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# Price and Cost Aspects of Alternative Cattle Selling Methods

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The level of prices and net returns are compared for cattle sold at auction, over-the-hooks and in the paddock. After adjusting prices to a point-of-slaughter basis, no significant difference was found between prices paid for cattle under the three selling methods examined. Producers' net returns at the farm gate were found to be significantly lower for cattle sold at auction. The results of two case studies examining livestock agents' costs and livestock buyers' costs under different selling methods are also reported.

## 1 Introduction

The aim in this paper is to examine price and cost aspects of three existing cattle selling methods, namely, traditional saleyard auction, paddock sales and sales over-the-hooks<sup>1</sup>. In particular, both the level of prices paid for cattle and the level of net returns to producers are compared for the alternative selling methods examined. Also, the identification of the major costs to livestock agents and livestock buyers is undertaken for each selling method. The study is based on the Adelaide market in South Australia.

Such an examination will provide a clearer understanding of existing selling methods and thereby assist policy makers to evaluate alternative options for the development and improvement of the livestock selling system. The study of prices and returns will enable producers to choose between selling methods with greater certainty when planning their livestock marketing strategy. One advantage of the cost study is that it allows some assessment to be made of the method of charging by livestock agents for marketing services. In addition, information on buyers' costs is necessary for evaluation of selling proposals such as the objective, sight-unseen trading of livestock.

Australian research on cattle selling methods has concentrated on comparison of net returns (Andrews, Thompson and Roughley 1972; Andrews 1974; Whan 1977). The studies have been based on small samples of cattle from a single property or area, sold through a number of selling methods.

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<sup>1</sup> It is assumed that South Australian producers are free to sell cattle through any of the three selling methods defined.

**Saleyard auction:** where stock are sold by an auctioneer at an open auction on a dollars-per-head basis.

**Paddock sales:** where buyers inspect stock on the producer's property, price is negotiated on a dollars-per-head basis and ownership is usually transferred at the farm gate.

**Over-the-hooks:** where price is negotiated on a cents-per-kilogram carcass-weight basis, with ownership being transferred at the point of slaughter.

The conclusion generally reached in this research was that net returns to producers under direct selling methods, such as paddock or over-the-hooks sales, were greater than those received through either the live-weight or open auctions. Overseas research involving the evaluation of livestock selling methods includes Stout and Feltner (1962), Ulrich (1964), Johnson (1972) and Martin *et al.* (1979). Stout and Feltner examined the U.S. slaughter hog market, comparing prices paid at terminal and country markets. The studies by Johnson and Martin *et al.* involved the evaluation of a number of alternative livestock selling methods but made no statistical comparison of price levels or net returns under the selling methods examined. Ulrich, on the other hand, compared prices received under four cattle marketing channels after adjusting for costs unique to each channel. He concluded that significant differences existed in the net prices received by producers under alternative marketing channels.

While the livestock marketing chain consists of several channels from producer through to consumer, cattle are purchased at three points in this chain—at the point of production (paddock), at the auction saleyard, and at the point of slaughter (over-the-hooks). Before the comparison can be made of either net returns to producers or prices paid at the three points in the chain, adjustment to a common basis is necessary to take account of changes in product form, time and place (Kohls and Downey 1972). These product changes occur as value is added to the product through the activities of several market intermediaries. A point-of-slaughter basis has been selected for the comparison of prices paid by buyers under alternative selling methods, whilst net returns to producers are compared on a farm-gate basis.

The paper reports on three aspects of cattle selling methods. Section 2 is concerned with the examination of price levels and net returns to producers under alternative cattle selling methods. The results of case studies which examine the costs incurred by livestock agents and buyers are presented in sections 3 and 4:

## 2 Prices and Net Returns Under Alternative Selling Methods

The need to control adequately for cattle-type differences is of key importance to a comparison of prices and net returns. To date, comparative studies of cattle selling methods have been based either on subjective assessments of the live animal (Andrews 1974; Whan 1977) or on official carcass grading standards (Ulrich 1964; Wittenberg 1977). In the absence of an acceptable carcass description scheme operating in all Australian abattoirs, the determination of a set of factors to control adequately for cattle-type differences became a major task.

Drawing from previous research, it was found that sex, carcass weight and fatness are factors that best explain differences in the value of slaughter cattle types, but the position is less clear for factors such as breed, conformation and age (Preston and Willis 1970; Charles 1971; Keane and Riordan 1973; Fielder and Martinez 1974; Meat and Livestock Commission 1975; Bureau of Agricultural Economics 1976). A parallel study of price variation in the same auction market has confirmed the significance of sex, carcass weight and fatness as explanators of cattle type (Todd and Cowell 1980). However, lot size, breed, district of origin and time of sale were also found to be significant explanators of within-sale price variation.

The factors to control for cattle type included in this study are carcass weight, fatness, sex and district of origin. No consistent measure for lot size could be found for the selling methods examined, and it was excluded from the model. In the auction market, stock agents commonly split consignment lots down to smaller sale lots of a more even quality. A previous study (Hogan and Todd 1979) supported the common industry suggestion that buyers will pay a premium for *large, even* lots. Consignment lots for the paddock and over-the-hooks sales in the study were not necessarily as even as auction lots. In some cases, a consignment lot contained a mixture of castrates and heifers, while this situation did not arise at the livestock auction sale. Thus while the consignment lots may have attracted a premium because they were large, they also may have been discounted because they were uneven. Identification problems for individual paddock and over-the-hooks sale lots prevented the detailing of breed. The absence of the breed factor is considered not to detract from the analysis as the distribution of different breeds was similar for each selling method. Finally, time of sale is a factor unique to the auction system and, as such, is inappropriate to the analysis.

## 2.1 Adjustments Required for Price Comparisons

Conventional competitive theory suggests that there should be no systematic difference in either the level of prices that buyers pay or the level of net returns to producers under alternative selling methods after allowance for changes to product form, time and place (Leftwich 1970).

Before price comparisons could be conducted, it was necessary to adjust for the marketing processes which changed the product. Prices for over-the-hooks and paddock sales conducted in the second week of the study were adjusted down by 5c/kg to allow for price movements over time. The adjustment was based on an examination of carcass auction prices over the two weeks in which all individual carcass prices were recorded. The authors consider that the carcass auctions reflected price movements at the point of slaughter more consistently than the alternative subjective livestock market reports. A standardized livestock market reporting service was not available at the time this study was undertaken.

In general, additional transport costs are incurred when cattle are sold through an auction centre rather than directly to an abattoir. For this study, the additional transport cost for auction selling was minimized, as the saleyards are adjacent to the abattoir. However, a cost was incurred for the droving of slaughter cattle from the saleyards to buyers' holding paddocks at the abattoir. The cost contained a contract droving charge (\$0.25/head) and an allowance for company droving costs to the holding paddocks (\$0.40/head) and was added to auction prices to place them on a point-of-slaughter basis. To adjust paddock prices to a point-of-slaughter basis, it was necessary to add the estimated transport cost from property to abattoir for each individual property. No adjustment was made to over-the-hooks prices for transport costs, as prices were established on a point-of-slaughter basis.

Storage occurred as a separate activity at the abattoir where major buying companies leased holding paddocks and employed drovers to feed and move stock to lairages. An allowance of \$1.00/head was added to all prices to cover the cost of these activities, as the authors considered that storage costs were

built into buyers' price limits equally for all selling methods (confirmed by the buyers). Further, it would appear that whilst storage costs could in principle differ between selling methods, they may not in practice. For example, although ownership for over-the-hooks sales changes at slaughter, buyers may still incur feeding and holding paddock charges.

## 2.2. Adjustments Required for Comparisons of Net Returns

To place net returns that producers received under alternative selling methods on a farm-gate basis, it was necessary to adjust for the costs between the farm gate and the point in the marketing chain at which prices were established.

From the auction price, saleyard dues (\$0.84/head), actual stock agents' commission (which averaged \$6.79/head) and transport costs from property to auction (\$6.64/head) were deducted. The average transport costs of \$6.64/head from property to abattoir was calculated over all selling methods from rates provided by regional truckers and weighted by the number of sale lots from each location. Its use in the adjustments is necessary to equalize the differences in the distribution of the origins of sale lots between the three selling methods.

From over-the-hooks prices, transport costs from property to abattoir (also \$6.64/head as the abattoir and saleyard are adjacent) were deducted. Although the producers who sold in the paddock did not incur any transport costs directly, an adjustment was necessary to ensure comparability between selling methods. The estimated transport cost to the abattoir less the average transport cost (\$6.64/head) was the adjustment added to the paddock price for each individual property to obtain producer net returns for paddock sales.

It was assumed that a livestock agent was not employed by those producers who sold in the paddock or over-the-hooks<sup>2</sup>. In these cases, the producers themselves undertook marketing activities such as gathering market information, arranging buyers, negotiating prices and bearing the risk of payment defaults. It was not possible to estimate and value producers' time spent on these activities and so no allowance was made under direct selling for producers providing their own selling services.

## 2.3 Data

The study was conducted over a two-week period in November, 1978, and centred on the Adelaide (Gepps Cross) cattle market. Adelaide was chosen as the location for the study, as a manual carcass classification service is offered at the South Australian Meat Corporation's (SAMCOR) Gepps Cross abattoir. The service is used periodically by producer marketing groups as a basis for cattle sales direct to wholesalers.

Livestock auction prices were collected from one day's sale of over 2 500 cattle held at the Gepps Cross auction market. The particular Gepps Cross auction examined was for domestic trade type cattle, *i.e.*, yearlings and light-weight steers. Similarly the cattle sold in the paddock and over-the-hooks

<sup>2</sup> The assumption is supported by a recent survey carried out by the Bureau of Agricultural Economics where the majority of producers who sold cattle predominantly in the paddock or over-the-hook never made use of a stock agent's selling services.

were of a domestic trade type (see appendix A). Paddock and over-the-hooks prices were collected throughout the two-week study period. For the three selling methods examined, some 780 beef carcasses were measured, comprising 166 auction lots (584 head), 19 paddock sale lots (118 head) and 10 over-the-hooks sale lots (78 head). The cattle in the study were drawn from the major cattle areas that supply the Adelaide market, with the majority from the Far North and Adelaide Hills regions.

All cattle were slaughtered at the SAMCOR abattoir where sex, age (dentition), hot carcass weight and fat depth were recorded. The cold carcass weight was obtained by allowing a 2 per cent shrink factor for moisture evaporation in the chillers. The carcass shrink factor is an automatic deduction made by SAMCOR meat graders when weighing hot carcasses<sup>3</sup>. Fat depth was used as a proxy for carcass fatness and was measured manually on each side with a calibrated knife at the 12th–13th rib interface to obtain an average reading for the carcass.

## 2.4 Objectives

In accordance with the general aim in the study mentioned earlier, two specific hypotheses were posed. It was hypothesized that—

Ho<sub>1</sub>: There is no significant difference in the level of prices paid for cattle under alternative selling methods after adjustment to a common basis.

Ho<sub>2</sub>: There is no significant difference in the level of net returns received for cattle under alternative selling methods after adjustment to a common basis.

## 2.5 Model and Methodology

The statistical technique used to examine prices and net returns under alternative selling methods was analysis of covariance using the regression approach (Johnston 1972). The factors in the model used to account for cattle-type differences were carcass weight, fatness, sex and district of origin. Selling method, sex and district of origin were included in the model as categorical variables, whilst carcass weight and fatness were covariates. Hypotheses Ho<sub>1</sub> and Ho<sub>2</sub> were tested with the following models:

Price (c/kg carcass weight) =  $f$  (carcass weight, fatness, sex, district of origin, selling method).

Net returns (c/kg carcass weight) =  $f$  (carcass weight, fatness, sex, district of origin, selling method).

## 2.6 Results and Discussion

The analysis of covariance model used to determine the existence of significant differences in prices paid between alternative selling methods is reported in Table 1.

The selling method variable was not significant in explaining price variation at the point of slaughter after adjustment to a common basis, *i.e.*, there was no significant difference in the prices buyers paid for cattle under the alternative selling methods studied. Therefore, the hypothesis Ho<sub>1</sub> was accepted.

<sup>3</sup> The size of this adjustment differs between abattoirs, depending in part on the evaporative rate of their chiller storage.

Table 1: Point-of-Slaughter Price under Alternative Selling Methods, Statistical Analysis

Source of variation	Sum of squares	Degree of freedom	F
Sex .. .. .	423.1	1	10.1*
Selling method .. .. .	10.5	2	0.1
District of origin .. .. .	1 003.8	4	6.0*
Weight (covar) .. .. .	5 934.1	1	140.7*
Fat (covar) .. .. .	388.5	1	9.2*
Residual .. .. .	7 800.8	185	
Total .. .. .	15 209.2	194	$R^2 = 0.49$

\* 1 per cent level of significance.

When net returns at the farm gate were compared, the selling method variable was found to be highly significant (see Table 2). The producer's choice of selling method, therefore, has a significant effect on the level of net returns from the sale of slaughter cattle and so the hypothesis  $H_{02}$  was rejected. From Table 3, it is apparent that, at the farm gate, a premium existed of 4.84 c/kg, or \$8.07/head, for cattle sold in the paddock and of 5.31 c/kg, or \$8.84/head, for sales over-the-hooks compared with cattle sold through the traditional auction system.

Table 2: Net Returns at Farm Gate under Alternative Selling Methods, Statistical Analysis

Source of variation	Sum of squares	Degree of freedom	F
Sex .. .. .	416.1	1	10.9*
Selling method .. .. .	468.4	2	6.1*
District of origin .. .. .	913.6	4	6.0*
Weight (covar) .. .. .	3 786.8	1	99.3*
Fat (covar) .. .. .	414.4	1	10.9*
Residual .. .. .	7 052.5	185	
Total .. .. .	12 884.7	194	$R^2 = 0.45$

\* 1 per cent level of significance.

When selling at auction, the selling services are performed by a livestock agent on behalf of the producer who is charged a percentage commission. As previously noted, it was assumed that, for paddock and over-the-hooks sales, no livestock agent was employed. It is consistent that a significant net return premium existed for paddock and over-the-hooks sales as no allowance was made for costs borne by producers who undertook their own selling arrangements. If the producers who sold cattle in the paddock and over-the-hooks employed an agent and were charged the same commission rate as for auction sales, the premiums would fall to \$2.34/head and \$1.16/head, respectively. The existence of these premiums is consistent with saleyard dues and additional droving costs associated with auction sales.

To determine whether the premium for a producer who sold direct was adequate to compensate him for his time spent on selling arrangements, it would be necessary to assess the opportunity cost of his time. In addition,

producers who sell over-the-hooks carry the risk of loss due to bruising trim and condemnments. Only the paddock sellers will avoid the possibility of stock losses during transportation.

Table 3: *Producer Net Return Premiums, by Selling Method*

Selling method								Premium (compared with livestock auction)	
								cents/kg	\$/head
Paddock ..	..	..	..	..	..	..	..	4.84	8.07
Over the hooks ..	..	..	..	..	..	..	..	5.31	8.84

In sections 3 and 4, an examination of livestock agents' selling costs and buyers' costs under alternative selling methods is undertaken.

### 3 Livestock Agents' Costs Under Alternative Selling Methods

Information on the costs of providing various livestock selling services to clients was sought from three pastoral houses in Adelaide and their respective branch managers at a country centre in the south-east of South Australia.<sup>4</sup> The results presented in Table 4 represent average costs of the firms approached in June, 1978, and relate to each firm's operations at the country centre.

Table 4: *Livestock Agent's Selling Costs: Cattle only*

Costs*	Salary	Travel	Telephone	Yards	Total
	\$/head	\$/head	\$/head	\$/head	\$/head
<i>Country auction—</i>					
Visit to client's property ..	0.38	0.22	0.01	..	} 1.56
Saleyard costs .. ..	0.35†	..	..	0.60‡	
<i>Direct selling§—</i>					
Visits to client's property ..					
Two .. ..	0.27	0.15	0.08	..	0.50
Three .. ..	0.40	0.23	0.08	..	0.71

Estimated average consignment size for auction selling: 13 head.

Estimated average consignment size for direct selling: 37 head.

\* Capital costs are limited to those of the saleyards and vehicles used for the property visits. Indirect costs such as office overheads are not included.

† Includes salaries of casual labour.

‡ Includes capital and maintenance costs of auction saleyards.

§ Direct selling covers both paddock and over-the-hooks selling when the producer engages the services of a livestock agent.

<sup>4</sup> At the time of the cost study, the pastoral houses interviewed accounted for over 80 per cent of cattle sold at auction in Adelaide and major country centres.



The major cost elements involved with the provision of livestock selling services are the travelling and labour expenses of property visits to prospective clients and the capital and operating costs of livestock saleyards. The labour component covers the time spent on property visits, less an allowance for non-livestock work, and is based on award salary rates.<sup>5</sup> From discussions with stock agents, one property visit was considered necessary for clients selling cattle at auction, whilst two or three visits were necessary for direct selling to inspect stock, arrange buyers and arrange transport. Agents expressed a preference for selling stock by auction and this is reflected in that over 80 per cent of cattle sold through the agents interviewed were consigned to auction.

The travelling costs were calculated on a per-kilometer basis which took account of both capital and running costs of a six-cylinder car.

The auction costs covered wages and salaries of staff involved with the cattle sales. It was assumed that yard dues covered the capital and maintenance costs of the saleyards which are owned and maintained jointly by the three stock agencies at the centre. The high cost to the livestock agencies of auction sales is due primarily to the capital and operating costs associated with livestock saleyards.

The average consignment size is critical in comparing the costs between auction and direct methods of selling cattle. The estimates are an average of those provided by livestock agents and represent the number of cattle consigned to a sale from each property. In Figure 1, the variation of agents' costs with consignment size for both auction and direct selling is depicted. For smaller lots of up to 12 cattle, agents' costs were lower for cattle consigned to auction. However, for larger lots, particularly of 20 or more, direct selling provided a lower cost alternative for livestock agents.

From these results, it appears that agents' costs in providing selling services to clients differ substantially between selling at auction and selling direct. Also, for large lots, agents' costs appear to be lower for cattle sold directly to wholesalers.

#### **4 Livestock Buyer Costs Under Alternative Selling Methods**

Research in the U.S.A. (Johnson 1972) has identified livestock buyer costs as an important consideration in the development of alternatives to the traditional cattle selling methods. As no similar research has been carried out in Australia on livestock buyer costs, an attempt to shed some light on the area is made in this section.

Information on the costs of buying livestock through alternative buying methods was sought from seven buyers who together regularly purchased approximately 40 per cent of cattle auctioned at Gepps Cross. The buyers represented seven meat companies which together covered various retailing, wholesaling, processing and exporting activities.

The labour component of buyers' costs covered attending cattle auction markets as well as other activities such as drafting and droving. Labour costs incurred for country buying did not reflect fully the additional travelling time

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<sup>5</sup> The appropriate award is the Clerical and Salaried Staffs (Wool Industry) Award, 1977.

involved, as buyers were not paid on an hourly rate. However, accommodation costs, telephone costs and the additional transport costs resulting from the greater distances involved revealed that country buying, either at markets or in the paddock, had substantially higher buying costs than other methods.

Table 5: *Livestock Buyer Costs, Cattle only*

Item	Gepps Cross auctions (Adelaide)		Country auctions/ paddock buying (south-east South Australia)		Over the hooks	
	cents/head	per cent	cents/head	per cent	cents/head	per cent
Labour ..	88	94	88	61	9	41
Accommodation ..	..	..	13	9	..	..
Transport ..	4	4	31	21	..	..
Telephone ..	2	2	13	9	13	59
Total cost ..	94	..	145	..	22	..

Buying over-the-hooks does not usually involve paddock inspection of cattle and, as sale negotiations are conducted by telephone, the telephone costs were somewhat higher than for city auction buying, although the labour costs were substantially lower.

Buyer costs were based on cattle numbers purchased in the respective markets by the companies approached and so did not relate to specific cattle lots. From the results presented in Table 5, buying over-the-hooks appears to offer savings compared with other buying methods. For over-the-hooks sales, a trust or understanding between buyer and seller exists to obviate the need for the costly pre-sale inspection of livestock. A constraint to the growth of over-the-hooks sales is the necessity to build up this understanding in the absence of an acceptable and consistent product description technique to facilitate sale negotiations and upon which market participants can rely.

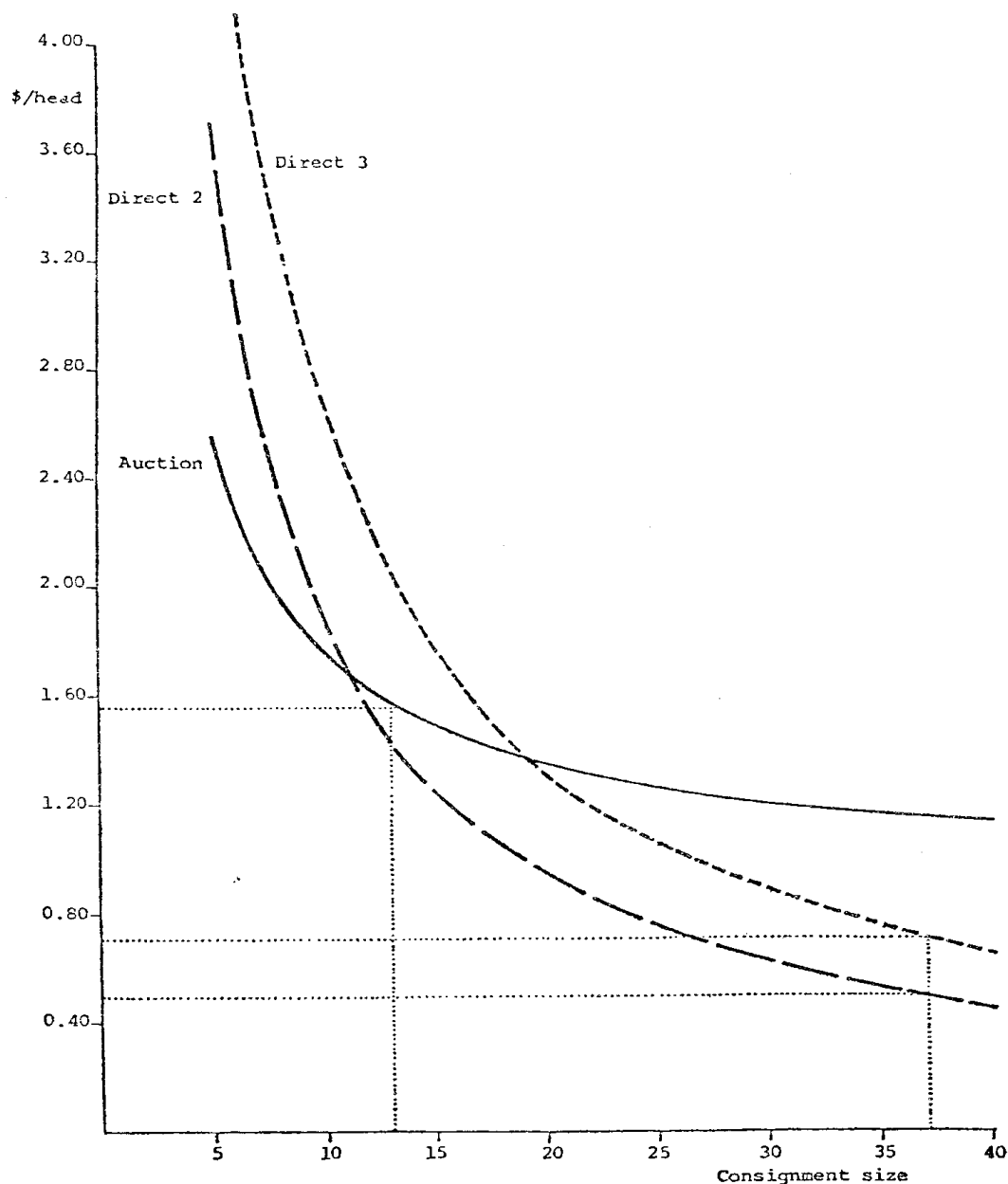
## 5 Conclusions

Caution should always be exercised in drawing general conclusions from case study research and further work is needed to confirm the results of this study. However several tentative conclusions and observations can be made that are relevant to the future development of cattle selling methods in Australia.

The analysis of prices confirmed the *a priori* reasoning that, after allowance for cattle-type differences and adjustment to a common basis, there is no significant difference between the prices paid by buyers under alternative selling methods. This result should be of encouragement to producers contemplating selling cattle through direct methods.

The comparison of net returns revealed that producers' net returns at the farm gate were significantly higher under both of the direct selling methods than under auction. The net return premiums for direct selling were consistent with *a priori* reasoning because it was not possible to include an allowance for the time spent by producers on activities that an agent would otherwise

Figure 1: Stock Agents' Costs for Cattle Sales



have performed. In contrast, the agents' marketing services were allowed for in the calculation of net returns from auction sales. If agents' commission charges are applied to direct sales returns, the reduced premiums reported earlier would reflect only saleyard dues and small additional droving cost associated with auction sales. If, however, the saleyard and abattoir are not adjacent, as in this study, the extra transport and handling could be expected to increase the net return premiums for direct selling.

The net return differences are supported by the preliminary findings of a Bureau of Agricultural Economics national survey of cattle producers. The producers who predominantly sold cattle direct to wholesalers considered that

the paddock and over-the-hooks methods gave higher net returns than selling at auction. Despite the indicated return differences, the traditional and continued popularity of auction sales demonstrates that producers must feel compensated for their lower returns when selling at auction.

In most States, livestock agents usually charge a fixed percentage commission (5 per cent in South Australia) which does not vary with the type of selling services provided or the selling method used. However, the results of the case study presented in Table 4 show that in south-east South Australia, agents' costs for large consignment sizes are lower under direct selling methods than under auction selling. Although further research is required to confirm the comparative cost figures, producers who otherwise choose to sell at auction would find direct selling a more attractive alternative if agents' charges reflected their apparent cost differences between selling methods. The findings of the Prices Justification Tribunal (1977) provided some support for these results. The Tribunal recognized that the costs incurred by livestock agents varied for several reasons, including the size of consignment, different services, method of selling, size of branch and type of livestock.

Cost advantages also exist for buyers under direct selling (over-the-hooks only), as presented in Table 5. The major saving for buying cattle over-the-hooks is the labour cost involved with inspecting livestock. The scope of the examination was limited to the cost aspects of livestock buying and, as many other factors influence buyers' preferences between selling methods, no one selling method should be recommended on a cost basis alone.

Over recent years, there has been substantial interest created amongst all sectors of the Australian cattle industry about alternative marketing systems that may develop. The results of this study indicate that, on a cost basis, sight-unseen trading over-the-hooks holds the greatest promise. Although there are many important considerations outside the scope of this study, such a development is constrained by the need to maintain a competitive pricing environment and to develop an adequate product description technique acceptable to both buyers and sellers.

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*Appendix A: Cattle Lot Statistics*

Item	Lots	
	No.	Proportion of Total
<i>Weight (kg d.c.w.)—</i>		per cent
101-125 .. .. .	22	11
126-150 .. .. .	50	26
151-175 .. .. .	53	27
176-200 .. .. .	40	21
201 and over .. .. .	30	15
<i>Fat (mm)—</i>		
0-2 .. .. .	7	3
3-5 .. .. .	56	29
6-8 .. .. .	86	44
9-11 .. .. .	27	14
12 and over .. .. .	19	10
<i>Sex—</i>		
Heifer .. .. .	106	54
Castrate .. .. .	89	46

## References

- Andrews, D. B. (1974), "Marketing of beef cattle in Australia", in *The Beef Industry: Proceedings of National Beef Symposium*, Agricultural Technologists of Australasia, Sydney.
- , Thompson, A. G. and Roughley, K. (1972), "Beef cattle marketing methods survey—May, 1971", Appendix III to submission by R. N. Irish, in Parliament of New South Wales, *Report from the Select Committee of the Legislative Assembly upon the Meat Industry*, Part II, Government Printer, New South Wales, pp. 450–3.
- Bureau of Agricultural Economics (1976), *Developments in Beef Carcass Classification*, Beef Research Report No. 19, AGPS, Canberra.
- Charles, D. D. (1971), Submission to the Australian Meat Board Committee on Beef Grading/Classification, AMB Statement 861/71, Sydney.
- Fielder, L. L. and Martinez, A. (1974), *Weight-Price Relationships for Calves, Steers and Heifers Marketed Through Louisiana Auctions*, Department of Agricultural Economics Research Report, No. 464, Louisiana State University.
- Hogan, J. C. and Todd, M. C. (1979), "Empirical tests of spatial and structural effects on cattle auction prices", *Australian Journal of Agricultural Economics* 23 (3), 176–90.
- Johnson, R. D. (1972), *An Economic Evaluation of Alternative Marketing Methods for Fed Cattle*, Special Bulletin No. 520, Nebraska Agricultural Experiment Station.
- Johnston, J. (1972), *Econometric Methods*, 2nd edition, McGraw-Hill, New York.
- Keane, M. J. and Riordan, E. B. (1973), "Product quality communication through price in the Irish cattle/beef industry", *Irish Journal of Agricultural Economics and Rural Sociology* 4 (1), 1–23.
- Kohls, R. L. and Downey, W. D. (1972), *Marketing of Agricultural Products*, 4th edition, Macmillan, New York.
- Leftwich, R. H. (1970), *The Price System and Resource Allocation*, 4th edition, Holt, Rinehart and Winston, London.
- Martin, L., Richards, R. R. and Osborne, W. R. (1979), *An Economic Comparison of Alternative Selling Methods for Slaughter Cattle in Ontario*, AEEE/79/1, University of Guelph.
- Meat and Livestock Commission (1975), *Progress on Beef Carcass Classification*, Technical Bulletin No. 22, Milton Keynes.
- Preston, T. R. and Willis, M. B. (1970), *Intensive Beef Production*, Pergamon, Oxford.
- Prices Justification Tribunal (1977), Dalgety Australia Limited, Matter No. N76/4523, Report, Melbourne.
- Stout, T. T. and Feltner, R. L. (1962), "A note on spatial pricing accuracy and price relationships in the market for slaughter hogs", *Journal of Farm Economics* 44 (1), 213–9.
- Todd, M. C. and Cowell, M. D. (1980), "Within sale price variation at cattle and carcass auctions", *Australian Journal of Agricultural Economics*, 25 (1), in press.
- Ulrich, M. A. (1964), "Price differentials between selected channels of marketing", *Canadian Journal of Agricultural Economics* 12 (2), 62–9.
- Wittenberg, J. (1977), *A Regional Analysis of Beef-Cattle Prices*, Miscellaneous Study No. 63, Department of Agricultural Economics and Management, University of Reading.
- Whan, I. F. (1977), *Marketing Proposals for Assisting the Australian Beef Producer*, Research Bulletin No. 27, Economic Services Branch, Queensland Department of Primary Industries.