EFFECT OF ACCESS TO WATER AFTER A SHORT JOURNEY ON CARCASS TRAITS AND MUSCLE PROPERTIES OF STEERS

J.R. WYTHES*, P. GOENER**, A.R. LAING† and W.R. SHORTHOSE‡

SUMMARY

In each of two experiments, 30 steers were offered water (W) and another 30 denied water (D) between arrival at an abattoir and slaughter. In experiment 1, after a 160 km journey, group W had access to water for 16 h and drank 3.1 L/hd, while group D was without water for a total of 22 h before slaughter. In experiment 2, after a 420 km journey, the treatment times for groups W and D were 23.5 and 40 h, with group W drinking 12.8 L/hd.

Allowing steers access to water did not significantly affect carcass weight, although it increased ($P < 0.05$) the water content of fat-free muscle from 79.16 to 80.08% in experiment 1 and from 78.68 to 79.19% in experiment 2. Dressing percentage and liver weight were not affected. Although commercially insignificant, the muscle pH 24 h *post-mortem* for group W was less ($P < 0.05$) than group D in experiment 2 only (5.52 v 5.56).

INTRODUCTION

Wythes *et al.* (1980) found that bullocks given access to water after a long journey had substantially heavier carcass weights than those denied water. They attributed the response to rehydration of carcass tissues, since muscle water content also increased. Smith *et al.* (1982) found that steers transported for 3 or 12 h had much lighter carcasses than those held simply in yards, when all groups were without water before slaughter. There is no information on the hydration status cf cattle transported short distances. In two experiments, we studied the effects on carcass traits and muscle properties of giving or denying steers access to water after a short journey in southern Queensland.

MATERIALS AND METHODS

Sixty 2-year old, 3/8 Sahiwal 5/8 Hereford steers were used in each experiment. Their mean unfasted liveweights were 418.5 ± 6.8 kg (± SE) and 444.3 ± 6.9 kg, respectively. They had been fed a grain based ration for at least 100 d while held in the feedlot at 'Brian Pastures' Research Station, Gayndah.

Experiment 1 was conducted in September 1980. The steers were taken off feed and water at 0830 h (day 1), weighed and drafted into two groups, after allocation on the basis of liveweight and previous history on pasture. At 1115 h they were transported 160 km by road to an abattoir. On arrival at 1430 h one group was offered water (W), while the other group continued to be denied water (D) until 0630 h next morning. The steers were slaughtered between 0700 and 0800 h.

Experiment 2 was conducted in October 1981 and procedures were the same as on the previous occasion, except for both groups having access to hay and water between weighing and loading. At 1245 h the steers were transported 20 km by road to the nearest railhead and railed 400 km to a different abattoir. On arrival at 0630 h (day 2), group W steers only were offered water until 0600 h next day. The groups were slaughtered between 0645 and 0715 h.

* Qld Dept Primary Industries, G.P.O. Box 46, Brisbane, Qld 4001.
** Qld Dept Primary Industries, P.O. Box 432, Maryborough, Qld 4650.
† Qld Dept Primary Industries, 'Brian Pastures', Gayndah, Qld 4625,
‡ CSIRO, Meat Research Laboratory, P.O. Box 12, Cannon Hill, Qld 4170.

In both experiments, the water intake of group W was recorded by a meter on the drinking trough. During experiment 1 the minimum temperature was 6°C and maximum 27°C, while in experiment 2 temperatures were 11-14°C and 23-26°C, respectively. No rain fell.

Procedures at both abattoirs were the same for all groups and as described by Wythes *et al.* (1980). At slaughter, we recorded hot-trimmed carcass weight and the total trim for each treatment group in order to estimate individual gross hot carcass weights. Livers also were weighed. Dressing percentages were calculated using gross hot carcass weights and initial liveweights. A 5 g sample of M. *longus colli* was obtained for subsequent analysis of the percentage of water in fat-free muscle. The pH of M. *longissimus dorsi* was recorded 24 h *post-mortem.* Within each experiment, the data were subjected to standard analysis of variance procedures, with carcass and liver weights being adjusted for differences in initial liveweight.

RESULTS

The results are presented in Table 1. In both experiments, allowing steers access to water did not significantly affect carcass weight, but it increased ($P < 0.05$) muscle water content. Treatment had no effect on dressing percentage and liver weight. In experiment 2 only, muscle pH of group W carcasses was less ($P < 0.05$) than group D. No paunches burst during dressing procedures in either experiment.

TABLE 1 Effect on carcass weight, carcass traits and muscle properties of offering (W) or denying (D) steers water after a short journey

Treatment group	Mean water intake (L)	Gross hot carcass weight (kg)	Liver weight (kg)	Dressing percentage	Muscle ph	Muscle water content (%)
Experiment 1						
D	0	226.6[†]	4.7	54.1	5.68	79.16[a]
W	3.1	224.4	4.7	54.4	5.70	80.08[a]
SE of difference		2.25	0.05	0.80	0.012	0.176
Experiment 2						
D	0	249.5	4.4	56.2	5.56[a]	78.68[a]
W	12.8	251.6	4.3	56.6	5.52[a]	79.19[a]
SE of difference		0.98	0.05	0.86	0.006	0.142

[†] Means with a superscript vary significantly at ($P < 0.05$).

DISCUSSION

Offering water to cattle after a short journey increased the water contentof muscle, on a fat-free basis, but had no significant effect on carcass weight in both experiments. This result is not entirely unexpected as animals were without water for shorter periods and ambient temperatures were lower than in some experiments (van den Heever *et al,* 1967; Chambers 1974; Wythes et *al.* 1980; Wythes unpub. data). The muscle water contents of our groups denied water werecomparable with those of hydrated groups in other studies (Wythes *et al.* 1980; Wythes unpub. data). It appears that when the percentage of muscle water is near normal, fluctuations will not necessarily be reflected by differences in carcass weight. Thus in experiment 2 a mean water intake of 12.8 L/hd by the group W failed to increase carcass weight significantly. In contrast, bullocks offered water after longer journeys in hotter weather had substantially greater carcass weights and muscle water contents than those denied water (Wythes *et al.* 1980; Wythes unpub. data). In experiment 1, the difference in liveweight between groups at allocation (421 v 415 kg) may have been accompanied by a difference in mean notional carcass weight, thus explaining the anomaly in actual carcass weights between groups W and D.

Although group W carcasses had a lower muscle pH than group D in experiment 2, the difference is insignificant commercially. The similarity in values between groups indicates that withholding water resulted in little aggressive behaviour among the steers and stress at the abattoirs. In support, the hydration status of carcasses had no effect on the pH values of bullocks after long journeys (Wythes *et al.* 1980; Wythes unpub. data).

The mean water intakes of group W steers are comparable with other reports for cattle deprived of water for similar periods in southern Queensland (Wythes *et al,* 1981). In northern Queensland steers denied water for 6 h drank 14.2 L/hd during the following 24 h (Tyler pers. comm.). Thus increases in carcass weight due to rehydration may occur under other circumstances for cattle transported relatively short distances.

One of the reasons meat processors deny cattle water during the immediate pre-slaughter period is their concern that relatively full paunches will burst during dressing procedures. Carcasses contaminated by rumen contents need additional trimming. It is noteworthy that allowing our 60 steers water until slaughter did not cause this problem. Wythes (unpub. data) recorded a similar result for 216 bullocks transported from western Queensland in hot weather.

In this study there was no significant advantage in carcass weight in offering water to cattle after a short journey, although muscle water content was increased. However, it is advisable to ensure that cattle have access to water, whenever practicable, as they are moved from the farm to slaughter.

ACKNOWLEDGEMENTS

We wish to thank Mr. S.S.F. Melrose, Brisbane; F.J. Walker Pty. Ltd., Maryborough; the Metropolitan Regional Abattoir, Brisbane and our colleagues, in particular Mr. R.F. Dickinson and Mr. K. Maynard and Mr. G.B. Robbins for their assistance. The Australian Meat Research Committee provided funds for the study.

REFERENCES

CHAMBERS, P.G. (1974). Rhod. Vet. J. 5: 38.

SMITH, R.J., THOMPSCN, J.M., RYAN, D.M., and NICHOLLS, P.J. (1982). Aust. J. Exp. Agric. Anim. Husb. (in press).

van den HEEVER, L.W., SUTTON, G.D. GROSSKOPF, J.F.W., and FOURIE, P.D. (1967). J. S. Afr. Vet. Med. Ass. 38: 145.

WYTHES, J.R., SHORTHOSE, W.R., SCHMIDT, P.J., and DAVIS, C.B. (1980). Aust. J. Agric. Res. 31: 849.

WYTHES, J.R., TYLER, R., DALY, J.J., BURNS, M.A., and LLEWELYN, D. (1981). Aust. J. Exp. Agric. Anim. Husb. 21: 553.