

Insights into monitoring livestock on the move.

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Overview

- Long haul road transport
- Aims, preliminary results
- Commercial study of pasture-raised beef cattle (4 replicates):
1-, 2- or 3-night rest stop after 38 hour journey in Western Australia, before travel to lairage



Background

- Cattle in Northern WA transported by road for processing $\geq 2,400\text{km}$
- Poor road conditions and remote location $\neq$ local abattoir viability
- Transport is known risk for animals; rest stops increase total time
- Limited effect of rest stop 0-12 h after 9, 12 or 36h, on cattle¹²³
- Animal-based measures needed (+ environment) but are challenging

Behaviour

Physiology -
health

Carcase

¹Knowles et al 1999, ²Earley et al 2013*, ³Melendez et al 2020

Recommended journey times

- Regulations vary, based on time off water or journey time
- Type and duration of 'rest' undescribed
- **Australia: max time off water is 48 h** followed by 36 h rest

(Animal Health Australia 2012)

- Canada: max 36 h journey before 8 h rest (Canada Transport of Animals Regulations)

- **EFSA 2022 recommend 29 h** with 24 h res

(EFSA J doi:10.2903/j.efsa.2022.7442)

- An international trend to reduce long journeys

(Cislaghi *et al* Review 2023; ECA review 03/2023)



Physical

Physiological

Psychological



Welfare of cattle during transport. European Food Safety Authority (EFSA)

EFSA Journal 2022;20(9):7442 doi:10.2903/j.efsa.2022.7442



Project aims: To identify

- the behaviour, health and physiology of *Bos indicus* cattle in supply chain
- the effect of rest stop duration:
 - short (18 h)**
 - medium (42 h)**
 - long (64 h)**after cattle transported for 38 h



Methods:

Bos indicus n= 952 cows

- 1) Loading to depot 2000 km
- 2) Cattle rest @38h at depot (3 durations)

Short rest 15-18 h

Medium rest 39- 42 h

Long rest 61- 64 h

- 3) Depot to Lairage (Harvey) 200km

- Behaviour – group; posture, x12 beh
- Physiology – focals; urine, haematology
- Carcase – focals; weight, glycogen, pH,
- Focal animals n = 240
- GLMM analysis



On truck

Depot yard

On truck

Lairage

Slaughter



Depot Yard Stop;
food, water, rest, shelter



On vehicle; no bedding
noise, high density, metal floor,
vibration, novelty,

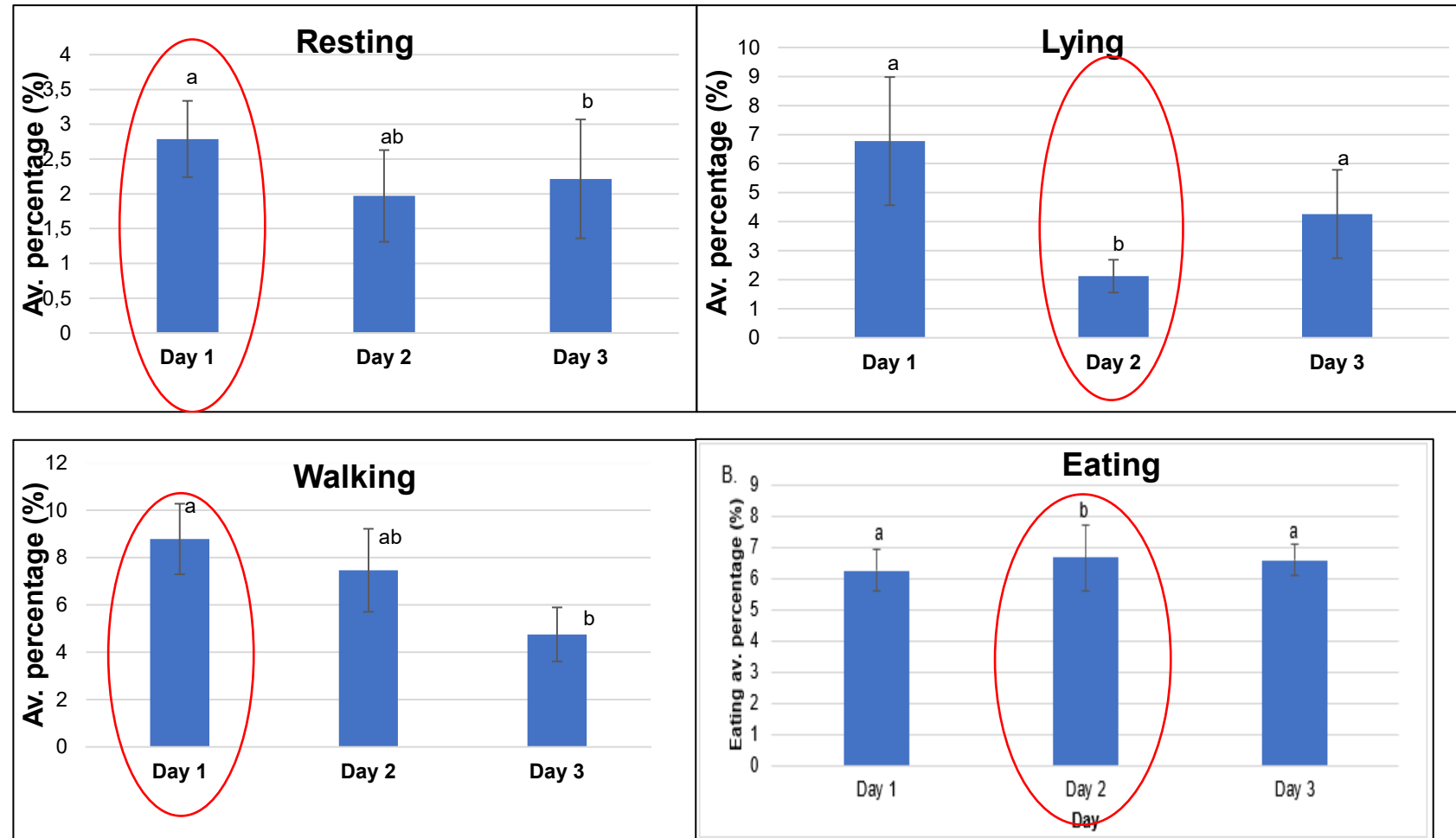


Credit: Nalabeef.com

Lairage; water, noise,
high density, concrete
floor, novelty

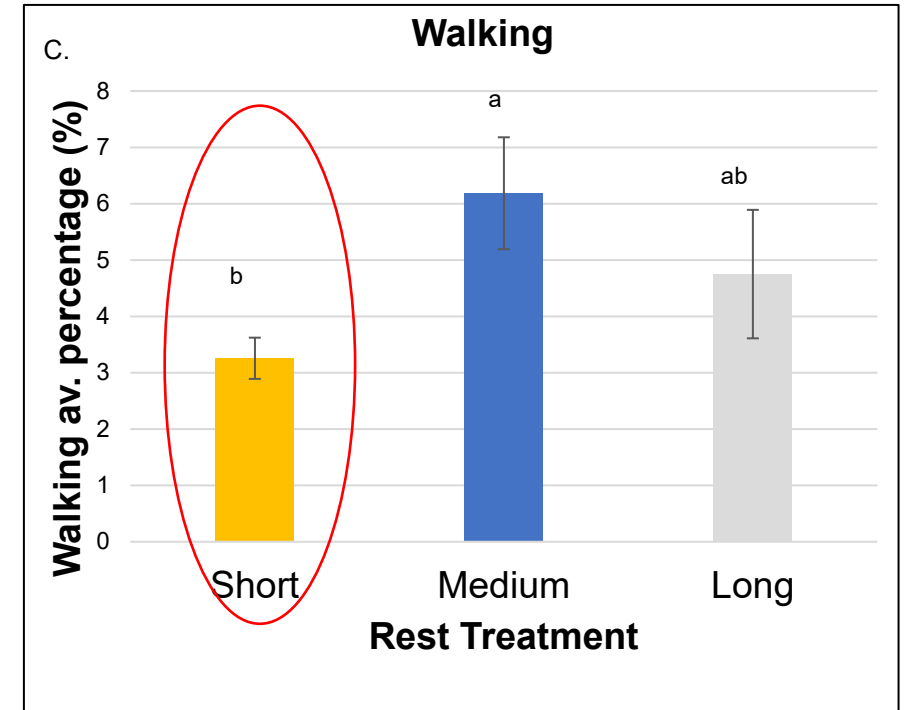
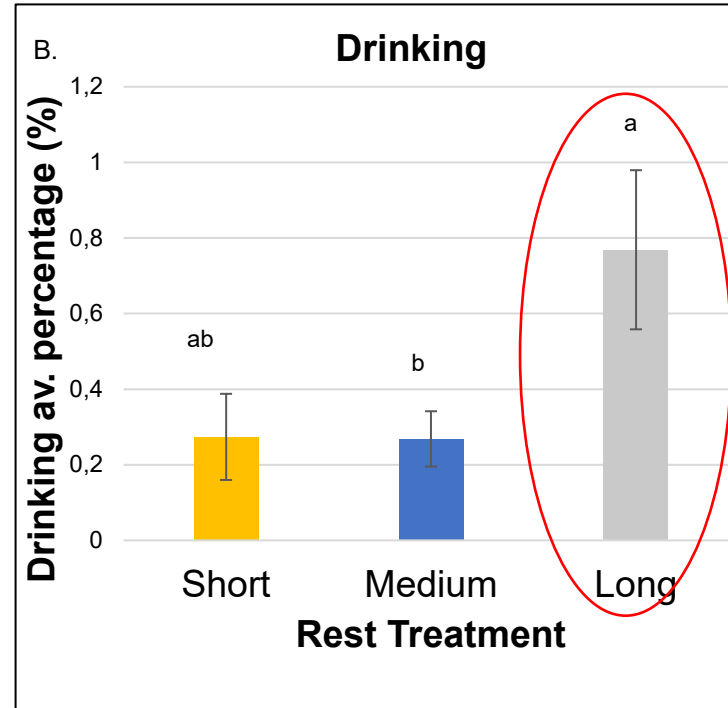
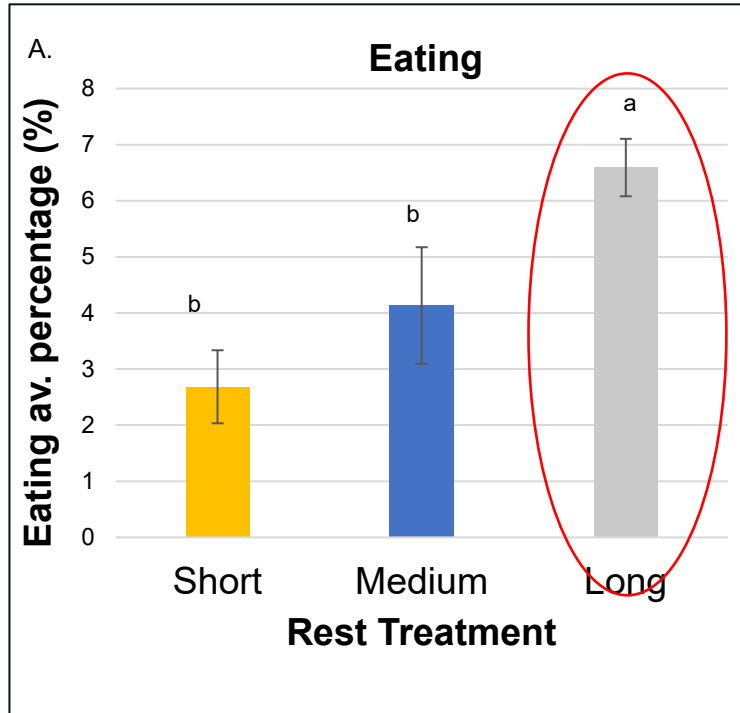
Prelim Results: behaviour all cows across days in depot after 38h

- Scored on 'long' stay cattle over 3 mornings (30min replicates)
- Day 1 - rest, walk, lying
Day 2 - more eating
Day 3 - return to normal patterns; rest and activity



RM ANOVA . Letters indicate significant Tukey's differences (95% CI).

Treatment effect on behaviour at depot rest stop after 38 h



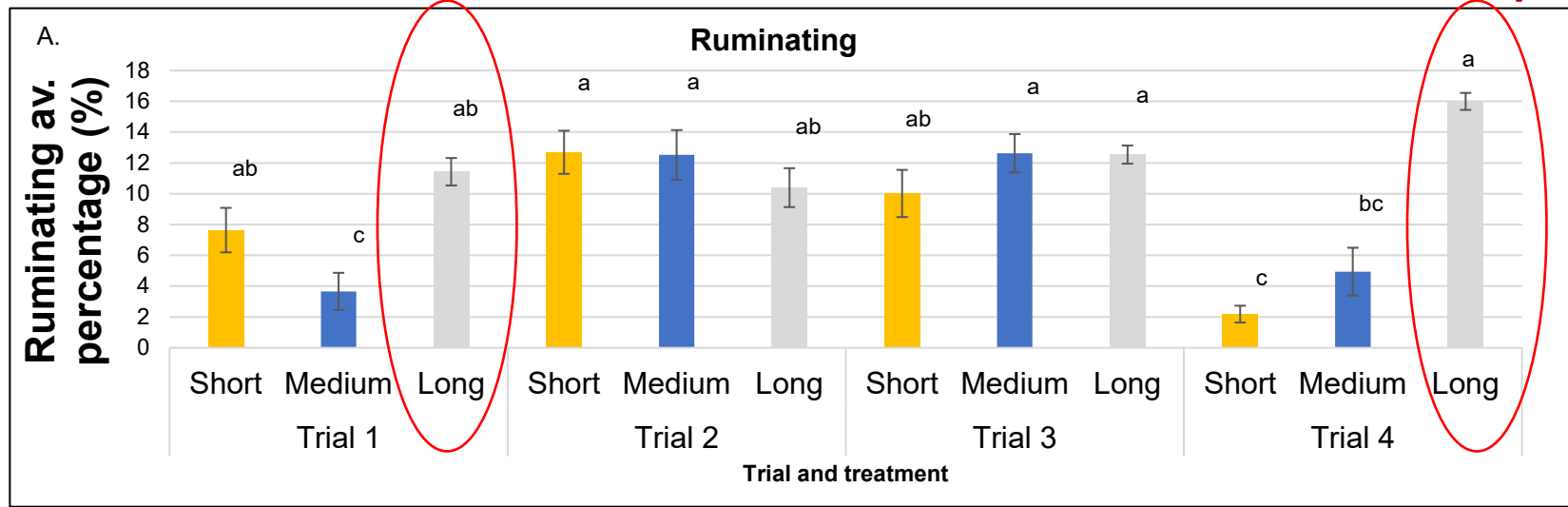
Scored on cattle on morning before loading out (90min). GLMM

No difference beh: social behaviour (pos or neg), lying, resting, ruminating

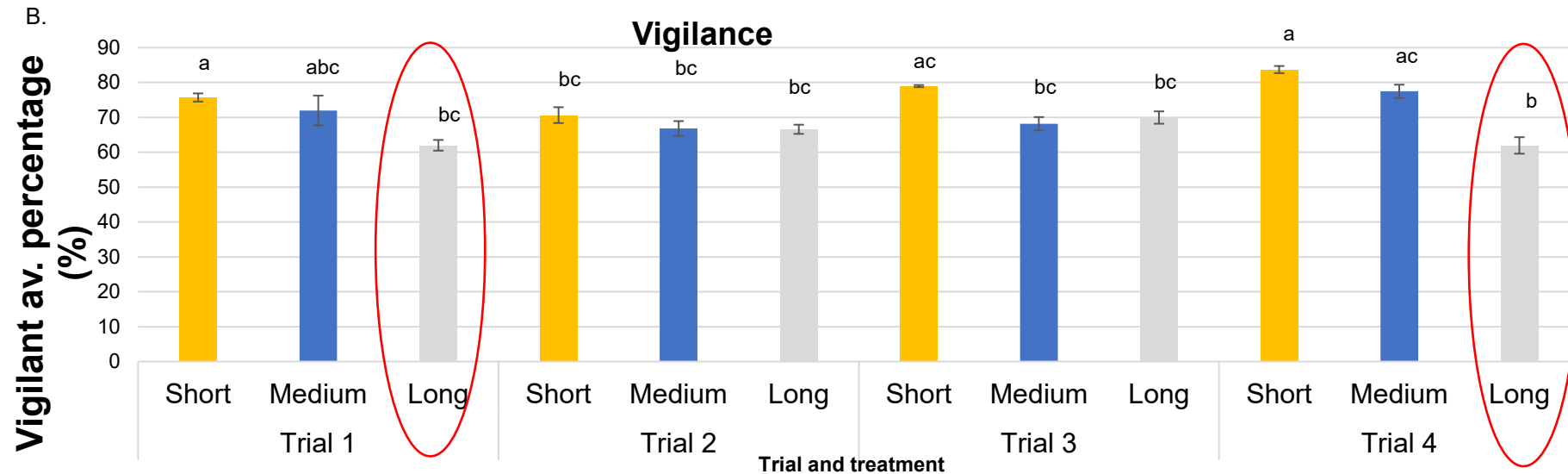
Letters indicate significant Tukey's differences (95% CI).

→ Higher average % cattle eating, drinking in long rest group, less % walking in short rest group

Treatment and trial effect on behaviour at depot rest



Ruminating - more in long stay group

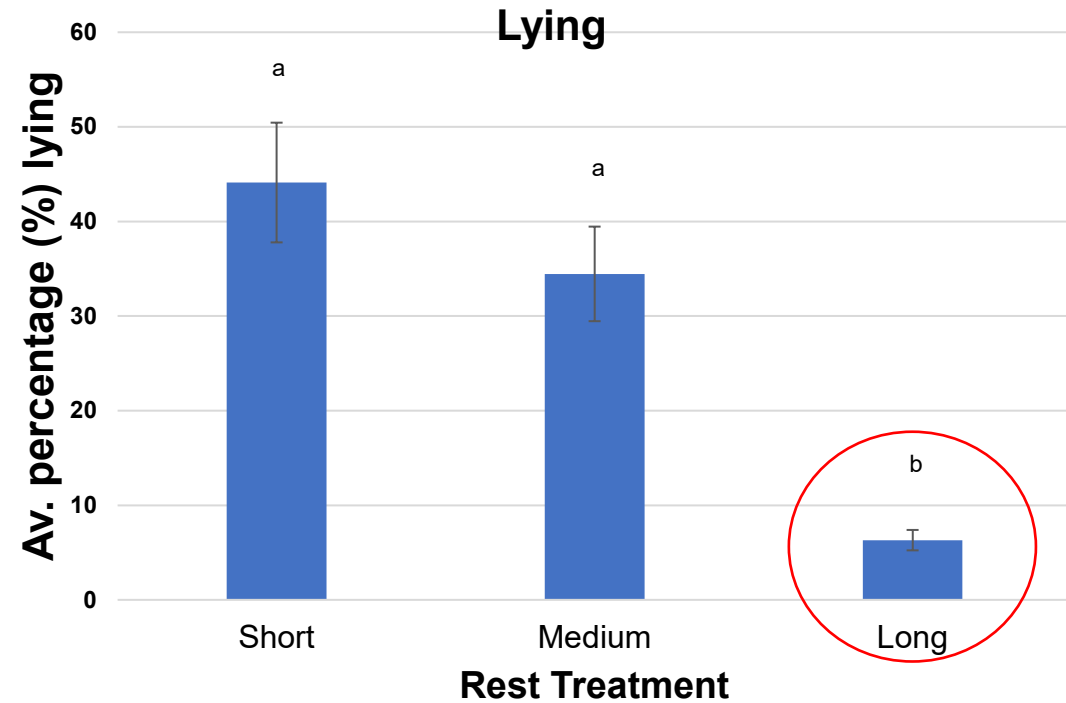


Vigilance - more in short stay group

Data is scored on cattle on morning before loading out (90min). GLMM

Cattle activity in lairage after 3h transit from depot yard rest

- 24h surveillance video of lairage pens, % pen standing/lying + drinking
- % Long stay cows lying significantly less than short and medium treatments



Physiological indicators (samples at slaughter)

Variable				Treatment		
	NDF, DDF	F-value	Normal	Short	Medium	Long
TPP (g/L)	ND	ND	57-75	77.04 ± 5.24	77.85 ± 5.45	77.73 ± 6.16
WBC (x10 ⁹ /L)	ND	ND	4.9-12.0	4.81 ± 1.53 (1.8-9.5)	4.51 ± 1.33 (1.8- 7.3)	4.46 ± 1.39 (1- 8.3)
USG (g/mL)	2, 196	9.187**	1.015-1.045	1.015 ± 0.002 ^a	1.008 ± 0.002 ^b	1.012 ± 0.002 ^{ab}
NEUTRO (x10 ⁹ /L)	2, 226	3.479*	0.69-4.00	3.45	3.02	3.07
(%)				71.59% ± 3.18 ^a	65.81% ± 3.11 ^b	68.91% ± 3.13 ^{ab}
LYMPH (x10 ⁹ /L) (%)	2, 226	5.117*	2.59-7.50	1.15 (23.96% ± 2.99) ^a	1.34 30.70% ± 2.92 ^b	1.22 27.34% ± 2.94 ^{ab}

Least square means +/- SE, GLMM * $p < 0.05$, ** $p < 0.001$ Tukey's (95% CI).

→ Evidence of mild dehydration and mild stress in all cattle

→ More acute stress response in cattle given short rest (15-18 h)

- Plasma concentration (TPP) - high; White cell count –low; Muscle CK – high in all groups
- Urine specific gravity – less dilute in short stay cattle ($p < 0.001$)
- Neutrophils (higher) and Lymphocytes (lower) in short stay ($p < 0.05$)

Preliminary conclusion

BEHAVIOUR:

- long rest (61-64 h) → more % time on maintenance behaviour
- medium rest (39-42 h) may permit recovery

PHYSIOLOGY:

- most cattle showed stress response, more pronounced in short (15-18 h)

CARCASE:

- no change in muscle glycogen and pH

- limited perspective on rest duration given variability – ?due to limitations
- No animals in marked physiological stress - but quality of rest important
- Suggest medium rest is required but further study

Thank you



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Credit: MLA Livecorp