Interstate Differences in the Cost of Complying With Feedlot Environmental Regulations: an Initial Investigation

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Environmental regulations impose construction and recurring costs on Australian feedlot operators. However to date there has been no published empirical information on these costs of environmental regulation. Additionally, variations in regulations between states and inconsistencies in the application of these regulations may have resulted in a pattern of location different from that dictated by least cost grain and feeder cattle inputs and processing and transportation services. The aim of this study was to attempt to measure the cost of complying with environmental regulations by large commercial feedlots in different Australian states. From data provided from a survey of 20 commercial feedlots it was found that the average cost of complying with these regulations was $36 per head of capacity. Substantial differences in these costs were found between New South Wales and Queensland, the two major producing states, with the more complex regulations in New South Wales resulting in higher costs.

1. Introduction

Australia has traditionally been a grassfed beef producer, with only a minor grainfed beef industry to service relatively small export and domestic markets. However, with the gradual expansion of markets for grainfed beef during the 1970s and 1980s and the liberalisation of the Japanese market announced in 1988, the proportion of grainfed beef in total output has risen markedly.

The increase in the demand for Australian grainfed beef in recent years has seen a corresponding growth in the domestic feedlot industry. Although small opportunity feedlots have been operating since the late 1950s, and interest in feedlotting was sparked during and after droughts in the 1960s, it was not until the emergence of the Japanese market in the early 1970s that large commercial feedlots began to appear. This expansion was shortlived with the closure of the Japanese market in 1974 and a period of reasonably stable numbers on feed followed, with fluctuations due to prevailing drought conditions. Further expansion followed the drought of the early-mid 1980s and this trend was accelerated by the signing of the Japanese beef market access agreement in 1988. Numbers on feed in feedlots over 500 head capacity rose from about 30,000 in 1984 to around 350,000 in February 1993. At that time registered feedlot capacity was about 450,000 head, giving a capacity utilisation rate of 78 per cent (Australian Meat and Livestock Corporation (AMLC) 1993). Turnoff from commercial feedlots of over 500 head capacity was approximately 650,000 during the 12 months to February 1993. This constituted almost 8 per cent of total beef slaughterings over the same period (Australian Lot Feeders Association (ALFA) 1993, Australian Bureau of Agricultural and Resource Economics 1993). With the gross value of production from cattle in feedlots estimated to be $740 million in 1991 (Senate Standing Committee on Rural and Regional Affairs (SSCRRA) 1992, p.10), feedlots are clearly a vital and increasingly important sector of the Australian beef industry.

Australia is now a substantial exporter of grainfed beef to Japan in competition with the United States. Grainfed beef accounted for 28 per cent of exports by volume to Japan in 1992, up from 13 per cent in 1990 and just 4 per cent in 1978 (ALFA 1993, SSCRRA 1992). Korean orders for grainfed beef

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have also continued to grow rapidly. In 1991 Korean beef imports were up 50 per cent on 1990 and the share of grainfed beef rose from 41 to 47 per cent. Of these grainfed orders, 36 per cent were for Australian carcases.

The domestic market for grainfed beef is expanding as well with an estimated 74,000 tonnes of fed beef predicted to have been consumed in 1991 (ALFA 1993). This was approximately 4 kg per capita or 11 per cent of total beef and veal consumption.

Lotfeeding in Australia is concentrated in New South Wales, in the Liverpool Plains, New England, Riverina and Central West Regions, and in Queensland, mainly in the grain belt areas of the Darling Downs and Central Queensland. In May 1993, Queensland and New South Wales were estimated to have, respectively, 47 and 32 per cent of national feedlot capacity (ALFA 1993), although Kelso (1992) notes that much of the recent growth is coming from the other states. There are large establishments as well in north western and southern Victoria, while minor concentrations are in the south west of Western Australia, the cereal belt of South Australia and northern Tasmania. The major commercial feedlots have accounted for about 15 per cent of feedlot facilities recently but have contributed about 70 per cent of output (McLeod and Collins 1993, Tucker *et al* 1991).

The main factors determining feedlot location are the accessibility to and proximity of grain, store cattle and processing works. Additionally, favourable price relativities between feed and cattle and a supply of reliable labour are desirable characteristics of a feedlotting region (Round 1990). Thus, as described above, most of the larger feedlotting areas are in or close to the grain growing regions. Further expansion in the already established regions is expected in the future, although the increasing importance of environmental issues in government policy formulation may force a movement towards the more remote regions (AMLC 1989).

It has been suggested that the legislation governing environmental regulation in the Australian feedlot industry and its subsequent implementation by the relevant government authorities is relatively severe compared with that in competing countries such as the United States. For example, Miyamoto (1991) indicated that the Australian environmental regulations for feedlots were the strictest in the world and contributed to the construction cost of a new feedlot in Australia being 50-70 per cent greater than one of comparable size in the United States. On the other hand, United States regulations are quickly becoming more rigorous (Runge and Vande Kamp 1992), with growing signs of animal and environmental lobby groups targeting the United States feedlot industry (Dunlop 1990).

It is possible that these additional regulatory costs, if substantial as suggested, may affect Australia's competitiveness and deter investment in the feedlotting industry away from Australia. For example, there may be a preference by investors to purchase currently approved facilities rather than to construct new facilities. Also, differential costs between Australian states and territories may mean that the location of new feedlots is skewed from that which would occur in a uniform regulatory environment. However, no published evidence is available to confirm or refute these suppositions.

The issue of environmental regulation is the focus of this paper. The objective is to provide a descriptive comparison of the different sets of regulations in the main feedlotting states and to estimate the additional costs these regulations impose on establishment and operating costs of feedlots in those states.

2. Feedlot Industry Environmental Regulations

There are many differing views among the public concerning the establishment and operation of feedlots. These relate to dietary issues, efficient conversion of protein, animal waste, potential for groundwater and stream pollution, odour and animal welfare considerations. To cater to these concerns and prevent environmental degradation in particular, most Australian states have implemented feedlot establishment and operating guidelines. A draft set of environmental guidelines for all feedlots was released in 1987 by the industry organisation, ALFA. However, there was ongoing

debate concerning the interpretation of environmental regulations by governing bodies, particularly by local government. There was also debate on the varying regulations imposed on feedlotters in different states and the methods of pollution control and monitoring that are acceptable to both society and the feedlotting industry. One outcome of this debate was the publication in 1992 of *National Guidelines for Beef Cattle Feedlots in Australia* (Standing Committee on Agriculture 1992). The guidelines specifically address environmental protection, animal welfare and the approval process and procedures. The issue of inconsistent feedlot regulations is, however, likely to remain in the forefront of feedlot industry debate. This is particularly so because of the public attention the industry has received recently, not only because of environmental concerns, but also because of concerns relating to animal welfare. This became much more pronounced since about 5,500 cattle died at a Queensland feedlot from botulism in January 1990 and over 2,500 head died as a result of heat stress in February 1991 at another Queensland feedlot.

2.1 State feedlot regulations

In **Queensland**, proposals for feedlots of over 50 head capacity are referred to the State Government. For these proposals, the main pieces of legislation governing feedlot development are the Stock Act and Local Government Amendment Act 1989, and the associated Cattle Feedlot Regulations 1989. The Department of Primary Industries (DPI) is the agency responsible for all aspects of design approval, licensing and ongoing monitoring. The feedlot design and operation guidelines describe the classification system used for feedlots and establish the parameters for use in the design of feedlots. These guidelines recognise that feedlots have a varying effect on impact areas, so the classes (1-4) allow such variations to be accounted for (Queensland DPI 1989). This means that numbers of cattle can be varied according to management standards. For example, distance from impact areas is not increased proportionally to the numbers of cattle being held but in accordance with the probable pattern of odour dispersal.

The DPI first issues a preliminary licence for a maximum number of "standard cattle units" (600kg liveweight at turnoff) for an approved design, and after site approval is granted by the local authority, the licenced capacity is confirmed (Australian Meat and Livestock Industry Policy Council (AMLIPC) 1990), the relevant statute being the Local Government (Planning and Environment) Act 1991. This approval is made in consultation with DPI (the Chief Inspector of Stock, and Water Resources) and other bodies such as the Department of Environment and Heritage. The provisions of the Clean Waters Act 1971-1988 apply to all proposed feedlots, whether fewer than or greater than 50 head capacity. The other relevant statute is the Animals Protection Act. Once construction is completed and complies with appropriate conditions, the operator is then able to stock the facility. The licence is valid for five years for a maximum capacity level and a given class of feedlot, and an annual inspection fee is incurred.

Feedlots smaller than 500 head capacity in **New South Wales** (previously 400 head) may be established with just local government approval, therefore leading to potential problems of differences in local interpretation of guidelines. The main New South Wales legislation governing feedlot developments of greater than 500 head capacity is Schedule 3 of the Environmental Planning and Assessment Act 1979, which defines such development as "designated" (New South Wales Agriculture & Fisheries (NSWA&F) 1990). As such, local government is required to follow certain procedures in considering a feedlot development application (DA) and the proponent is required to prepare an environmental impact statement (EIS). The New South Wales Inter-Departmental Committee on Intensive Animal Industries - Feedlot Section, established as the Feedlot Advisory Unit in May 1989, provides technical direction to the industry in relation to production and environmental management (specifically site selection) and coordinates the activities of the various government agencies involved with licensing and approval of feedlot developments. Its major function though is to inform and advise local government, who are the consent authorities.

The steps involved in the feedlot development process in New South Wales are detailed in NSWA&F (1990). These begin with the initial decision to establish a feedlot and site selection, followed by a planning focus meeting, preparation and lodgement of the EIS and DA. Once the EIS and DA are lodged with the local consent authority, copies are sent to the Inter-Departmental Committee and the relevant government agencies and copies are also made available to the public. At the end of the public exhibition period, the consent authority forwards all comments to the Department of Planning. It should be noted that the factors considered by the government agencies are guidelines, not mandatory regulations. It is the responsibility of the developer to show that the feedlot will not adversely impact on the environment. Procedures from lodging an EIS to final approval take a minimum of 79 days; should a public inquiry be called, a further 3-9 months could be added.

Clearly, for large feedlots the regulatory framework in New South Wales is more complex and time consuming than the one that exists in Queensland. In New South Wales a license for a feedlot is issued not pursuant to one Act of State Parliament as in Queensland, but may require consents and approvals pursuant of several Acts. Even if the regulations were the same (which they are not, see Table 1 below), the confusing regulatory system in New South Wales may result in disincentives to invest in the industry (SSCRRA 1992).

The Environment Protection Act 1970 is the main legislation governing feedlot development or expansion in **Victoria** (Department of Agriculture 1978). This refers mainly to achieving and maintaining high levels of water quality. "Planning schemes" for land use controls have been established by the Planning and Environment Act 1987 and associated regulations. These regulations require local councils to refer applications for construction or expansion of beef cattle feedlots to the Environment Protection Authority prior to commencement. This ensures that air, land and water discharging procedures can be examined. On completion of construction, a licence is required from the Authority for wastewater discharge. Other government departments such as Agriculture and the Rural Water Commission also have involvement in the development process. The planning guidelines are very similar to those in New South Wales although Victoria does not apply a capacity measurement or other quantitative standards. In their view, a capacity measurement is not the only indicator of potential damage to the environment since the combined potential impact of smaller facilities on the environment can be just as harmful as larger facilities (AMLIPC 1990). The Victorian Department of Agriculture guidelines state that each feedlot should be considered individually.

Inconsistencies in regulations across these three states are highlighted in Table 1. The most obvious differences concern proximity to population settlements and water courses, establishment of buffer zones and the number of authorities involved in the application process. The objective of the survey, described below, was to collect data on the cost implications for feedlots of the regulations in place in the major feedlotting states.

2.2 Impediments to regulation uniformity

The impediments to obtaining uniform guidelines are differences between and within states in the way standards and controls are applied to the industry and the varying processes required for consideration of DAs. Further, there are differences in climate, topography, closer settlement patterns, water availability and soil types within and between states. It is therefore not possible to develop uniform environmental standards regulating the feedlot industry as environmental hazards are, to a large extent, site specific.

State responsibilities, consultation and coordination, degree of technical support and policy deficiencies are all issues hindering the development of greater uniformity. There exists a complex relationship between the aims of local councils and state and federal governments and economically and environmentally suitable sites and locations. Information at the local government level varies between states, with some councils having a lack of knowledge concerning specific site requirements and the economic value of feedlot development (AMLIPC 1990). The infrastructure and expertise at the local government level may be

Table 1: Inconsistencies in Feedlot Environmental Regulations Between States

	NSW	QLD	VIC
Capacity measurement (head)	400	50	n.a.
Distance from residential zone (km)	>8	*	>5
Distance from dwelling house (km)	>5	*(min. 0.1)	>0.4
Distance from property boundary (m)	n.a.	*	>50
Distance from proclaimed water catchment (km)	>2	*	>0.8
Screening/buffer zones	Feedlot must not be visible	Buffers should reflect the potential impact of the operation	Buffers must be established
Applications open to public scrutiny	yes	yes	n.a.

* use of formulae, eg., distance required for a specified number of cattle.
Odour objectives are adapted. n.a. not applicable.

Sources: Department of Agriculture, Victoria (1978)
Queensland Department of Primary Industries (1989)
New South Wales Agriculture & Fisheries (1990)

inadequate to deal with feedlot applications promptly which causes frustration and ultimately increases costs for investors. Many councils have not established feedlot development guidelines or policies, which may cause additional pressure for the council and potential for confusion and additional cost for the investor.

One of the specific objectives in developing the *National Guidelines for Beef Cattle Feedlots in Australia* was to overcome the inconsistent and confusing approach to regulation in the industry. The *Guidelines,* however, are only a generally acceptable set of principles for the States to use in drawing up their own legislation. With recent endorsement of the *Guidelines,* one outcome will be a common set of data to be documented in the DA process.

It was considered that because of the lack of knowledge of the financial impacts of these regulations, an attempt to measure the cost implications on feedlot establishment and operation would prove useful to regulators and the industry.

3. Data Collection

Data for the study were collected by conducting a survey of large commercial feedlots in New South Wales, Queensland and Victoria during mid 1991. The number of AUS-MEAT registered feedlots was then over 600 in Queensland and more than 100 in New South Wales, although the majority in both states were small opportunity feedlots. Resource constraints restricted the sample to 36 feedlots, all of which were over 400 head capacity. A pilot survey was conducted to test the questionnaire design. After minor revisions, the main survey was conducted by mail with follow-up telephone calls to non-respondents and respondents who had only partially completed the questionnaire.

The questionnaire contained three major sections The first section contained questions on the char-

acteristics of each feedlot, such as capacity and present numbers, year established, soil type and slope, rainfall, distance from water courses and population centres, destination of output and the time taken between first application for development and final approval. The second section asked about specific costs incurred associated with environmental regulation, including various types of capital expenditure on earthworks, dams and waste disposal systems, expenditure on EIS and various other fees and licence costs. Then data were sought on recurrent costs of monitoring soil and water standards, maintenance of earthworks and dams and any ongoing contributions to local shire roadworks, etc. The final section asked the respondent to estimate the cost of complying with the environmental regulations and to provide some opinions as to the severity of the regulations and which regulations caused the greatest cost to the feedlot and the industry. Further detail on specific questions and a copy of the questionnaire are in Ridley (1991).

The response rate for the survey was 56 per cent (20 responses), although only 17 of these were useable. Six responses were from Queensland and 11 from New South Wales. Unfortunately no replies were received from Victoria. A comparison between the Australian states was restricted therefore to Queensland and New South Wales.

4. Results

Fifty-three per cent of feedlots that responded supplied grainfed beef to a combination of the Japanese and domestic market. Twenty-three per cent exported solely to the Japanese market, six per cent supplied the domestic market only, while the remainder supplied other overseas markets in addition to the domestic and Japanese markets. With 62 per cent of grain fed beef produced in Australia currently (quarter ending February 1993) being exported to Japan, 24 per cent to the domestic market and 4 per cent to Korea (ALFA 1993), the target markets of the respondent feedlots seemed to be broadly representative of the industry as a whole.

The 17 responses were grouped into four capacity ranges according to their present licensed capacity. In the event of a feedlot having no current capacity licence then the present capacity figure was used. The four capacity ranges were 400<4,999 head, 5,000<9,999 head, 10,000<14,999 head and greater than 15,000 head. The response frequency for each capacity range was five, four, two and six respectively. A large proportion of New South Wales respondents fell into the last category whereas the majority of Queensland respondents fell into the first two categories.

The average costs of compliance per head are shown in Table 2. These are additional costs incurred because of the existence of the regulations. They are measured for various categories (as detailed in Table 3) at establishment and converted into 1991 dollars, and are reported for the respondent feedlots on a licensed capacity basis. The average cost was $36 per head, with the cost in New South Wales ($41) exceeding that for Queensland ($27). Although no statistical inferences can be drawn about the differences between the average costs incurred in each of the categories in the two states[1], it appears that the cost of compliance per head did increase as feedlot capacity increased. This result may appear counter-intuitive based on expectations of scale economies, but the year of establishment and the level of technology among other factors cannot be controlled for here. The one outlier to this trend, the single respondent from Queensland with a licensed capacity of 15,000 head, was established over three decades ago and has incurred only minimal environmental regulation related costs when the feedlot's capacity has been expanded over the years. Other feedlots may be in a similar situation. On the other hand, there may be some feedlots which have either over-invested in environmental related infrastructure in anticipation of future expansion, or some which have high environmental related costs because of poor site selection. Because of the small sample size it was not possible to draw any inferences about the shape of the long run average cost curve

[1] The hypothesis that there is no significant difference in environmental compliance costs between New South Wales and Queensland was tested using a chi square test. However, because of the small number of observations in each cell, such results are unreliable and are not reported here.

Table 2: Cost of Compliance at Establishment (1991 dollars)

Licensed Capacity (no. of head)	NSW		QLD	
	No. of respondents	Av. cost of compliance ($/head)	No. of respondents	Av. cost of compliance ($/head)
400<5,000	3	0	2	0
5,000<10,000	2	0	2	19
10,000<15,000	1	36	1	125
≥15,000	5	84	1	0
Average		41		27

curve (in relation to compliance with environmental regulations). It may be that this curve does increase from a relatively low output (feedlot capacity) level if, after a threshhold capacity level is reached, environmental degradation increases at an increasing rate as feedlot capacity increases. This is an issue requiring further empirical work.

Of respondent feedlots, 59 per cent incurred an application cost (EIS and/or DA), in the process of establishing the feedlot. Of the ten feedlots incurring an application cost seven required an EIS. Only two of these were from Queensland while five were from New South Wales. Five feedlots out of the seven required to prepare an EIS were estab-

Table 3: Cost of Compliance to Specific Environmental Regulations: New South Wales and Queensland (1991 dollars)

	NSW ($/head)	QLD ($/head)
Establishment Costs:		
Structural earthworks	0 - 167	0 - 15
Construction of holding ponds	0 - 93	0 - 25
Waste disposal equipment (drainage, etc)	0 - 69	0 - 24
Earthworks	0 - 20	0 - 1
Application cost	0 - 18	0 - 3
License cost	0 - 7	0 - 1
Provision of shade	0 - 93	0 - 1
Construction of visual belts	0 - 15	0 - 1
Recurrent Costs:		
Monitoring program cost	0 - 4	0 - 1
Road works contribution	0 - 28	0

lished after 1984. This is consistent with the tightening of regulations in recent years. Although the environmental laws have not changed over this time, the cost of complying with the guidelines appears to have increased.

The per head costs (in 1991 dollars) of compliance with environmental regulations experienced by the respondent feedlots on a cost category basis are presented in Table 3. The values represent the highest and lowest cost in both New South Wales and Queensland. Costs were classified as either establishment or recurrent costs. At the upper end of the range New South Wales feedlots incurred substantially greater costs than Queensland feedlots in all the categories. However, the capacity ranges in each state varied and the highest cost for any particular category may be an outlier compared to the majority of feedlots. However it is worth pointing out that while the average environment related establishment cost of $36 per head is not large compared to the estimated overall establishment cost of around $600 per head, for individual feedlots specific costs were as high as $167 per head, or more than 20 per cent of the total cost.

New South Wales costs per head varied considerably within the high and low range, exhibiting no central tendency among the surveyed feedlots in any category. This reflects the uncertainty with regard to costs incurred when establishing a feedlot in New South Wales. Although establishment costs are site specific, Queensland feedlotters' establishment costs had a smaller variance.

In addition to financial information, respondents were asked to indicate their perceptions of environmental regulations in their state with regard to both their necessity and relative severity. The responses are summarised in Table 4. There was a clear difference between the responses from the two states. For example, a majority of respondents from New South Wales indicated that regulations were too severe in New South Wales compared to other states and overseas. In contrast, only 17 per cent of Queensland respondents thought that Queensland regulations were relatively severe. However feedlotters in both states generally thought the environmental regulations were necessary for the future stability of the industry but *no* respondents in either state thought that the regulations were not severe enough.

Table 4: Feedlot Managers' Perceptions of Environmental Regulation[a]

	NSW			QLD		
	Yes	No	N/R[b]	Yes	No	N/R
Feedlot regulations are too severe in comparison to:						
(a) other states	7	2	2	1	5	-
(b) overseas	6	2	3	1	5	-
Feedlot regulations are necessary for the future stability of the feedlot industry	6	3	2	6	-	-
Feedlot regulations are not severe enough	-	9	2	-	6	-

[a] The survey contained 17 useable responses, 11 from NSW and 6 from QLD.
[b] No response.

Respondents were asked to indicate which regulation they believed caused the greatest cost to their own feedlot and to the industry as a whole. Only ten responded to the individual feedlot question, of whom four indicated that the greatest cost was complying with manure usage and disposal regulations. The other six respondents each indicated separate cost items (such as public roads maintenance contributions, EIS preparation, minimum distance from dwellings), emphasising the differential impact the regulations have on individual feedlots.

The majority of respondents to the "cost to industry" question (7 of 11) indicated that the lack of coordination between the numerous government agencies and organisations involved in regulating feedlots created substantial costs to the industry. A frequent comment by feedlot managers (especially from New South Wales) was that the existing legislation and regulations were not inappropriate, but that the procedures involved, the interpretation of the regulations by the various agencies, and the subsequent (and sometimes costly) delays did create disincentives to new investment. These costs of delay were not considered in the survey. Also, because of the site specific nature of feedlot pollution problems, many respondents thought that regulations could not be too prescriptive. They saw the role of some of the regulatory agencies as being primarily advisory and that interpretation and enforcement of the regulations needed to be undertaken by officials who have, among other things, a knowledge and appreciation of the costs involved for feedlotters.

5. Conclusions

The beef feedlot sector is a major component of the Australian livestock industry. It is expected to continue to expand in line with the growth in export market opportunities. A possible constraint limiting this potential growth is the range of environmental regulations imposed on operators of feedlots in Australia. Little is known though of the actual impacts of these regulations on feedlot costs. In addition, these regulations are not uniform across the different feedlot production regions in Australia. Therefore feedlots may be being situated in response to least cost environmental considerations as well as least cost grain, feeder cattle, processing and transportation considerations. The issue of environmental regulation was the focus of this paper.

A review of the feedlot environmental regulations in the three main producing states suggested that the regulatory framework in New South Wales was more complex than that in the other states, particularly Queensland. New South Wales operators faced more stringent, more time consuming and more uncertain processes and procedures in having feedlot developments approved.

To estimate the additional costs these regulations imposed on establishment and operating costs of feedlots in these states, a survey of registered commercial feedlots of over 400 head capacity in New South Wales, Queensland and Victoria was conducted. Twenty responses (56 per cent) were received from New South Wales and Queensland feedlots. For a range of capital costs associated with compliance with environmental regulations, an average cost of $36 per head was calculated. The cost of compliance per head also increased as feedlot capacity increased.

The average cost was higher in New South Wales ($41) than Queensland ($27). Also, for specific regulations, the upper end of the range of costs reported was substantially higher for New South Wales feedlots than for Queensland feedlots, for every specified category. More New South Wales feedlots were compelled to provide an EIS on establishment.

Further, a majority of respondents from New South Wales indicated that regulations were too severe in New South Wales compared to other states and overseas, whereas only 17 per cent of Queensland respondents thought that Queensland regulations were relatively severe. Also New South Wales feedlot managers believed that the existing legislation and regulations were not inappropriate, but that the procedures involved, the interpretation of the regulations by the various agencies, and the subsequent (and costly) delays did create disincentives to new investment.

Thus the prospect that the more complex set of regulations in New South Wales compared with Queensland would lead to a higher cost of compliance in New South Wales seems to have been borne out in practice. There were substantial differences in the cost of complying with beef feedlot environmental regulations between New South Wales and Queensland, and this may have been particularly so for feedlots developed since the mid 1980s. Feedlot managers also believed that there were substantial cost differences between states.

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