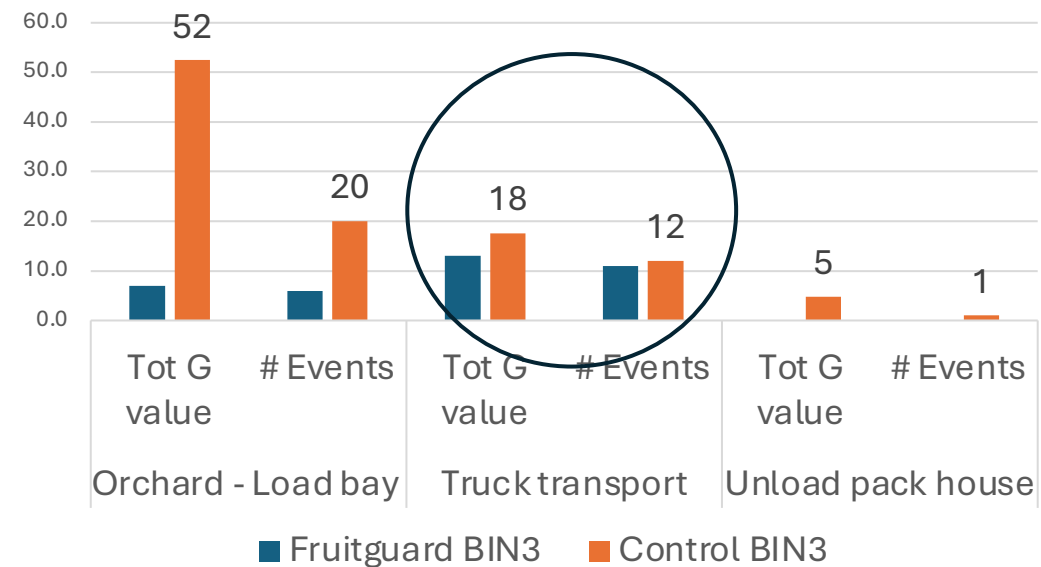
$$18/12=1.5$$

	New speed limit
On the Farm gravel	20
On the farm tar	40
TFT > Fonteintjie	80
Fonteintjie > Wadraif	50
Wadrif > Gydo	80
Gydo	50
Gydo > Hamlet	70
Hamlet	50
Hamlet > Ceres	70

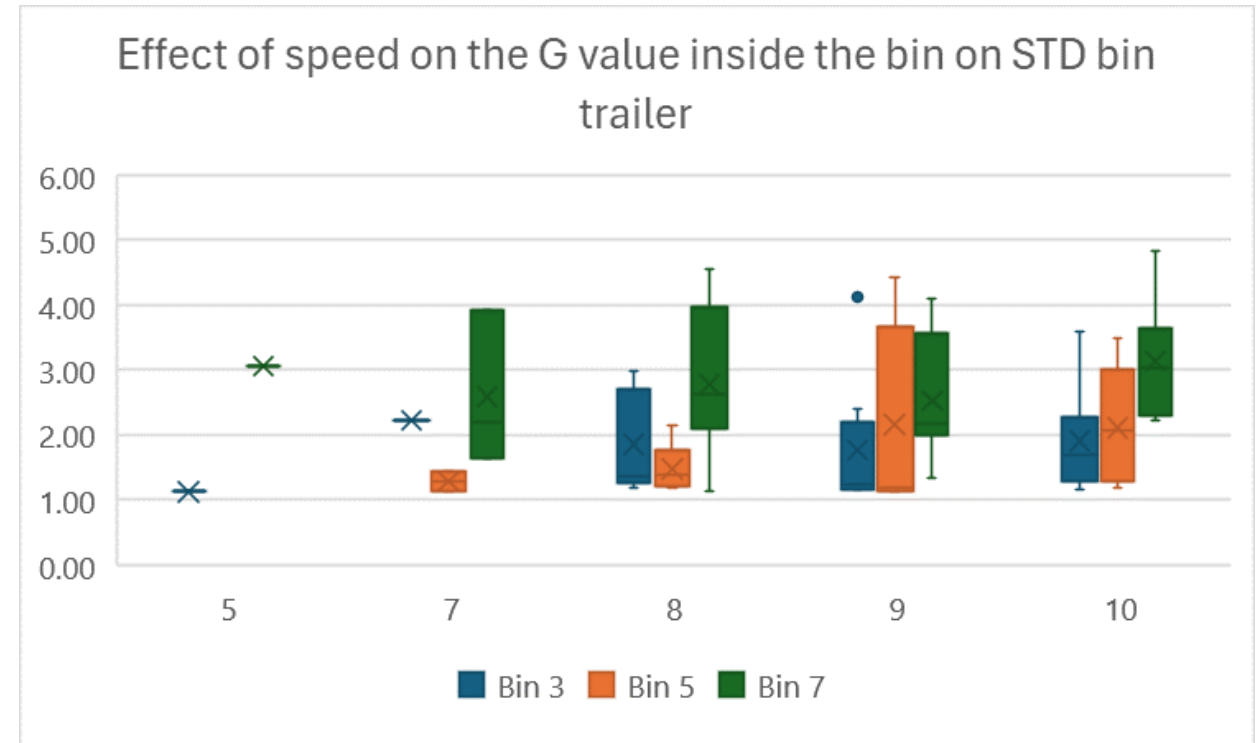
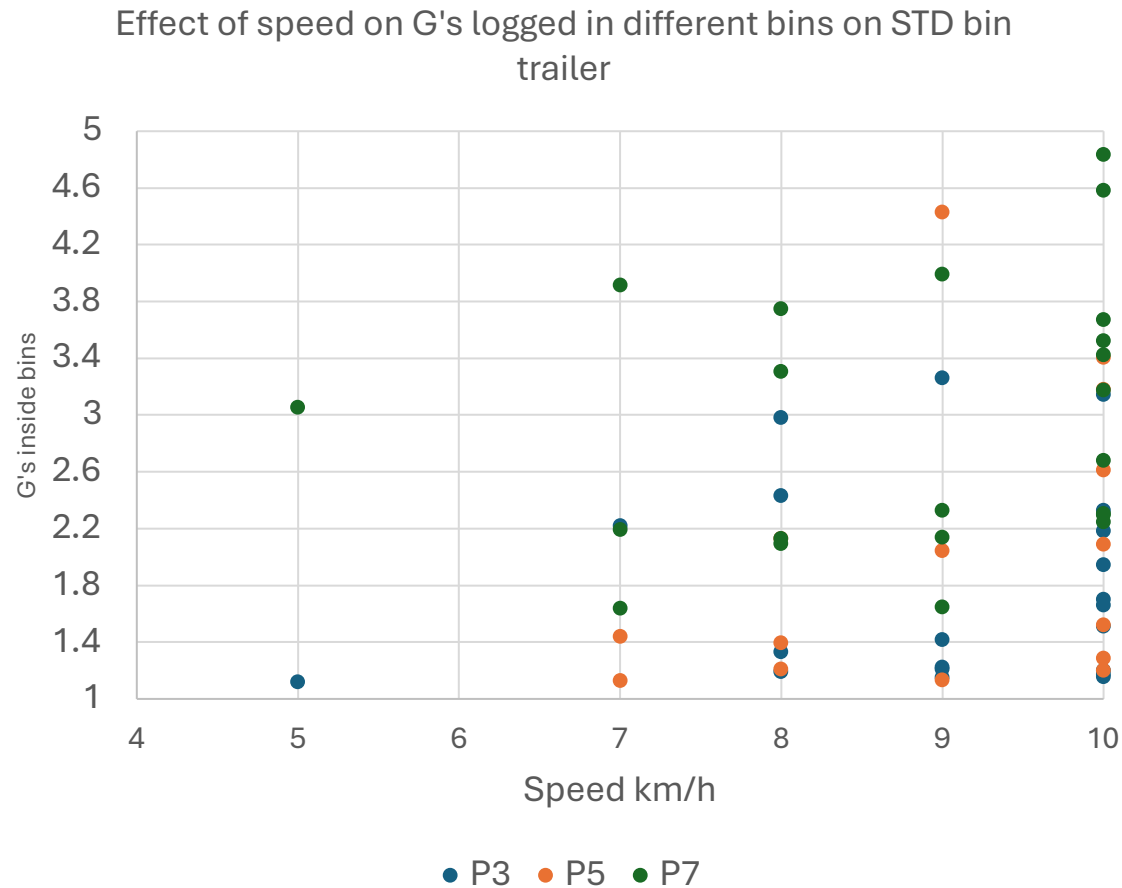
ervoer op teerpad, Lindeshof na Du



Impackts inside the bins durring transport to pack house (FG vs CTR)(Bin 3 STD bin trailer)



Effect of speed on impacts of STD bin trailer

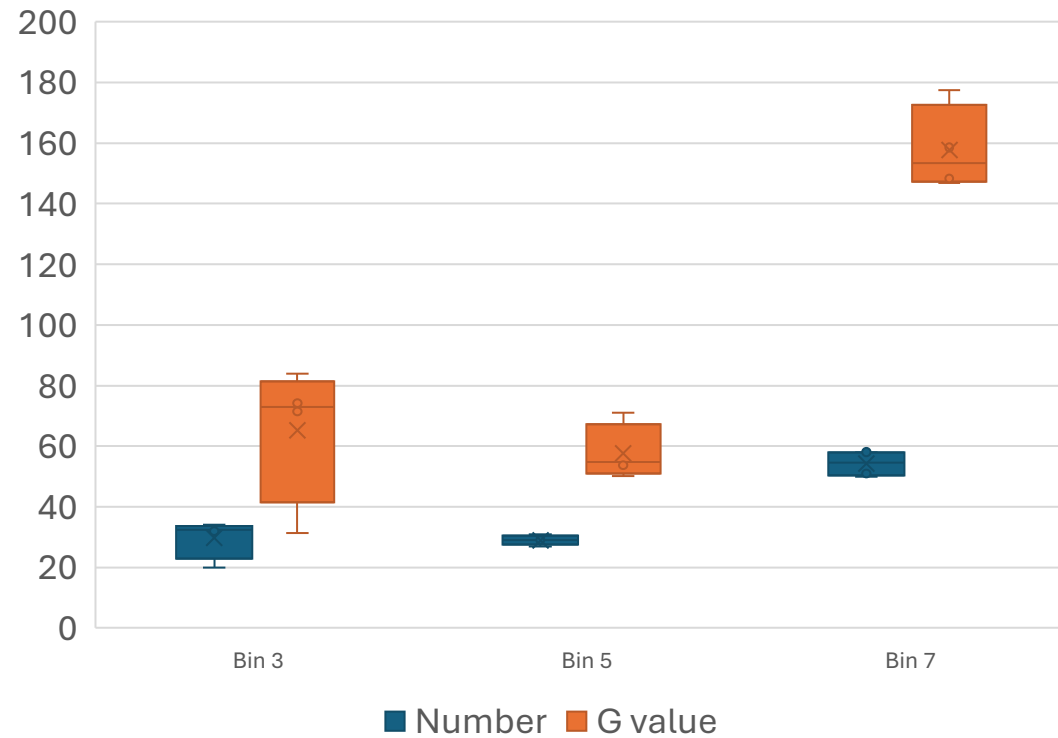


STD bin trailer position comparison

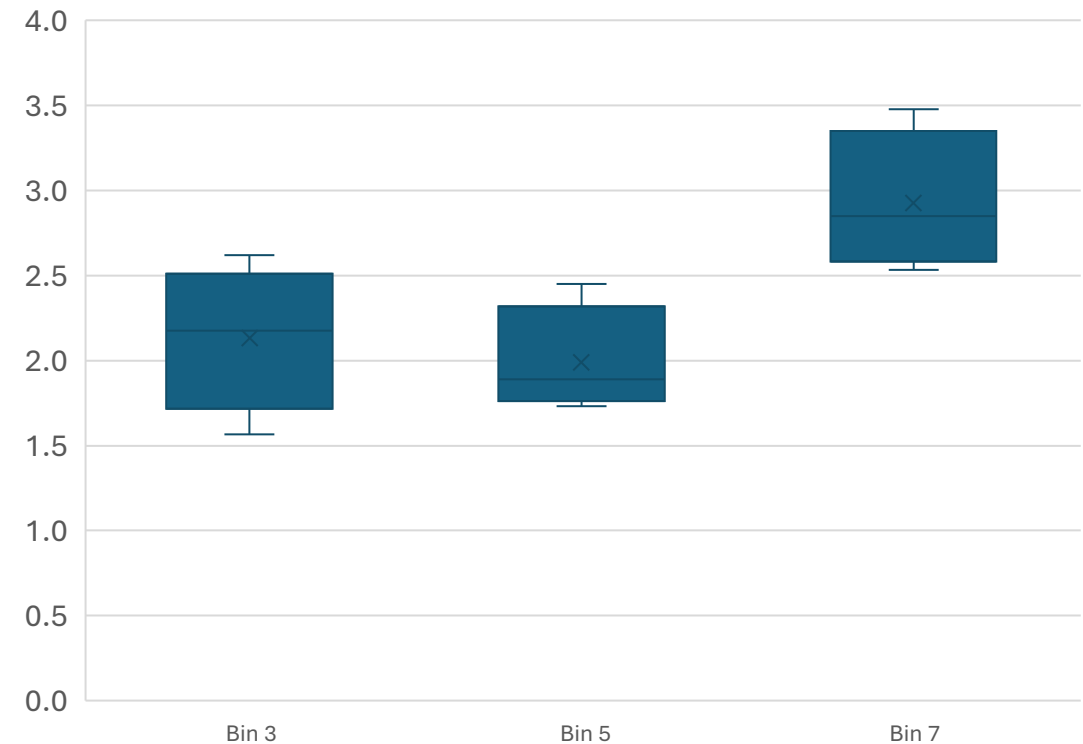
(46% #, 61% in Tot , 28% AVE)

Placement of juice bin (class 3 culled fruit).

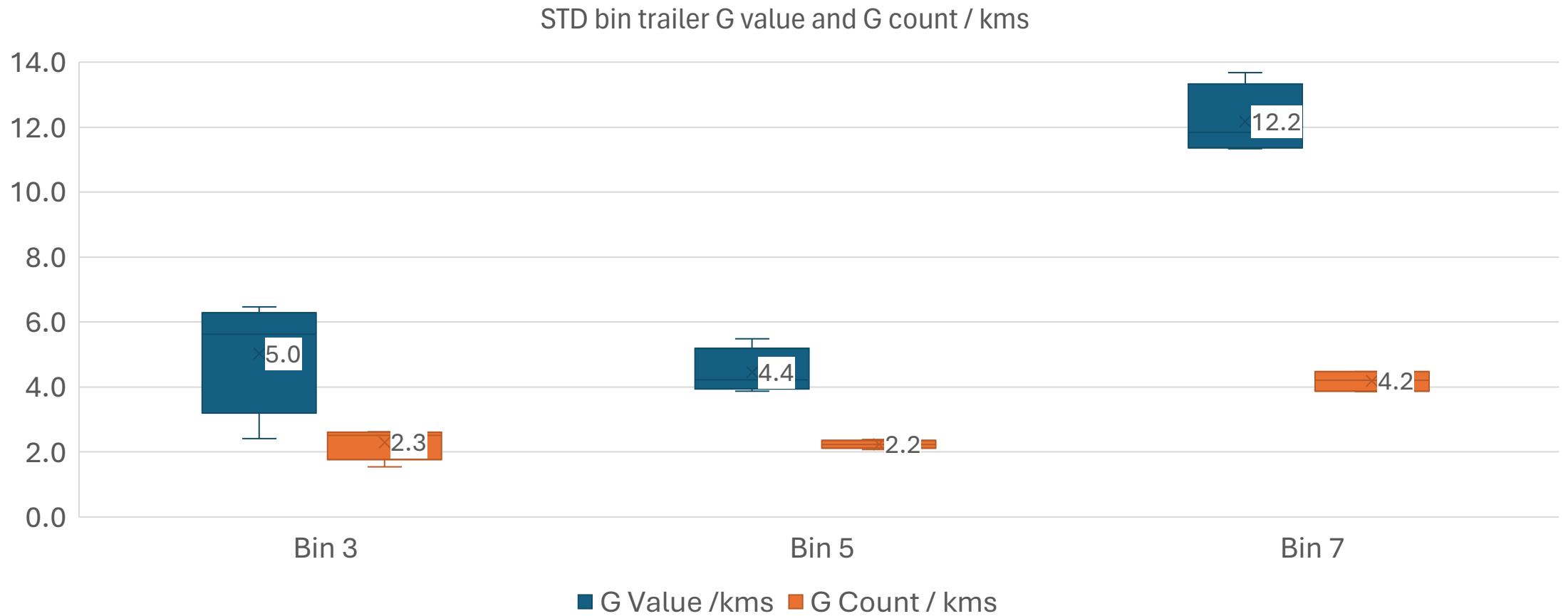
Comparison between bin positions on STD 7 bin trailer in 1 hour (Values inside the bin).



Ave G value between Bin positions on STD bin trailer inside the bin



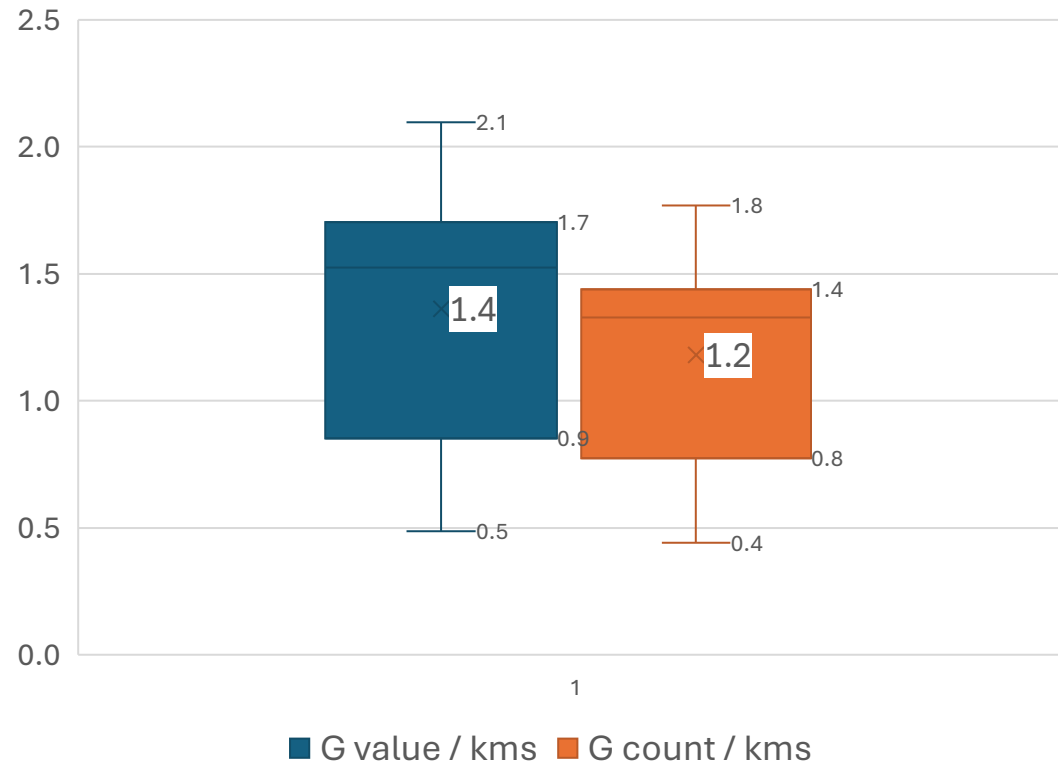
Speed Between 5 and 10 km/h (WRONG!)



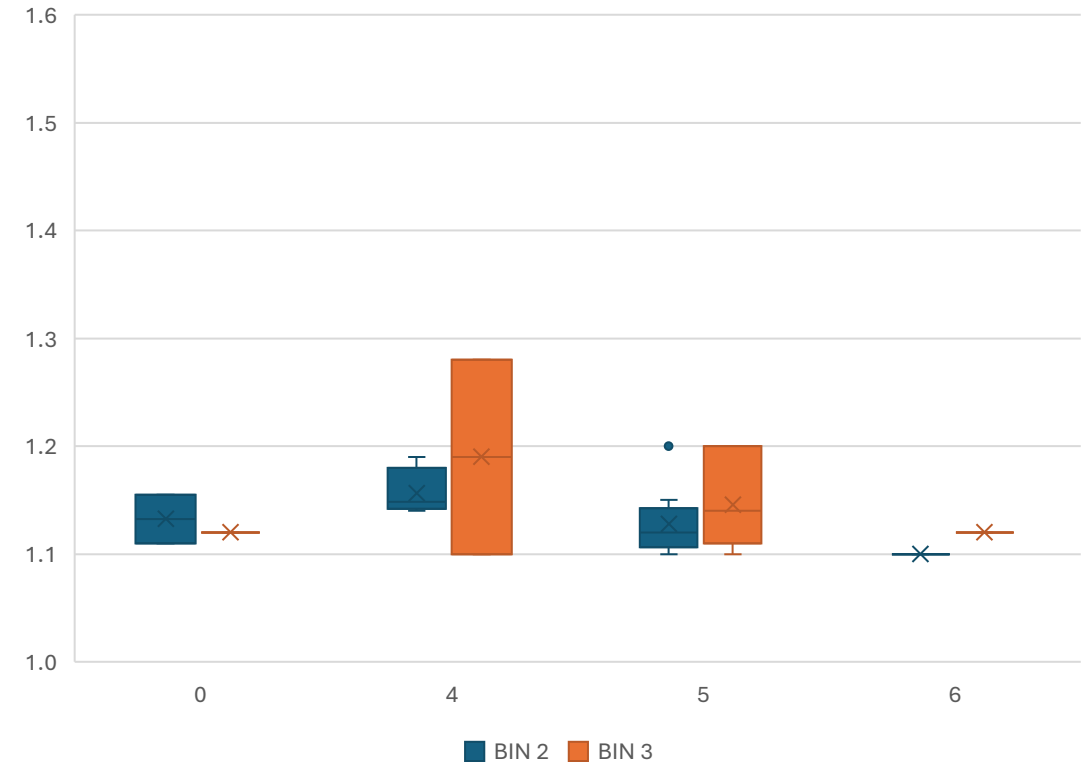
STD BIN trailer at slow speed @ < 5km/h

GOOD ROAD conditions

Effect of Gs inside **BIN3** on STD bintrailer over 2.3kms at slow speed



G Values inside the bin of STD Bin trailer at SLOW SPEED OVER 2.3 kms





Normal Bin trailer, (NGD) (slow speed)

87	21/02/2024 14:09	Elapsed Time	5						
88	21/02/2024 14:09	High G Event	5	6 866	5 187	60			
89	21/02/2024 14:10	Elapsed Time	6						
90	21/02/2024 14:10	High G Event	6	3 493	3 207	20	4.74	2.21	2.19
91	21/02/2024 14:10	Elapsed Time	7						
92	21/02/2024 14:11	High G Event	7	4 237	3 278	40		2.21	
93	21/02/2024 14:11	Elapsed Time	5						
94	21/02/2024 14:11	Elapsed Time	5						
95	21/02/2024 14:12	Elapsed Time	6						
96	21/02/2024 14:12	High G Event	6	6 049	3 168	70	3.81		
97	21/02/2024 14:12	High G Event	6	4 149	3 947	20			
98	21/02/2024 14:13	Elapsed Time	5						
99	21/02/2024 14:14	Elapsed Time	3				3.11		
100	21/02/2024 14:14	Elapsed Time	7						
101	21/02/2024 14:15	Elapsed Time	8						
102	21/02/2024 14:15	Elapsed Time	7				2.34		
103	21/02/2024 14:16	Elapsed Time	8						
104	21/02/2024 14:17	Elapsed Time	6						
105	21/02/2024 14:17	Elapsed Time	6				3.16		
106	21/02/2024 14:18	Elapsed Time	0						
107	21/02/2024 14:19	Elapsed Time	4						
108	21/02/2024 14:19	Elapsed Time	5						
109	21/02/2024 14:20	Elapsed Time	7						
110	21/02/2024 14:20	Elapsed Time	6						
111	21/02/2024 14:21	Elapsed Time	6						
112	21/02/2024 14:21	High G Event	6	7 559	4 425	150			
113	21/02/2024 14:21	Elapsed Time	8						
114	21/02/2024 14:22	Elapsed Time	5						
115	21/02/2024 14:23	Elapsed Time	16						
116	21/02/2024 14:23	High G Event	16	2 794	2 448	40	4.19	2.03	
117	21/02/2024 14:23	Elapsed Time	7						
118	21/02/2024 14:24	High G Event	7	4 588	4 272	20	1.35	2.86	5.01
119	21/02/2024 14:24	Elapsed Time	8						
120	21/02/2024 14:24	Elapsed Time	6						

- This is the speed we travel in practice
- Even at slow speed we see the impact
- Even lower G values measured on the trailer
- High values inside the bin
 - The effect of no suspension

TORSION BARS BACK TO THE FUTURE



Torsion bar (Very old model)

Device Data Export							Ry agter		
Device Data Export for 15B-L15-439952 - 439952 - 05/03/2024							Posisie 3	Posisie 2	
Date Logged (SAST (+02:00))	Log Reason	Speed KmH	Heading Degrees	Analog 18	Analog 19	Analog 20	996	930	517
05/03/2024 14:39	Start Of Trip	8	290						
05/03/2024 14:41	Distance Travelled	16	152					1.43	
05/03/2024 14:42	Elapsed Time	15	152						
05/03/2024 14:43	Elapsed Time	11	130						
05/03/2024 14:43	Elapsed Time	14	120						
05/03/2024 14:44	Elapsed Time	9	72						
05/03/2024 14:45	Elapsed Time	12	82						
05/03/2024 14:45	Elapsed Time	13	70						
05/03/2024 14:46	Elapsed Time	11	132						
05/03/2024 14:46	Elapsed Time	14	156						
05/03/2024 14:47	Elapsed Time	7	156						
05/03/2024 14:48	Elapsed Time	3	102						
05/03/2024 14:48	Elapsed Time	0	118						
05/03/2024 14:49	Elapsed Time	5	70						
05/03/2024 14:49	Elapsed Time	6	54						
05/03/2024 14:50	High G Event	6	54	9 294	5 539	140			
05/03/2024 14:50	High G Event	6	54	13 006	8 220	110			
05/03/2024 14:50	Elapsed Time	7	54						
05/03/2024 14:51	Elapsed Time	6	56						
05/03/2024 14:51	Elapsed Time	0	60						
05/03/2024 14:52	Elapsed Time	0	66						
05/03/2024 14:53	Elapsed Time	0	56						
05/03/2024 14:53	Elapsed Time	0	60						
05/03/2024 14:54	Elapsed Time	0	112						

- Even at slightly faster speed, we do not get impacts on the trailer
- If we do get high values on the trailer, is not always transferred to the fruit.
- IF you drive slow with this, you will ALWAYS be safe

	TRAILER SET				
TYPE	STANDARD	T-BAR	STANDARD	RUBBER	T-BAR + RUB
FARM	LDH	LDH	NGD	NGD	NGD
Route	A	D	B	B	B
G-Value (>1.09/km)	4.1	2.2	5.4	3.9	1.9
Count (>1.09/Km)	2.3	1.5	2.5	2	1.6
3 km drive	3	3	3	3	3
G value	28	10	41	23	9
		35%			23%

New software will send automated reports on drivers

High G Trip Report - > 4.5g

High G Trip Report (Kratstel, Kratstel met TB) - 06/02/2024 to 14/02/2024

EVENTS > 4.5g

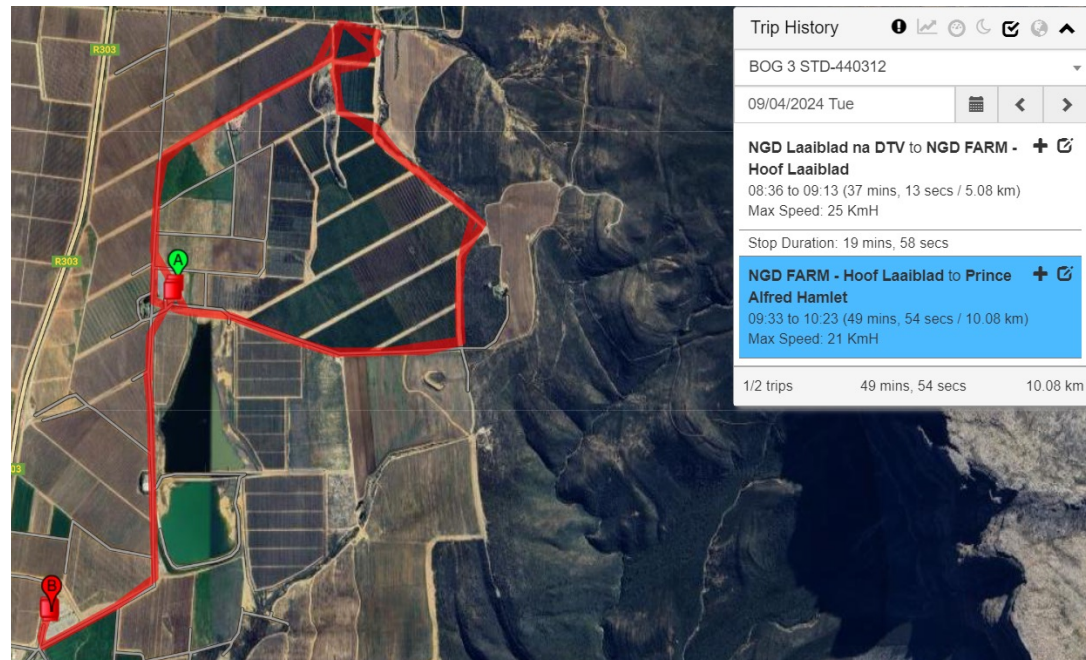
Asset Type	Asset	Distance (km)	High G Count	Per km
Kratstel	Total - 10A-L10-440223 (41)	65.85	4 936	75
Asset Type	Asset	Distance (km)	High G Count	
Kratstel	Total - 10B-L10-440221 (62)	97.72	9 298	95

Asset Type	Asset	Distance (km)	High G Count	
Kratstel met TB	Total - 13A-L13-402669 (52)	59.78	2 313	39 k
Asset Type	Asset	Distance (km)	High G Count	
Kratstel met TB	Total - 15B-L15-439952 (45)	62.35	816	13
Asset Type	Asset	Distance (km)	High G Count	
Kratstel met TB	Total - 3A-L3-440254 (43)	88.62	1 044	12



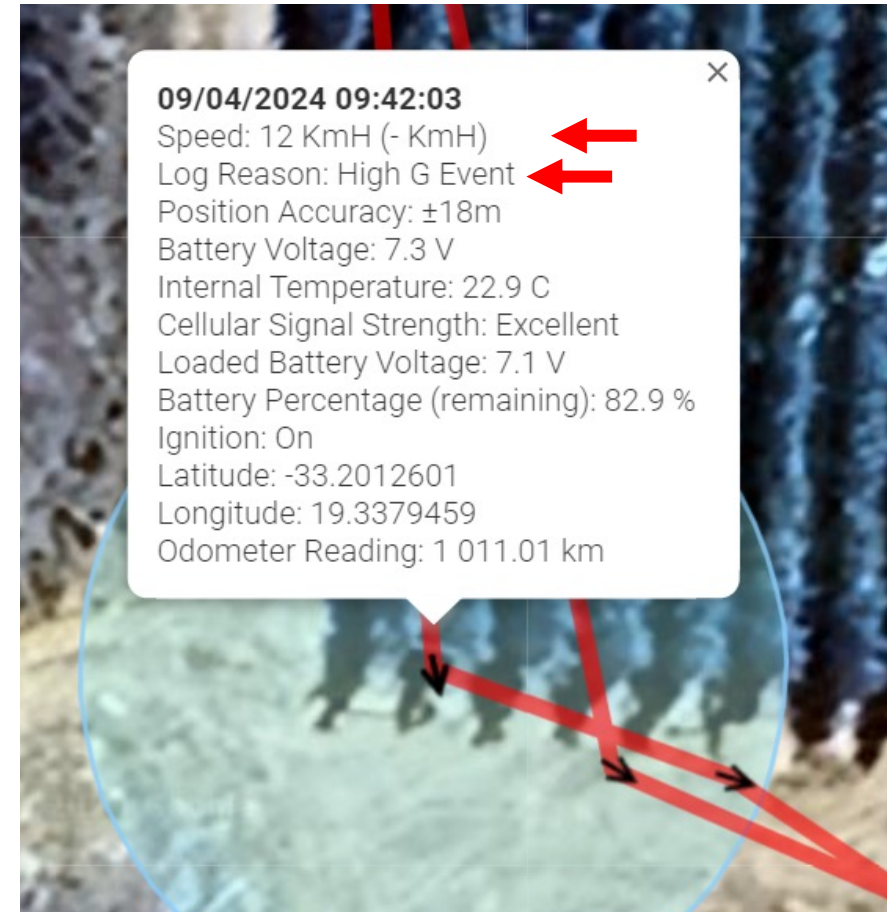
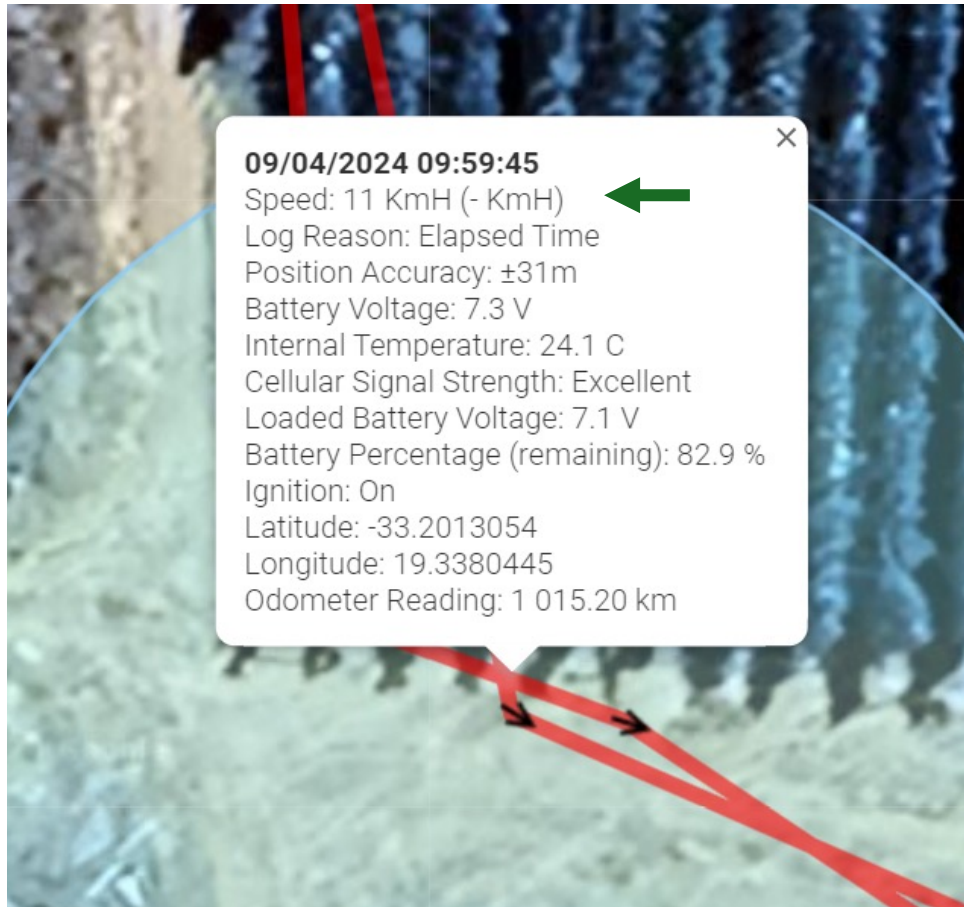
RED ANT BOG AIR vs BOG

BOG STD vs BOG AIR – Same route + Speed



SPEED + TURN in STD BOG

Angle + speed > increased risk



BOG STD – Speed and turning

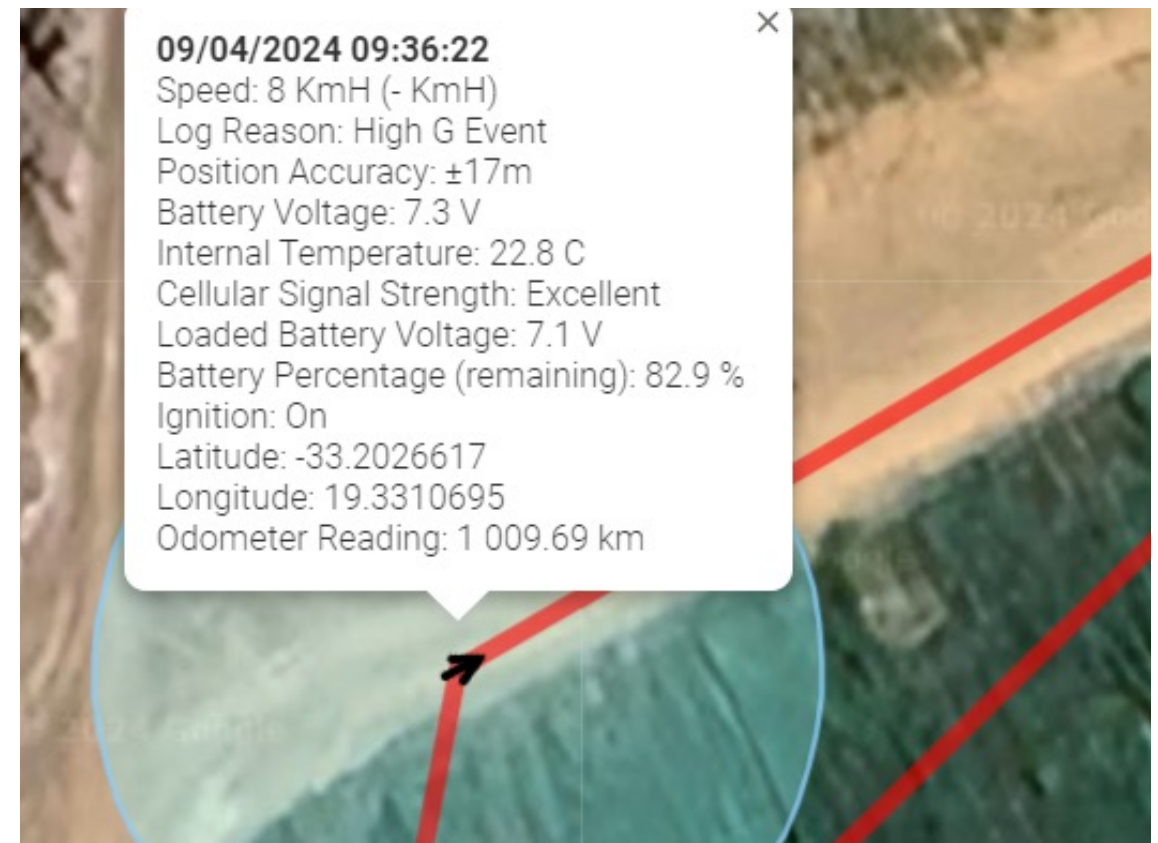
Reduce speed when turning (Below 7km/h)

Straight = 12km/h



BOG STD

Effect of crabbing on 60° angle turn
SPEED IS TO FAST
Effect on chassis and inside the bin!



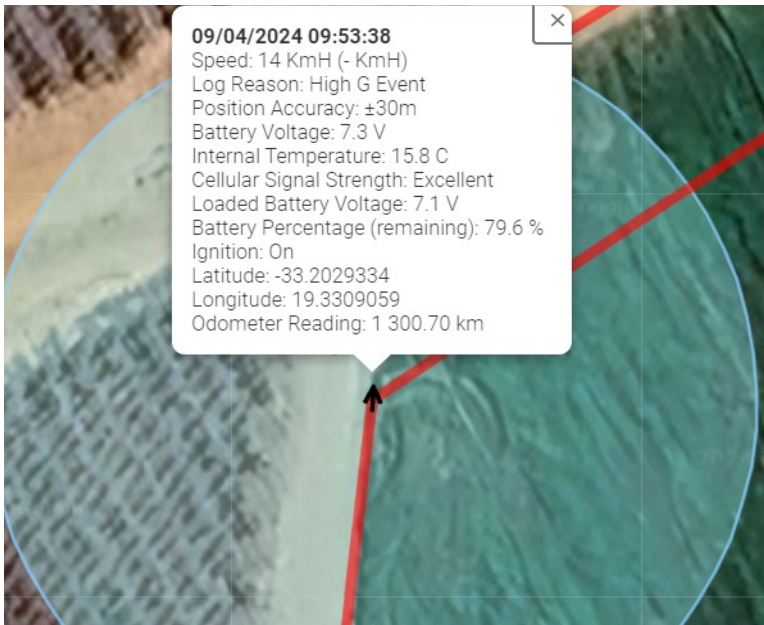
54	09/04/2024 09:35	Elapsed Time	16	2	1.19	
55	09/04/2024 09:35	Elapsed Time	8	60		
56	09/04/2024 09:36	High G Event	8	60	2 696	3.01 5.31 TURN + CRABBING
57	09/04/2024 09:36	High G Event	8	60	1 996	
58	09/04/2024 09:36	High G Event	8	60	1 967	
59	09/04/2024 09:36	High G Event	8	60	2 069	
60	09/04/2024 09:36	Elapsed Time	14	58		
61	09/04/2024 09:36	High G Event	14	58	1 932	
62	09/04/2024 09:36	Elapsed Time	16	58		

BOG AIR – Same TURN, SAME SPEED

Pick up the HIGH G event on the Frame

Travel at faster speed

Does not get the effect in the BIN



		SPEED	HEADING	G	G in BIN
09/04/2024 09:52	Elapsed Time	15	4		
09/04/2024 09:53	Elapsed Time	14	2		
09/04/2024 09:53	High G Event	14	2	7 952	
09/04/2024 09:53	High G Event	14	2	3 127	SH
09/04/2024 09:53	High G Event	14	2	4 289	
09/04/2024 09:53	Elapsed Time	13	54		

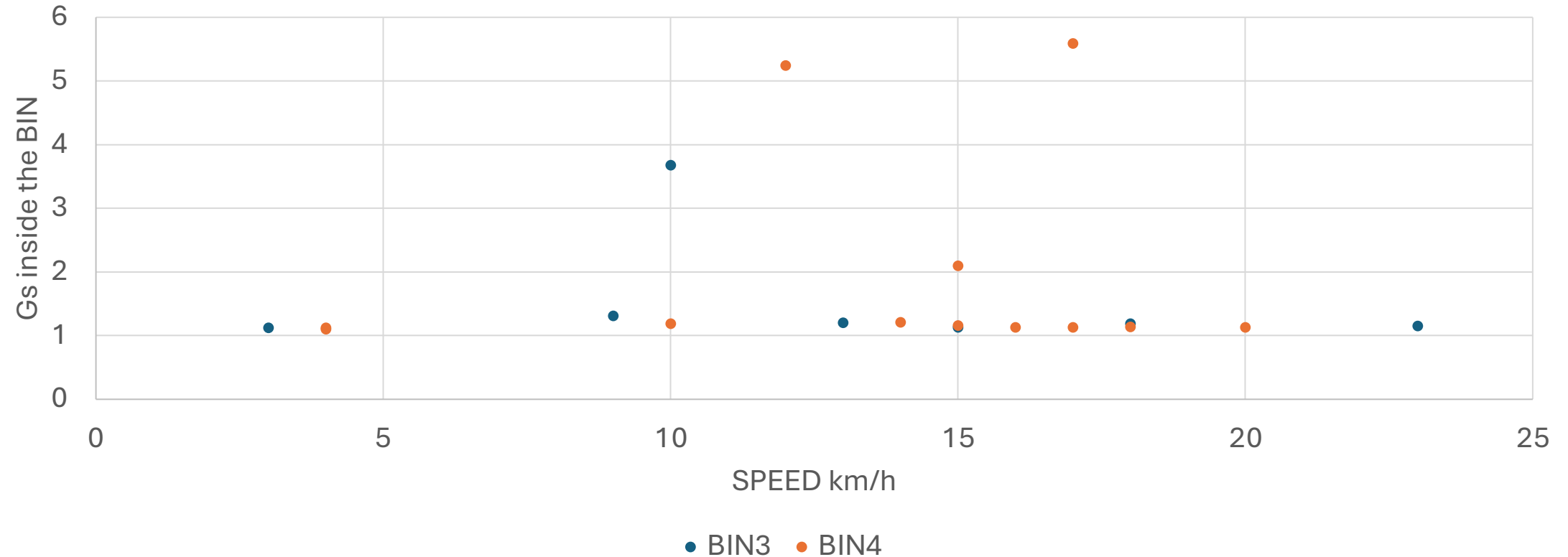
RED ANT BOG with AIR suspension

Safest option to transport fruit

Faster speed, longer distance

(Remember, we are looking at the worst bin!)

BOG AIR Gs inside the BIN vs SPEED



Unloading when **fork lift** handles the bins

Big impacts
Can cause a lot of damage!

Device Data Export for Kratstel 29 - 401685 - 401685 - 27/03/2024								
Date Logged (SAST (+02:00))	Log Reason	Speed KmH	Analog 18	Analog 19	Analog 20	249	743	581
27/03/2024 11:49	Elapsed Time	0						
27/03/2024 11:50	Elapsed Time	0						
27/03/2024 11:51	Elapsed Time	5						
27/03/2024 11:51	High G Event	5	3 997	2 197	150	2.46	6.26	1.34
27/03/2024 11:51	Elapsed Time	0						
27/03/2024 11:52	Elapsed Time	0						
27/03/2024 11:52	Elapsed Time	0						
27/03/2024 11:53	Elapsed Time	0						

- Unload
- Drench
- Stack
- Un stack again
- Truck loading



Multiple handling of bins!





Forklift fitted with Vibration Damper vs Standard

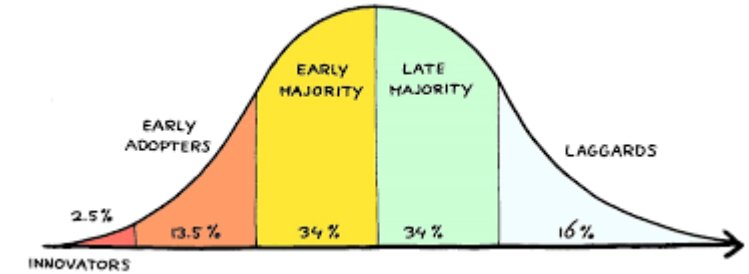
Unloading bins at cold room		
31 Mei 2023		
	Standard	Vibration Damper
km	3.3	6.1
Total g value / day	529	576
g value / km	159	94
# events >1.5g / km	48	29
<u>Number</u>		
>1.5g	161	177
>3g	87	93
>4g	44	41
>5g	10	7
Improvement		40%

Pallet movement		
30 Mei 2023		
	Standard	Vibration Damper
km	4.7	6.3
Total g value / day	414	314
g value / km	87	50
# events >1.5g / km	29	17
<u>Number</u>		
>1.5g	139	106
>3g	59	43
>4g	25	14
>5g	3	3
Improvement		42%

# Events / km		
>1.5g	48	29
>3g	26	15
>4g	13	7
>5g	3	1
<u>% Improvements</u>		
>1.5g		40%
>3g		42%
>4g		49%
>5g		62%

29	17
12	7
5	2
0.6	0.5
	42%
	45%
	58%
	24%

Vibration dampers on forklift



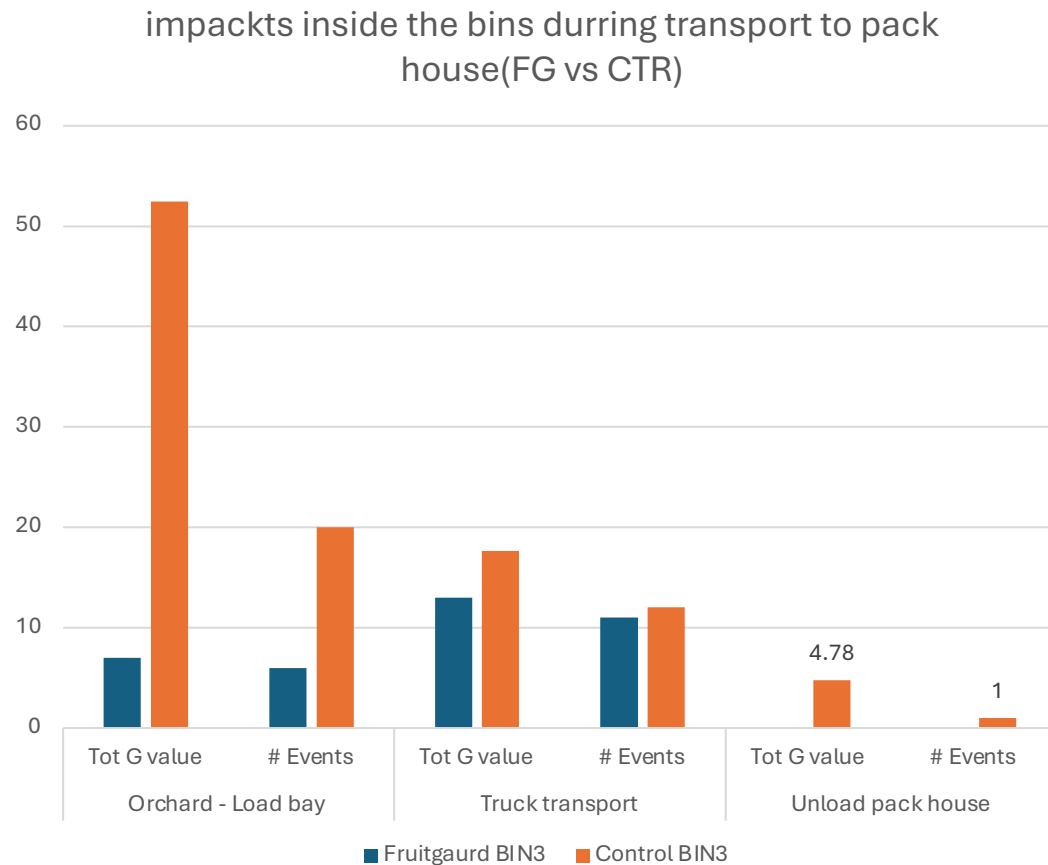
30 min on each of the below actions

		STD G-Value >1.09	STD G-Count >1.09	VD G-Value >1.09	VD G-Count >1.09
Unloading	Picking up bins from the trailer and placing back	114	36	53	17
Unloading	Placing on cement floor and picking up	163	40	60	17
Stacking	Staking and destacking in cold room	256	71	140	46
Driving	Trip from cold room to tipping area	76	29	31	16
Total		609	176	285	96
Difference				324	80
				G-Value >1.09	G-Count >1.09
V-Damper Improvement				53%	45%

Stacking was done, 3, 6 and 9 bins high

Why do we have to change?

We need to close the circle, to get full value of investments



- We have to close the circle if we want to reduce bruising.
 - It's not just the pickers!
 - Surface of the road on the farm.
 - Travel speed of the bin trailers.
 - FORKLIFTS!!!!!!
 - Travel speed of the truck.
- We have technology that can help us evaluate our steps
 - Easier to identify and measure differences.
- Make use of Fruitguard liners!
 - It always protect the fruit.

Thanks



Transport of nectarines

- Weight of the bins / load different.
- Strap the bins inside tautliner tot the load bed.
- Can keep the speeds the same!
- Blue arrow: Logger

