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The Texas Drylot Lamb Feeding Industry: Operational Characteristics and Costs

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Highlights

The Texas drylot lamb feeding industry is located primarily within the Edwards Plateau area and the Texas Panhandle. Feedlots within the Edwards Plateau area accounted for 60 percent of the fed lambs marketed during 1987-88 with Panhandle feeders accounting for the remaining 40 percent. Feedlots with 30,000 head and over capacity, which accounted for 58 percent of the lambs marketed from drylots, enjoyed a cost advantage over smaller size operations. Smaller feedlots, however, can mitigate cost disadvantages due to size by increased feedlot utilization rates. The drylot lamb feeding industry is a high risk industry subject to volatile feeder/fed lamb and feed grain prices and limited slaughter outlets.

This study provides estimates of costs and economies of size in Texas drylot lamb operations during 1987-88. The study also provides current information on management, feeding, and marketing prices of Texas drylot lamb operations by size of feedlot.

Total annual fixed costs varied from 4.4 cents per pound of gain for lots with 30,000 head or more capacity to 6.0 cents per pound of gain for lots with less than 20,000 head capacity. Depreciation and interest accounted for more than 80 percent of the annual fixed costs.

Variable costs comprised more than 89 percent of the total per pound of gain feeding costs with annual fixed costs accounting for the remaining 11 percent. Feed was the major variable costs item accounting for 56 percent of the variable costs followed by labor costs, interest costs and death loss.

Total fixed investments in equipment and facilities averaged more than $22 per head of capacity. Total capital investments declined from almost $25 per head of capacity for drylots with less than 20,000 head capacity to less than $21 for lots with 20,000 to 29,999 head capacity. The major items of fixed investments were pens and equipment and milling equipment which accounted for 52 percent of the fixed investments.

Approximately 68 percent of the lambs fed in Texas drylots during 1987-88 were fed on custom basis which included clients not affiliated with the feedlots or for members of the feedlot corporation. More than 50 percent of the lambs fed on a custom basis were owned by packers with ranchers accounting for another one-third of the custom lambs.

Drylot lamb feeders were dependent on Texas sources for more than three-fourths of their placements. The second most important source was New Mexico followed by Colorado. Lamb feedlots tended to reach out over a wider geographic area and from more sources as feedlot size increased.

Direct purchases from farms and ranches represented more than 50 percent of the lambs placed on feed followed by public markets which supplied another 46 percent.

Feedlots estimated that 60 percent of the lambs placed on feed were equivalent to U.S. Choice, 23 percent were equivalent to U.S. Good, and 14 percent were U.S. Prime.

Two feeder lamb weight groups—60 to 69 pounds and 70 to 79 pounds—comprised almost 52 percent of the total placements. The remaining placements were almost equally divided by placements weighing less than 60 pounds and those weighing more than 80 pounds.

The peak placement months were June and May, followed by January, July, and December. More than 60 percent of the lambs placed on feed were fed for 70 to 90 days. Feedlots with 30,000 head or more capacity tended to display a wider dispersion and a more even distribution of days on feed than did the two smaller feedlot size groups.

Reliance on animal health and growth promotant programs tended to increase as drylot lamb feedlots increased in size. Drenching, administration of enterotoxemia shots, and addition of antibiotics to feed rations was a general practice by all feedlot size groups.

Almost one-half of the fed lambs marketed from Texas drylots weighed from 110 to 119 pounds during 1987-88. Fed lambs ranging in weight from 100 to 109 pounds and 120 to 129 pounds each accounted for about 20 percent of the total. The remainder consisted predominantly of lambs weighing 130 pounds or more.

Ninety percent of the fed lambs were sold to slaughter outlets in Texas. The remainder were shipped primarily to Kansas and Minnesota.

Drylot lamb feeders generally used two types of selling arrangements for marketing fed lambs—guaranteed yield and direct liveweight cash. Selling arrangements for custom lambs fed for packers although classified as "other" generally consisted of valuation on a carcass basis.

The drylot lamb feeding industry is a high risk industry which is characterized by volatile fed lamb, feeder lamb, and feed prices; relatively low and declining per capita lamb consumption; and a limited number of slaughter outlets. Some Texas lamb feeders adopted a strategy for decreasing market risk by feeding higher percentage of lambs on a custom basis. Marketing opportunities appear to exist by producing more uniform high quality lambs at desired weights, by assuring that lamb displayed at retail is fresh and attractive to consumers, and by pricing lamb cuts competitive with other meat items.

Introduction

Texas, historically, has been the leading state in sheep and lamb production. Since 1940, Texas producers have generally accounted for 18 percent or more of the annual sheep and lamb inventories in the United States (1). Approximately 73 percent of the sheep and lambs produced in Texas were concentrated within the Edwards Plateau area of Texas during 1986 (2). Although cash receipts from the sale of sheep, lambs, and wool accounted for less than two percent of the agricultural income derived from livestock and livestock products in Texas during 1987, sheep, lamb, and wool production accounted for 20 percent of the total agricultural income in the Edwards Plateau in 1987 (3).

Drylot and pasture sheep and lamb feeding industries evolved in Texas along with the development of the sheep and lamb industry. Although the U.S. Department of Agriculture reported data on lamb feeding within Texas as early as January 1, 1930, current industry information concerning economics of drylot and pasture lamb feeding operations in Texas are generally not available. Miller and Winn analyzed the marketing problems within the Texas sheep and lamb industry in 1957 (4). Miler and Tieken surveyed Texas lamb feeders in 1960 relative to size of operations, source of feeder lambs, and market outlets for fed lambs (5). Davis conducted an interregional analysis of U.S. lamb marketing in 1975 (6).

Two types of lambs are produced for slaughter: milk-fat or spring lambs and fed lambs. Fed lamb operations consist of concentrated drylot operations and pasture feeding operations which may consist of grazing on small grain, alfalfa or other type of feed along with various types of supplemental feeding to produce slaughter lambs.

This study was designed to analyze the operational characteristics, feeding and marketing practices, and costs of the Texas drylot lamb feeding industry for 1987-88. Such data and information should be useful for decision making by feeders, producers, and allied industries. A second study based on a mail survey of Texas pasture lamb feeding operations will be completed in 1989.

Information for this study was obtained through personal interviews of all 17 Texas drylot lamb feedlots known to be feeding during the period July 1, 1987 to June 30, 1988. Data used in this study represent 11 drylot lamb feeding operations who accounted for more than 93 percent of the lambs marketed by drylot lamb feeders during the survey period. Of the lamb feeders not included in the study, two were lamb growing operations, two were unavailable for interview after two contacts, and two had initiated lamb feeding during the latter part of the survey period.

Organizational Characteristics of the Industry

Sheep and lamb numbers declined more than 80 percent in the United States and Texas during the last five decades (Figure 1). U.S. sheep and lamb numbers declined from more than 56 million head in 1942 to almost 11 million head in 1988. Texas sheep and lamb inventories similarly declined from almost 11 million head in 1943 to less than 2 million head in 1988. A recent study by the Packers and Stockyard Administration, U.S. Department of Agriculture (7), cited the following concerns of producers and lamb feeders regarding the decline in U.S. sheep and lamb production:

(1) Labor intensiveness and lack of qualified sheepherders.
(2) Lack of effective predator control.
(3) Decrease in consumer demand.
(4) Relative price of lamb.
(5) Lack of consumer awareness concerning the health benefits of lamb.
(6) Increasing pressure from foreign competitors.

Texas, historically, has been the leading state in sheep and lambs with about 18 percent of the U.S. inventories (Table 1). Other leading sheep and lamb producing states are California, Wyoming, and Colorado. The make-up of the top 10 sheep and lamb producing states, which accounted for more than 71 percent of the U.S. inventories on January 1, 1988, has undergone little change from 1975 to 1988 (Table 1).

Sheep and lambs on feed in the United States on January 1 from 1930 to 1988 declined 75 percent from a high of 7 million head in the early 1940s to less than 2 million head in 1988 (Figure 2). Sheep and lambs on feed in Texas on January 1 from the 1950s to 1988 revealed cyclical fluctuations but less of a sharp decline in numbers on feed than was true for the U.S. (Figure 2). Colorado was the leading state in numbers of sheep and lambs on feed on January 1, 1988, followed by California, Texas, Wyoming, Kansas, and Oregon (Table 2).

These six leading lamb feeding states accounted for two-thirds of the U.S. lambs on feed with Colorado accounting for more than one-fourth of the total.

The sharp decline in sheep and lamb numbers has resulted in the concentration of lamb slaughter in relatively few states, firms, and plants (7). Colorado was the leading sheep and lamb slaughtering state in 1987 with more than one-fifth of the U.S. slaughter (Table 3). California ranked a close second followed by Texas, Iowa, Kansas, and Minnesota. These six states accounted for almost three-fourths of the U.S. sheep and lamb slaughter in 1987.

The number and location of 14 plants slaughtering 100,000 or more sheep and lambs annually in 1984 are shown in Figure 3. Since that time, one plant in Southern California, the plant in South Dakota, and a plant in Michigan have ceased operation. The remaining 11 major sheep and lamb slaughtering plants accounted for 90 percent or more of all lambs slaughtered by federally inspected plants in the U.S. during 1987. The concentration of lamb slaughter in relatively few firms and plants, due largely to the long term decline in sheep and lamb numbers and slaughter supplies, has resulted in single plants purchasing nearly all of the fed slaughter lambs in Texas, New Mexico, and Washington (7). Further, several other plants purchased over half of the slaughter lambs produced within their respective states.

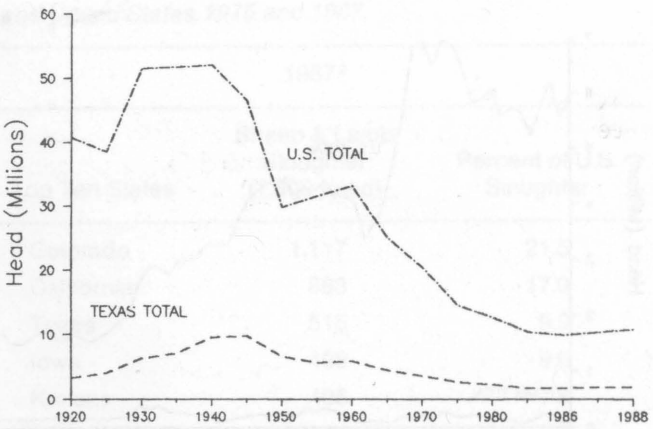

Figure 1. *Stock sheep, United States and Texas, January 1, 1920-1988.*

Source: Livestock and Meat Statistics, Statistical Bulletin 230, U.S. Department of Agriculture and Texas Historic Livestock Statistics, 1867-1985, Texas Crop and Livestock Reporting Service, U.S. Department of Agriculture.

Table 1. *Number of sheep and lambs, top 10 states and United States, January 1, 1975 and 1988.*

1975			1988		
Top Ten States	Sheep & Lamb Inventory[1] (1,000 head)	Percent of Inventory	Top Ten States	Sheep & Lamb Inventory[2] (1,000 head)	Percent of Inventory
Texas	2,688	18.5	Texas	1,960	18.2
Wyoming	1,350	9.3	California	1,015	9.4
California	1,100	7.6	Wyoming	865	8.0
Colorado	990	6.8	Colorado	860	8.0
South Dakota	792	5.4	South Dakota	610	5.7
Montana	710	4.9	Montana	538	5.0
Utah	697	4.8	Oregon	490	4.5
Idaho	595	4.1	Utah	478	4.4
New Mexico	578	4.0	New Mexico	451	4.2
Ohio	517	3.6	Iowa	405	3.8
Top 10	10,017	69.0	Top 10	7,672	71.2
U.S.	14,512	100.0	U.S.	10,774	100.0

[1]Livestock and Meat Statistics, U.S. Department of Agriculture, Washington, D.C.

[2]Meat Facts, American Meat Institute, Washington, D.C.

Figure 2. *Sheep and lambs on feed, United States and Texas, January 1, 1930-1988.*

Source: Livestock and Meat Statistics, Selected Issues, U.S. Department of Agriculture.

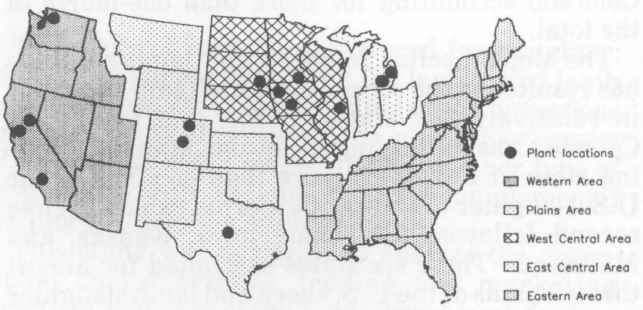

Figure 3. *Plant location and primary trade areas, 14 major lamb slaughter plants, United States, 1984.*

Source: Slaughter Lamb Marketing, Packers and Stockyard Administration, U.S. Department of Agriculture, Washington, D.C., 1987.

Table 2. *Sheep and lambs on feed, top 10 states and United States, January 1, 1975 and 1988.*

1975			1988		
Top Ten States	Sheep & Lambs on Feed[1] (1,000 head)	Percent Distribution	Top Ten States	Sheep & Lambs on Feed[2] (1,000 head)	Percent Distribution
Colorado	440	21.0	Colorado	465	26.1
Texas	204	9.8	California	215	12.1
California	190	9.1	Texas	160	9.0
Wyoming	160	7.6	Wyoming	115	6.5
Arizona	130	6.2	Kansas	105	5.9
Nebraska	110	5.3	Oregon	100	5.6
Iowa	90	4.3	Minnesota	73	4.1
Minnesota	90	4.3	Iowa	70	3.9
Montana	90	4.3	S. Dakota	70	3.9
Ohio	75	3.6	Ohio	60	3.4
Top 10	1,579	75.5	Top 10	1,433	80.5
U.S.	2,091	100.0	U.S.	1,781	100.0

[1]Livestock and Meat Statistics, U.S. Department of Agriculture, Washington, D.C.

[2]U.S. Sheep Industry Market Situation Report 87/88, American Sheep Producers Council, Denver, Colorado.

Table 3. *Commercial sheep and lamb slaughter, top 10 states and United States, 1975 and 1987.*

1975[1]			1987[2]		
Top Ten States	Sheep & Lamb Slaughter (1,000 head)	Percent of U.S. Slaughter	Top Ten States	Sheep & Lamb Slaughter (1,000 head)	Percent of U.S. Slaughter
Colorado	1,513	19.3	Colorado	1,117	21.5
California	1,477	18.9	California	883	17.0
Texas	1,410	18.0	Texas	515	9.9
Nebraska	440	5.6	Iowa	498	9.6
New Jersey	410	5.2	Kansas	405	7.8
Illinois	397	5.1	Minnesota	381	7.3
Michigan	356	4.5	Michigan	217	4.2
South Dakota	331	4.2	Washington	157	3.0
Washington	234	3.0	Virginia	148	2.8
Iowa	220	2.8	Pennsylvania	105	2.0
Top 10	6,788	86.6	Top 10	4,426	85.1
U.S.	7,835	100.0	U.S.	5,200	100.0

[1]Livestock and Meat Statistics, U.S. Department of Agriculture, Washington, D.C.

[2]Meat Facts, American Meat Institute, Washington, D.C.

Texas Drylot Lamb Feeding Characteristics

Location and Size of Operations

Drylot lamb feeding in Texas is concentrated within the Edwards Plateau area and the Texas Panhandle. Feeders within the Edwards Plateau area accounted for 60 percent of the fed lambs marketed from drylots in 1987-88 with Panhandle feeders accounting for the remaining 40 percent.

Texas drylot lamb feeders were classified into 3 size groups in this study, 1,000 to 19,999 head capacity, 20,000 to 29,999 head capacity, and 30,000 head and over capacity. Feedlots with 30,000 head and over capacity accounted for 58 percent of the fed lamb marketings during 1987-88, lots with 20,000 to 29,999 head capacity marketed 26 percent, and lots with 1,000 to 19,999 head marketed the remaining 16 percent.

Legal Form of Ownership

The primary legal forms of ownership were corporations, who accounted for 45 percent of the drylots, with the remainder being equally divided between partnerships and single proprietors (Table 4). Although incorporated lots accounted for less than 50 percent of the total drylots, they accounted for more than 70 percent of the drylot fed lamb marketings in Texas during 1987-88.

Principal Form of Business

Feedlots with 20,000 head and over capacity reported lamb feeding as their principal form of business (Table 5). Sixty percent of the lots with less than 20,000 head capacity reported lamb feeding as their primary business with feed companies and farming accounting for the remaining 40 percent.

Primary Source of Financing

Commercial banks were the major source of financing for operating capital followed by Production Credit Associations (Table 6). Sources of financing were more varied for fixed investments than for operating capital, although commercial banks were also the leading source of financing with most of the remainder being split between Production Credit Associations and "other" which consisted primarily of "own" or "internal" sources of financing (Table 7).

Table 4. *Legal forms of ownership by size of feedlot, Texas drylot lamb feeders, 1987-88.*

Form of Ownership	Size of Feedlot			
	1,000 to 19,999 head capacity	20,000 to 29,999 head capacity	30,000 head and over capacity	Total
	Percent			
Single proprietor	60.0	NR	NR	27.3
Partnership	20.0	66.7	NR	27.3
Cooperative	NR	NR	NR	NR
Corporation	20.0	33.3	100.0	45.4
Total	100.0	100.0	100.0	100.0

NR=None reported by respondents interviewed.

Table 5. *Principal business by size of feedlot, Texas drylot lamb feeders, 1987-88.*

Principal Business	Size of Feedlot: 1,000 to 19,999 head capacity	20,000 to 29,999 head capacity	30,000 head and over capacity	Total
	Percent			
Feeder	60.0	100.0	100.0	81.8
Rancher	NR	NR	NR	NR
Meat packer	NR	NR	NR	NR
Feed company	20.0	NR	NR	9.1
Retailer	NR	NR	NR	NR
Farming	20.0	NR	NR	9.1
Total	100.0	100.0	100.0	100.0

NR=None reported by respondents interviewed.

Table 6. *Primary source of financing for operating capital, by size of feedlot, Texas drylot lamb feeders, 1987-88.*

Source of Financing	Size of Feedlot: 1,000 to 19,999 head capacity	20,000 to 29,999 head capacity	30,000 head and over capacity	Total
	Percent			
Commercial bank	80.0	NR	66.7	54.5
PCA	20.0	33.3	33.3	27.3
Individual	NR	33.3	NR	9.1
Other	NR	33.4	NR	9.1
Total	100.0	100.0	100.0	100.0

NR=None reported by respondents interviewed.

Table 7. *Primary source of financing for fixed investments by size of feedlot, Texas drylot lamb feeders, 1987-88.*

Source of Financing	Size of Feedlot: 1,000 to 19,999 head capacity	20,000 to 29,999 head capacity	30,000 head and over capacity	Total
	Percent			
Commercial bank	40.0	NR	66.7	36.3
PCA	20.0	33.3	33.3	27.3
Individual	NR	33.3	NR	9.1
Other	40.0	33.4	NR	27.3
Total	100.0	100.0	100.0	100.0

NR=None reported by respondents interviewed.

Feeding and Marketing Practices

Feeding Practices

Source of feeder lambs, placement practices, and feeding practices varied by size of feedlot during 1987-88.

Geographic Origin of Feeder Lambs

Drylot lamb feeders were dependent on Texas farmers and ranchers for more than three-fourths of their placements (Table 8). The second most important source was New Mexico followed by Colorado. While feedlots with 30,000 and over capacity obtained two-thirds of their placements from Texas sources, these large lots tended to reach out over a wider geographic area and from more sources than did feedlots with less than 30,000 head capacity.

Feeder Lamb Purchases by Type of Buyer

Feedlots or their buyers purchased almost one-half of their placements during 1987-88 while order buyers supplied another one-third of the feeder placements (Table 9). The remaining placements, almost one-fifth, consisted primarily of deliveries or purchases by custom clients. Feedlots with 30,000 head and over capacity were highly dependent on their own buyers for placements while lots with 20,000 to 29,999 head capacity received almost 60 percent of their placements through deliveries or purchases by custom clients. Placement purchase patterns by feedlots with less than 20,000 head capacity were generally similar to those of the largest size group although the smaller lots obtained smaller percentages of their placements through their own feedlot.

Feeder Lamb Purchases by Type of Market

Feeder lamb purchases by type of market were very similar for all size groups (Table 10). Direct purchases from farms or ranches and public markets were the major sources of feeder lambs for drylots as these two sources supplied more than 96 percent of the placement requirements. In 1955, Miller and Tieken reported Texas lamb feeders obtained 83 percent of their placements through direct purchases or commission operations in the country with the remainder originating from public markets (5).

Feeder Lamb Grades

Feedlots estimated that 60 percent of the lambs placed on feed were equivalent to U.S. Choice, 23 percent were equivalent to U.S. Good, and 14 percent U.S. Prime (Table 11). Placements equivalent to U.S. Utility or U.S. Cull generally represented older sheep (ewes) or lighter, small feeder lambs.

Weight of Lambs Placed on Feed

Two feeder lamb weight groups—60 to 69 pounds and 70 to 79 pounds—comprised almost 52 percent of the total placements during 1987-88 (Table 12).

Table 8. *Geographic source of feeder lambs by size of feedlot, Texas drylot lamb feeders, 1987-88.*

State	Size of Feedlot			
	1,000 to 19,999 head capacity	20,000 to 29,999 head capacity	30,000 head and over capacity	Total
	Percent			
Texas	89.1	95.6	66.6	77.7
Oklahoma	NR	NR	2.7	1.6
New Mexico	10.9	0.9	20.0	13.6
Colorado	NR	1.3	6.7	4.2
Other	NR	2.2	4.0	2.9
Total	100.0	100.0	100.0	100.0

NR=None reported by respondents interviewed.

Table 9. *Feeder lamb purchases, by type of buyer and size of feedlot, Texas drylot lamb feeders, 1987-88.*

Type of Buyer	Size of Feedlot			
	1,000 to 19,999 head capacity	20,000 to 29,999 head capacity	30,000 head and over capacity	Total
	Percent			
Feedlot	54.3	3.7	68.4	49.1
Order buyer	34.9	36.9	28.3	31.6
Other[1]	10.8	59.4	3.3	19.3
Total	100.0	100.0	100.0	100.0

[1]Primarily deliveries of purchases by custom clients.

Table 10. *Feeder lamb purchases, by type of market and size of feedlot, Texas drylot lamb feeders, 1987-88.*

Type of Market	Size of Feedlot			
	1,000 to 19,999 head capacity	20,000 to 29,999 head capacity	30,000 head and over capacity	Total
	Percent			
Direct from farm or ranch	52.5	48.9	50.0	50.1
Public market	47.5	51.1	43.3	46.0
Stocker-grower	NR	NR	6.7	3.9
Total	100.0	100.0	100.0	100.0

NR=None reported by respondents interviewed.

Table 11. *Feeder lamb grades by size of feedlot, Texas drylot lamb feeders, 1987-88.*

USDA Grade Equivalent	Size of Feedlot			
	1,000 to 19,999 head capacity	20,000 to 29,999 head capacity	30,000 head and over capacity	Total
	Percent			
Prime	1.9	NR	23.3	13.9
Choice	92.6	58.9	51.7	59.8
Good	4.8	36.7	21.0	22.7
Utility	0.7	2.2	4.0	3.0
Cull	NR	2.2	NR	0.6
Total	100.0	100.0	100.0	100.0

NR=None reported by respondents interviewed.

Table 12. Weight of lamb placed on feed by size of feedlot, Texas drylot lamb feeders, 1987-88.

Weight (pounds)	Size of Feedlot			
	1,000 to 19,999 head capacity	20,000 to 29,999 head capacity	30,000 head and over capacity	Total
	Percent			
Under 50	6.8	10.7	11.7	10.7
50-59	9.9	11.0	15.0	13.2
60-69	11.6	50.0	20.0	26.7
70-79	61.7	12.4	21.6	25.2
80-89	10.0	10.0	16.7	13.9
Over 90	NR	5.9	15.0	10.3
Total	100.0	100.0	100.0	100.0

NR=None reported by respondents interviewed.

The remaining 48 percent were almost equally divided by placements weighing less than 60 pounds and those weighing more than 80 pounds.

Weight groups of placements tended to be more evenly dispersed over all weight groups for feedlots with 30,000 head or more capacity compared to smaller feedlots. Feedlots with 20,000 to 29,999 head capacity reported that 50 percent of their placements weighed from 60 to 69 pounds while 62 percent of the placements in feedlots with less than 20,000 head capacity weighed from 70 to 79 pounds.

Feeder Lamb Placements by Month

Although Texas lamb feedlots placed substantial lambs on feed each month, the peak placement months were June and May, followed by January, July, and December (Table 13). The peak placement months for lots with 30,000 or more capacity were May through June and December through January. May and June were also important placement months for lots with 20,000 to 29,999 head capacity while lots under 20,000 head capacity reported a relatively even distribution pattern for placements throughout the year.

Length of Feeding Period

More than 60 percent of the lambs placed on feed in Texas drylots during 1987-88 were fed for 70 to more than 90 days (Table 14). Feedlots with 30,000 head or more capacity tended to display a wider dispersion and a more even distribution of days on feed than did the two smaller size groups. More than three-fourths of the lambs fed by lots with 20,000 to 29,999 head capacity remained on feed from 60 to 90 days. Feedlots with less than 20,000 head capacity fed almost 94 percent of their lambs from 70 to more than 90 days.

Animal Health Practices Utilized

Reliance on animal health and growth promotant programs tended to increase as drylot lamb feedlots increased in size (Table 15). Drenching, administration of enterotoxemia shots, and addition of antibiotics to feed rations was general practice by all feedlot size groups for lambs placed on feed. Vitamin A shots were administered only by feedlots with 30,000 head and over capacity to about one-third of the lambs fed. Growth promotants, which were used by some feedlots in all size groups, were administered to about one-fourth of the lambs fed during 1987-88. Growth promotant usage tended to increase as feedlots increased in size.

Death Loss

Death losses which may vary by season of the year and kind of lambs placed on feed were relatively stable over all size groups (Table 16). Death losses ranged from 1.9 percent for lots with 20,000 to 29,999 head capacity to 2.2 percent for the other two size groups.

Table 13. *Feeder lamb placements by month and size of feedlot, Texas drylot lamb feeders, 1987-88.*

Month	Size of Feedlot			
	1,000 to 19,999 head capacity	20,000 to 29,999 head capacity	30,000 head and over capacity	Total
	Percent			
January	9.1	6.3	10.2	9.0
February	9.2	6.3	7.8	7.6
March	9.7	8.8	3.5	5.8
April	9.3	9.0	3.9	6.1
May	7.6	16.5	10.5	11.3
June	7.5	15.0	14.0	13.3
July	7.6	6.5	10.0	8.7
August	7.6	6.4	7.9	7.4
September	7.6	6.3	9.2	8.2
October	9.1	6.3	7.5	7.5
November	7.9	6.3	6.5	6.7
December	7.8	6.3	9.5	8.4
Total	100.0	100.0	100.0	100.0

Table 14. *Length of feeding period by size of feedlot, Texas drylot lamb feeders, 1987-88.*

Days on feed	Size of Feedlot			
	1,000 to 19,999 head capacity	20,000 to 29,999 head capacity	30,000 head and over capacity	Total
	Percent			
Under 40	NR	0.7	10.0	6.1
40-49	NR	5.2	11.7	8.2
50-59	0.1	5.5	16.7	11.2
60-69	6.3	18.5	13.3	13.6
70-79	28.2	34.2	15.0	22.1
80-89	33.0	23.3	15.0	19.9
Over 90	32.4	12.6	18.3	18.9
Total	100.0	100.0	100.0	100.0

NR=None reported by respondents interviewed.

Table 15. Animal health and growth promotant practices utilized by size of feedlot, Texas drylot lamb feeders, 1987-88.

Type of Practice	Size of Feedlot			
	1,000 to 19,999 head capacity	20,000 to 29,999 head capacity	30,000 head and over capacity	Total
	Percent			
Vitamin A shot administered[1]	NR	NR	3 4.6	20.3
Placements drenched[1]	100.0	100.0	98.3	99.0
Enterotoxemia shot administered[1]	100.0	100.0	100.0	100.0
Antibiotic administered[2]	91.3	96.3	100.0	97.7
Growth promotant utilized[1]	16.1	22.4	31.7	26.9

[1]Percent of lambs placed on feed.
[2]Percent of rations containing antibiotics.

Fed Lamb Marketing Practices

Weight Ranges of Fed Lambs Marketed

Almost one-half of the fed lambs marketed from drylot lamb feedlots weighed from 110 to 119 pounds during 1987-88 (Table 17). Fed lambs ranging in weight from 100 to 109 pounds and 120 to 129 pounds each accounted for about 20 percent of the total. The remaining 10 percent represented fed lambs weighing predominantly 130 pounds or more. Predominant fed lamb market weight groups by size of feedlot were as follows: 30,000 head and over capacity, 100 to 129 pounds; 20,000 to 29,999 head capacity, 100 to 119 pounds; and feedlots with less than 20,000 head capacity, 110 to 129 pounds.

Grades of Fed Lambs Marketed

Drylot lamb feeders estimated that 95 percent of the fed lambs marketed during 1987-88 were equivalent in quality to U.S. Choice or higher (Table 18). Higher percentage of fed lambs marketed were estimated to be U.S. Choice or higher for lots with 30,000 head and over capacity compared to feedlots with less than 30,000 head capacity.

Selling Agency Used for Selling Fed Lambs

Feedlot owners and/or managers were the principal sales agency for fed lamb sold at drylot lamb feedlots (Table 19). This sales pattern was especially true for lots with 30,000 head and over capacity whereas sales at feedlots with 20,000 to 29,999 head capacity were consummated or arranged mostly by owners of lambs fed on a custom basis. Lambs at feedlots with less than 20,000 head capacity were sold mostly by feedlots or their representative and by commission agents.

Geographic Area of Fed Lamb Sales

Ninety percent or more of the fed lambs marketed during 1987-88 were sold to slaughter outlets in Texas (Table 20). The remainder were shipped primarily to Kansas and Minnesota. Sales to out-of-state outlets tended to increase as feedlots increased in size.

Selling Arrangements for Fed Lambs

Numerous selling arrangements were used in marketing fed lambs. The most commonly used selling arrangements and/or pricing methods in the fed lamb industry include pricing on the basis of live weight, guaranteed yield, double dressed weight, carcass value, and grade and yield (7). The availability and usage of these pricing methods are dependent on the seller's geographic location and the packer's familiarity with the seller's lambs. These pricing methods are described in more detail as follows:

Table 16. *Death loss by size of feedlot, Texas drylot lamb feeders, 1987-88.*

Item	Size of Feedlot			
	1,000 to 19,999 head capacity	20,000 to 29,999 head capacity	30,000 head and over capacity	Total
	Percent			
Death loss	2.2	1.9	2.2	2.1

Table 17. *Weight ranges of fed lambs marketed by size of feedlot, Texas drylot lamb feeders, 1987-88.*

Weight (pounds)	Size of Feedlot			
	1,000 to 19,999 head capacity	20,000 to 29,999 head capacity	30,000 head and over capacity	Total
	Percent			
Under 90	NR	NR	NR	NR
90-99	NR	4.0	3.3	3.0
100-109	1.7	25.1	21.3	19.3
110-119	43.5	61.2	45.1	49.1
120-129	46.5	7.8	20.0	20.8
130 and over	8.3	1.9	10.3	7.8
Total	100.0	100.0	100.0	100.0

NR=None reported by respondents interviewed.

Table 18. *USDA grade equivalents of fed lambs marketed by size of feedlot, Texas drylot lamb feeders, 1987-88.*

USDA Grade Equivalent	Size of Feedlot			
	1,000 to 19,999 head capacity	20,000 to 29,999 head capacity	30,000 head and over capacity	Total
	Percent			
Prime	2.5	NR	45.7	27.1
Choice	91.7	88.2	53.3	68.3
Good	5.2	11.8	1.0	4.5
Utility	0.6	NR	NR	0.1
Cull	NR	NR	NR	NR
Total	100.0	100.0	100.0	100.0

NR=None reported by respondents interviewed.

Table 19. *Selling agency utilized for marketing fed lambs by size of feedlot, Texas drylot lamb feeders, 1987-88.*

Selling agency	Size of Feedlot			
	1,000 to 19,999 head capacity	20,000 to 29,999 head capacity	30,000 head and over capacity	Total
	Percent			
Owner	17.3	60.9	13.3	26.5
Feedlot	44.3	39.1	86.7	67.7
Other[1]	38.4	NR	NR	5.8
Total	100.0	100.0	100.0	100.0

NR=None reported by respondents interviewed.
[1]Commission agent.

Table 20. *Geographic areas of fed lamb sales by size of feedlot, Texas drylot lamb feeders, 1987-88.*

Sales areas	Size of Feedlot			
	1,000 to 19,999 head capacity	20,000 to 29,999 head capacity	30,000 head and over capacity	Total
	Percent			
Texas	100.0	98.1	84.3	90.3
Oklahoma	NR	NR	NR	NR
California	NR	NR	NR	NR
Colorado	NR	NR	0.3	0.2
Other[1]	NR	1.9	15.4	9.5
Total	100.0	100.0	100.0	100.0

NR=None reported by respondents interviewed.
[1]Primarily Kansas and Minnesota.

Table 21. *Selling arrangement used for marketing fed lambs by size of feedlot, Texas drylot lamb feeders, 1987-88.*

Selling Arrangements	Size of Feedlot			
	1,000 to 19,999 head capacity	20,000 to 29,999 head capacity	30,000 head and over capacity	Total
	Percent			
Direct-liveweight cash	NR	NR	55.0	32.1
Grade and carcass weight	NR	NR	NR	NR
Guaranteed yield	89.1	39.1	33.4	43.3
Other[1]	10.9	60.9	11.6	24.6
Total	100.0	100.0	100.0	100.0

NR=None reported by respondents interviewed.
[1]Primarily custom lambs owned by packers.

Live Weight. This purchase method uses the actual live weight as the pay weight. The buyer and seller negotiate on the basis of available market information and anticipated weights, grades, pelt value, yield, and shrink which is generally four percent.

Guaranteed Yield. The guaranteed yield pricing method takes into consideration the carcass weight or actual yield in determining pay weight. For example, if the average liveweight is 116 pounds per head, the guaranteed yield is 50.8 percent, and the actual carcass weight is 59.5 pounds, the pay weight is 117 pounds. This is calculated as follows: 59.5/116 = .5129/.508 = 1.009646 x 116 = 117. Pay weights may be adjusted up or down depending upon the guaranteed yield, the actual yield, and other specifics of the arrangement between buyer and seller. A recent study reported that under some guaranteed yield arrangements the seller is never paid for more than the actual liveweight regardless of the carcass yield (7). An important consideration in determining carcass weight is shrink. The Packers and Stockyards Administration reported that where actual payment was based on a guaranteed yield percentage during 1984, 60 percent of the lamb carcasses were paid for on the basis of their hot weight and 40 percent were paid for on the basis of their shrunk hot weight (7).

Double Dressed Weight. This method is a variation of guaranteed yield. Double the dressed weight is the same as a 50 percent modern guaranteed yield (7).

Grade and Yield. The grade and yield arrangement takes into consideration the quality grade, the carcass weight, and pelt grade in determining price or value. The carcasses are normally graded by a USDA grader a day after slaughter.

Carcass Value (Rail). This method relies on the wholesale value of the carcasses and takes into consideration wholesale carcass value, drop credits, pelt credits, pelt cost, and the amount of profit that the packer expects (7).

Texas drylot lamb feeders primarily used two types of selling arrangements for fed lambs sold from their feedlots during 1987-88—direct liveweight cash and guaranteed yield (Table 21). Guaranteed yield selling accounted for more than 43 percent of the total lambs fed by Texas feedlots. Direct liveweight cash sales, which accounted for almost one-third of the lambs fed, was used only by feedlots with 30,000 head and over capacity. The selling arrangement for one-fourth of the lambs fed was classified as "other" which consisted primarily of lambs fed on a custom basis for packers who valued such lambs on a carcass basis. Lambs not fed for packers by lots under 30,000 head capacity were sold exclusively on a guaranteed yield basis. Lambs sold on a guaranteed yield basis increased to 57 percent when lambs fed for packers were excluded from consideration.

During 1984, U.S. packers purchased 52 percent of the slaughter lambs on a liveweight basis and 47 percent on a combination carcass-guaranteed yield basis (7). Further, grade and yield accounted for less than 0.4 percent of all slaughter lambs purchased.

Days Sold Prior to Shipment. More than 92 percent of the fed lambs were shipped within 10 days of sale (Table 22). Only feedlots with 30,000 head or more capacity reported retention of fed lambs in excess of 10 days after sale. Buyers of fed lambs which were retained at feedlots in excess of 10 days after sales were consummated were assessed custom feeding charges for feed and services until such lambs were delivered.

Table 22. *Number of days lambs sold prior to shipment by size of feedlot, Texas drylot lamb feeders, 1987-88.*

Days	Size of Feedlot			
	1,000 to 19,999 head capacity	20,000 to 29,999 head capacity	30,000 head and over capacity	Total
	Percent			
0-10	100.0	100.0	86.7	92.2
11-20	NR	NR	3.3	2.0
21-30	NR	NR	6.7	3.9
Over 30	NR	NR	3.3	1.9
Total	100.0	100.0	100.0	100.0

NR=None reported by respondents interviewed.

Ownership of Lambs on Feed and Custom Feeding Arrangements

Ownership of Lambs on Feed

Approximately 68 percent of the lambs fed in Texas drylots during 1987-88 were fed on a custom basis (Table 23). Custom feeding was especially prevalent among feedlots with 20,000 to 29,999 head capacity which reported feeding more than 95 percent of their lambs on a custom basis. All size groups fed 50 percent or more of the lambs in their lots on a custom basis, which included clients not affiliated with feedlots or for members of the feedlot corporation.

Ownership of Custom Fed Lambs

More than 50 percent of the lambs fed on a custom basis in Texas drylots during 1987-88 were owned by packers (Table 24). Packer feeding in Texas during 1987-88 represented about one-third of the total lambs fed whereas packer feeding accounted for 27 percent of the U.S. total during 1984 (7). During 1969-70, packer feeding in Texas was equivalent to 17 percent of the fed lamb marketings from Texas feedlots (9). Ranchers accounted for almost one-third of the lambs fed on a custom basis in Texas during 1987-88. "Other" custom clients were represented by order buyers, bankers, members of feedlot corporation, etc.

Methods of Assessing Custom Feeding Charges

Feedlots used several methods of assessing custom feeding charges. The most commonly used method consisted of a base feed charge along with a mark-up ranging from 20 percent to 30 percent of the basic feed charge or about $20 to $30 per ton of feed. Some feedlots also assessed a daily yardage fee ranging from one to two cents per head per day.

Preferences of Feedlots Relative to Breed, Weight, Age, and Sex

Two-thirds of the feedlots expressed a preference for Suffolk-Rambouillet feeder lambs. Most of the remaining one-third did not have any preference relative to breed or cross.

Forty-five percent of the feedlots expressed a preference for feeder lambs ranging from 60 to 70 pounds. The remaining 55 percent was about equally divided by feeders preferring lambs under 60 pounds and those preferring lambs over 70 pounds.

More than 70 percent of the feeders expressed a preference for lambs ranging in age from four to five months. The remaining 30 percent were about equally divided by those with (1) no preference as to age, (2) under four months, and (3) those preferring lambs ranging from seven to eight months.

Almost 55 percent of the feeders had no preference as to sex of feeder lambs. The remaining 45 percent preferred mutton feeder lambs.

Table 23. *Ownership of lambs on feed by size of feedlot, Texas drylot lamb feeders, 1987-88.*

Ownership of Lambs	Size of Feedlot			
	1,000 to 19,999 head capacity	20,000 to 29,999 head capacity	30,000 head and over capacity	Total
	Percent			
Feedlot	49.4	4.4	39.7	31.8
Members of feedlot corporation	NR	NR	16.7	9.8
Not feedlot owned	50.6	95.6	43.6	58.4
Total	100.0	100.0	100.0	100.0

NR=None reported by respondents interviewed.

Table 24. *Ownership of custom lambs fed by size of feedlot, Texas drylot lamb feeders, 1987-88.*

Ownership of Lambs	Size of Feedlot			
	1,000 to 19,999 head capacity	20,000 to 29,999 head capacity	30,000 head and over capacity	Total
	Percent			
Packer	45.4	63.8	41.4	50.2
Retailer	NR	NR	9.4	4.9
Rancher	49.8	36.2	21.6	30.1
Other	4.8	NR	27.6	14.8
Total	100.0	100.0	100.0	100.0

NR=None reported by respondents interviewed.

Table 25. *Fixed investment per head of capacity by major items of equipment and size of feedlot, Texas drylot lamb feeders, 1987-88.*

Item	Size of Feedlot			
	1,000 to 19,999 head capacity	20,000 to 29,999 head capacity	30,000 head and over capacity	Total
	Dollars			
Pens and equipment	7.18	4.10	9.11	7.16
Water and equipment	1.27	0.94	0.77	0.92
Milling equipment	4.49	5.82	3.48	4.41
Feed storage facilities	3.56	3.21	2.18	2.78
Feed distribution equipment	2.16	2.39	1.81	2.07
Manure equipment	1.03	0.64	0.33	0.57
Transportation equipment	0.65	1.20	2.45	1.70
Repair facilities	0.43	0.14	0.27	0.26
Land	2.64	0.82	1.37	1.46
Office	0.78	0.46	0.46	0.52
Scales	0.33	0.75	0.46	0.52
Total	24.52	20.47	22.69	22.37

Costs Associated with Lamb Feeding

Costs associated with feeding lambs include (1) fixed investments, (2) annual fixed costs, and (3) variable costs. Fixed investments include expenditures for durable goods including the feed milling equipment, pens and feeding facilities, office, etc. Annual fixed costs occur without regard to the number of lambs fed and include depreciation, long term interest, taxes, and insurance. Variable costs are those costs that vary with the number of lambs placed on feed and include such items as feed, labor, fuel, medication, and shearing.

Investment in Equipment and Facilities

Total fixed investments averaged more than $22 per head capacity in Texas lamb drylots during 1987-88 (Table 25). The two major items of fixed investments, which accounted for more than one-half of the total fixed investments, were pens and equipment and milling equipment. Feed storage facilities and feed distribution equipment ranked next in importance.

Feedlots with 20,000 to 29,999 head capacity reported the lowest fixed investment per head of capacity, followed by lots with 30,000 head and over capacity, and lots with less than 20,000 head capacity (Table 25). Pens and equipment were the major items of fixed investments for all feedlots except for lots with 20,000 to 29,999 head capacity where milling equipment ranked first. Fixed investments in milling equipment, feed storage facilities, feed distribution equipment, and manure equipment were relatively higher in the smaller lots compared to feedlots with 30,000 head and over capacity. Investments in transportation equipment tended to increase as feedlots increased in size.

Annual Fixed Costs

Annual fixed costs revealed a relatively stable economies of size pattern (Table 26). Total annual fixed costs varied from 4.4 cents per pound of gain for lots with 30,000 or more head capacity to 6.0 cents per pound for lots under 10,000 head capacity.

Depreciation and interest, the two major annual fixed cost components, accounted for more than 80 percent of the total annual fixed costs (Table 26). Repairs were the third most important annual fixed cost item followed by insurance and taxes.

Variable Costs

Variable costs are those costs that vary directly with the number of lambs placed on feed. Feed, which was the major variable cost item per pound of gain, accounted for 55 percent of the total variable costs (Table 27). Grain costs at the time this study was conducted average about $3.50 per hundred weight, but shortly thereafter increased 50 percent or more. The lower grain costs were reflected in the feed costs in Table 27. The second most important variable cost item was labor followed by interest on feeder lambs and death loss. Shearing costs and veterinary and medical expenditures were other important variable cost items.

Feedlots with 30,000 head and over capacity exhibited the lowest total variable costs per pound of gain followed by lots with less than 20,000 head capacity (Table 27). Feed was the most important variable cost item at all feedlots. Labor was an important variable cost item at all feedlots, especially at feedlots with less than 30,000 head capacity. Other important variable cost items include interest on feeder lambs, death loss, shearing cost, and veterinary and medical expenses.

Total Feeding Costs

Variable costs comprised almost 90 percent of the total feeding costs in Texas feedlots during 1987-88 (Table 28). Fixed costs per pound of gain were lowest for feedlots with 30,000 head and over capacity which suggests that these larger feedlots enjoyed both economies of size advantages and higher utilization rates compared to feedlots with less than 30,000 head capacity. Feedlot utilization rates by feedlot capacity were as follows: (1) less than 20,000 head capacity, 39 percent; 20,000 to 29,999 head, 40 percent; and 30,000 head or more, 51 percent.

Table 26. *Annual fixed costs per pound of gain by size of feedlot, Texas drylot lamb feeders, 1987-88.*

Item	Size of Feedlot			
	1,000 to 19,999 head capacity	20,000 to 29,999 head capacity	30,000 head and over capacity	Total
	Dollars			
Depreciation	.0293	.0269	.0195	.0229
Interest	.0250	.0197	.0157	.0182
Taxes	.0007	.0015	.0009	.0010
Insurance	.0020	.0023	.0027	.0025
Repairs	.0029	.0050	.0047	.0044
Total	.0599	.0554	.0435	.0490

Table 27. *Variable costs per pound of gain by size of feedlot, Texas drylot lamb feeders, 1987-88.*

Item	Size of Feedlot			
	1,000 to 19,999 head capacity	20,000 to 29,999 head capacity	30,000 head and over capacity	Total
	Dollars			
Feed	.2097	.2293	.2197	.2205
Labor[1]	.0615	.0605	.0341	.0455
Interest:				
Feed	.0058	.0056	.0049	.0052
Feeder lambs	.0403	.0368	.0359	.0363
Labor	.0015	.0015	.0007	.0010
Other	.0011	.0010	.0010	.0010
Death loss	.0325	.0281	.0352	.0327
Veterinary and medical	.0141	.0279	.0176	.0196
Gas and oil	.0063	.0023	.0096	.0070
Electricity	.0041	.0059	.0027	.0036
Telephone	.0018	.0009	.0011	.0011
Shearing cost	.0275	.0222	.0281	.0259
Other	.0003	.0006	.0006	.0005
Total	.4065	.4226	.3912	.3999

[1]Includes Social Security, Workmen's Compensation and unemployment compensation.

Economies of Size

Analyses of cost curves are useful for determining the efficiency of feedlots relative to the level of output or production. Short-run average cost curves (SACI, SAC2, SAC3) (Figure 4) represent three specific but successively larger feed mills for three different sizes of feedlot as output increases or decreases in relation to feedlot utilization rate. The long-run average cost curve (LAC) represents an envelope curve which is tangent to each of the short-run average costs curves as is a theoretical expansion path of minimum per-unit production costs as feedlots increase in size.

Levels of production as indicated in Figure 4 at point A on SAC1, point B on SAC2 and point C on SAC3 represent least cost long-run feeding levels for these outputs. Each of the short-run average cost curves represents an infinitesimal number of costs whose points are determined by varying feedlot utilization rates for the specified feed mill capacity. When feeding facilities as represented by SACl are under-utilized, costs per pound of gain tend to move to the left on SAC1 from point A. In contrast, when feeding facilities are over-utilized, costs tend to rise and move to the right on the short-run curve from the minimum point. The intersection of SAC1 and SAC2 represents that point at which a feedlot would be expected to expand its feeding facilities and install a larger feed mill.

If the long-run average cost curve declines as output increases, then successively larger sizes of feedlots are more efficient than the smaller feedlots as a result of existing economies of size. As a general rule, economies of size are available in those industries in which division and specialization of labor are present and in which advanced technological developments in machinery and equipment can readily be applied. However, increases in the long-run average costs beyond minimum point on the long-run average costs curve indicate the successively larger scales or sizes of feedlots become less and less efficient.

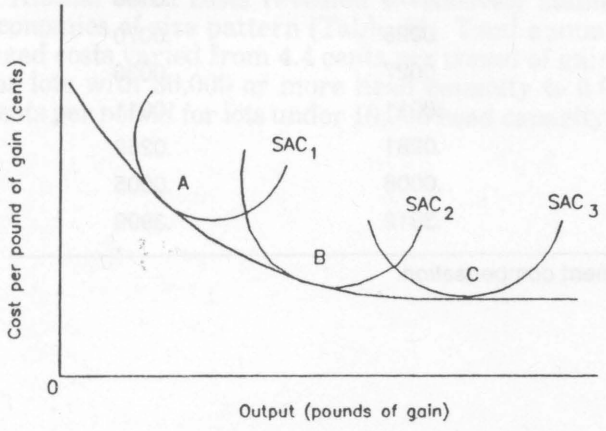

Figure 4. Theoretical cost curves for a feedlot.

The regression model adopted for use in this study was a nonlinear model in which the variables are expressed in logarithms. Costs functions were developed for measuring the relationship between (1) feedlot size and various items of fixed cost and (2) feedlot size and total fixed cost under varying assumptions regarding degree-of-feedlot-utilization rates.

Relationship Between Total Fixed Costs and Size of Feedlot

Figure 5, which depicts the estimated relationship between annual fixed costs per pound of gain and size of feedlot, reveals that substantial economies of size existed in Texas drylot lamb operations during 1987-88. For example, feedlots with 1,000 head capacity incurred annual figured costs of 6.8 cents per pound of gain compared to 4 cents per pound of gain for feedlots with 40,000 head capacity. Most of the competitive advantages attributed to economies of size were realized once feedlot size reached 20,000 head capacity. However, annual figured costs per pound of gain continued to decrease as feedlot size increased (Figure 5). Such decreases in annual fixed costs per pound gain as feedlot size increases can generally be attributed to higher feedlot utilization rates, more specialized labor and management, and higher degrees of mechanization.

Relationship Between Size of Feedlot, Feedlot Utilization Rates, and Total Fixed Costs

When feedlot utilization rates are held constant over feedlot size groups, past research has revealed that competitive advantages due to size tend to decrease as feedlot utilization rates increase (8). For example, when feedlot utilization rates are held constant at 25 percent, annual fixed costs were 9.9 cents per pound of gain for a 5,000 head capacity feedlot compared to 7.1 cents for a 40,000 head feedlot or a difference of 2.8 cents per pound of gain (Figure 6). However, when utilization rates are increased to 75 percent, annual fixed costs per pound of gain are 3.8 cents for a 5,000 head feedlot compared to 2.7 cents for a 40,000 head feedlot or a difference of 1.1 cents per pound of gain. Competitive advantages due to economies of size tend to decrease even more as feedlot utilization rates approach 100 percent. Nevertheless, Figure 6 reveals that as feedlot size increases, larger feedlots tend to enjoy a competitive advantage over smaller feedlots with respect to annual fixed costs in the absence of relatively large, offsetting utilization rates.

Table 28. *Total feeding cost per pound of gain by size of feedlot, Texas drylot lamb feeders, 1987-88.*

Item	Size of Feedlot			
	1,000 to 19,999 head capacity	20,000 to 29,999 head capacity	30,000 head and over capacity	Total
	Dollars			
Annual fixed costs	.0599	.0554	.0435	.0490
Variable costs	.4065	.4226	.3912	.3999
Total	.4664	.4780	.4347	.4489

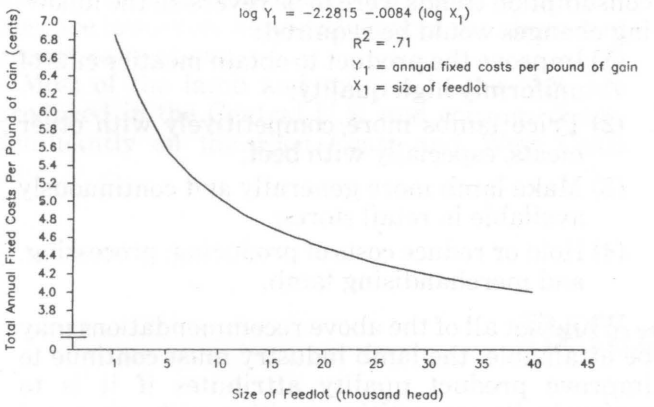

Figure 5. *Relationship between size of feedlot and total annual fixed costs, per pound of gain, Texas drylot lamb feeders, 1987-88.*

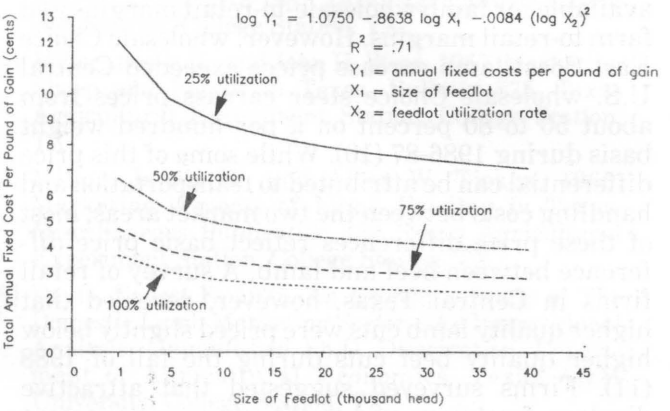

Figure 6. *Relationship between size of feedlot and total annual fixed costs, per pound of gain, with varying degrees of feedlot utilization, Texas drylot lamb feeders, 1987-88.*

Implications and Selected Issues

This section focuses on industry implications emanating from results of this study and on the areas of concern expressed by feedlot owners/managers during the drylot lamb interview process. A summary of some major findings of this study are provided in the Highlights section of this study.

The drylot lamb feeding industry is a relatively small, diverse industry compared to the state's cattle feeding industry (8). Fed lamb marketings from Texas drylots from July 1987 through June 1988 numbered 510,000 head with almost 60 percent of the marketings originating from lots with 30,000 head or more capacity. The drylot lamb industry is located in the Edwards Plateau Region and in the Texas Panhandle. Approximately 65 percent of the state's 240,000 drylot lamb feeding capacity was located in the Edwards Plateau region with the remainder represented by lots in the Texas Panhandle.

The U.S. and Texas lamb feeding industry is a high risk industry which is characterized by historically declining sheep and lamb numbers; a narrow live and retail market; volatile fed lamb, feeder lamb, and feed prices; relatively low and declining per capita lamb consumption; and a limited number of slaughter outlets for fed lambs. Several states, like Texas, have only one major slaughter outlet for fed lambs (7). The limited number of sheep and lamb slaughter outlets are generally attributed to the declining sheep and lamb numbers and the decline in U.S. per capita lamb consumption. Major slaughter plants which have ceased operation during the last decade generally cite insufficient slaughter supplies, limited market outlets, and plant obsolescence as major reasons for ceasing operations.

Since lamb feeders in Texas and other regions of the U.S. are faced with a limited number of slaughter outlets, questions have surfaced concerning the competitive atmosphere for slaughter lambs. In addition, increased packer feeding of lambs also raise issues concerning potential price-depressing effects on market prices. However, a recent study by the U.S. Department of Agriculture found that when packers overall procurement patterns were analyzed, individual plant's share of trade area slaughter supplies generally fell within acceptable limits, given the small volume of slaughter supplies and plant-scale efficiencies (7). Further, the study also showed that the daily rate of packer-owned lamb transfers to slaughter showed little relationship to prices received for lambs not owned by packers. There was also little evidence of any relationship between the volume of packer-fed transfers to slaughter and total volume of slaughter.

Nevertheless, given the current packer-lamb feeding industry competitive structure within the fed lamb industry, Texas lamb feeders interviewed expressed concern about the volatility of feeder and slaughter lamb prices and future prospects for slaughter lamb outlets. Assuming that current slaughter lamb outlets will remain unchanged in the foreseeable future, the trend toward increasing percentages of custom fed lambs will continue as feeders try to avoid risk. Given further periods of volatile input and slaughter lamb prices, increased rates of custom feeding tend to minimize price risks and operating capital requirements for feedlot operators.

The long-term downward trend in lamb consumption in the United States was categorized as a more stubborn problem than that of lamb imports in 1973 (9). The 1973 study stated that if long-term consumption trends were to be reversed, the following changes would be required:

(1) Improve the product to obtain meatier cuts of uniformly high quality;

(2) Price lambs more competitively with other meats, especially with beef;

(3) Make lamb more generally and continuously available in retail stores;

(4) Hold or reduce costs of producing, processing, and merchandising lamb.

While not all of the above recommendations may be attainable, the lamb industry must continue to improve product quality attributes if it is to maintain its competitive position with other red meat items. Engelman, et al., stated in 1973 that the growing lack of downward flexibility in retail lamb prices tended to widen wholesale-to-retail margins and the overall farm-to-retail margins (9). The net results were that lamb prices exceeded beef prices at retail and further aggravated the competitive position for lamb. Current data are not available for lamb wholesale-to-retail margins and farm to-retail margins. However, wholesale Choice East Coast lamb carcass prices exceeded Central U.S. wholesale Choice steer carcass prices from about 50 to 80 percent on a per hundred weight basis during 1986-87 (10). While some of this price differential can be attributed to transportation and handling costs between the two market areas, most of these price differences reflect basic price difference between beef and lamb. A survey of retail firms in Central Texas, however, revealed that higher quality lamb cuts were priced slightly below higher quality beef cuts during the fall of 1988 (11). Firms surveyed suggested that attractive displays, freshness, and quality were as important as price in marketing lamb. Nevertheless, other meat items such as pork and poultry were priced 66 percent and 28 percent below beef, respectively, at retail in the United States during 1987 (10) suggesting these meat items were priced more competitively with beef than was true for lamb.

Over-finished lambs have been a chronic problem in the lamb feeding industry. Recent published reports (12) and acknowledgment by lamb feeders interviewed in this study suggests that the industry, including slaughter firms, should establish a program to monitor or discourage such practices. Some lamb feeders interviewed acknowledged the existence of price discounts for over-finished lambs but stated that discounts were more severe for underfinished lambs and therefore they tended to finish some lambs at the heavier weights.

Imports continue to be a concern for the U.S. lamb industry as lamb imports during 1987 were equivalent to 14 percent of the U.S. commercial lamb and mutton production (13). In addition, some U.S. firms marketed imported lamb exclusively rather than domestic lambs. Where factors like price, quality, weight, and other physical attributes are concerned, the U.S. lamb industry must position itself to compete effectively with such imports if they are to survive as an industry in the absence of import restrictions.

Most of the lamb and mutton in the U.S. are produced in the Central U.S. and consumed predominantly on the East Coast and West Coast which necessitates transportation, handling, packaging, etc. Economic forces and interregional competition are the driving forces behind such industry lamb feeding and slaughter locations as the industry attempts to minimize production-slaughter distribution costs. While the structure of the meat industry has changed significantly during the last five years, the basic location of most of the production and slaughter generally has remained unchanged.

The study revealed that cost efficiencies in lamb feeding were available in a variety of situations. Economies of size existed with respect to feedlots with 20,000 head or more capacity, and fixed feeding costs were reduced as feedlot utilization rates increased. A pervasive problem in the lamb industry is market risk which was not dealt with directly in this study. Some Texas lamb feeders adopted a strategy for decreasing market risk by feeding higher percentage of lambs on a custom basis. Marketing opportunities also appear to exist within the industry by producing more uniform high quality lambs at desired weights, by assuring that lamb displayed at retail is fresh and attractive to consumers, and by pricing lamb cuts competitive with other meat items.

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