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# South Dakota Feedlot Management

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B 709, May 1991

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Agricultural Experiment Station
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## Contents




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## To The Reader ...

The authors are deeply grateful to the South Dakota cattle feedlot managers who provided the information on which this bulletin is based.

Responses to the questionnaire were unusually high for a mail survey. Those who responded showed remarkable care and competence in answering the questions. Their assembled answers enhance the value of this report. We salute South Dakota's feedlot managers for their concern for the state's leading industry.

The authors also extend deep appreciation to Dr. Robbi Pritchard, associate professor of animal science, and Dr. Gene Murra, professor of agricultural economics, who shared many deep and valuable insights at the research design stage of this study; Rodney Kappes, research assistant in agricultural economics, who planned and carried out most of the processing and analysis of data; Dr. Dillon Fuez, assistant professor of agricultural economics, and Dr. Murra for their thoughtful suggestions to improve earlier versions of the manuscript; and Verna Clark for her patience and competence in preparing the tables for the report.

Donald C. Taylor and
John J. Wagner
May 1991

## Tables



## Figures



Levels of significance for figures 3-30 are indicated just below the graphs, with coding as follows: * = 1% level of significance
** = 5% level of significance
ns = not significant at the 5% level

# SOUTH DAKOTA FEEDLOT MANAGEMENT

## Summary and conclusions

South Dakota ranks about 10th in the U.S. in number of cattle and calves on feed. Compared to other major cattle feeding states, most of our feedlots are relatively small.

However, in the past 30 years, the configuration of South Dakota's cattle feedlot production has changed considerably. The share of production from over-1,000 head capacity lots increased from 16% in 1969-1970 to 64% in 1988-89. This percentage point increase is greater than in any of the nation's 12 other major cattle feeding states that collectively account for 85% of U.S. total cattle on feed.

### Summary

A March 1989 survey shows the nature of South Dakota's cattle feeding industry and the management practices being followed by its practitioners. The most important findings from the 145 South Dakota feedlot managers that responded to the survey follow.

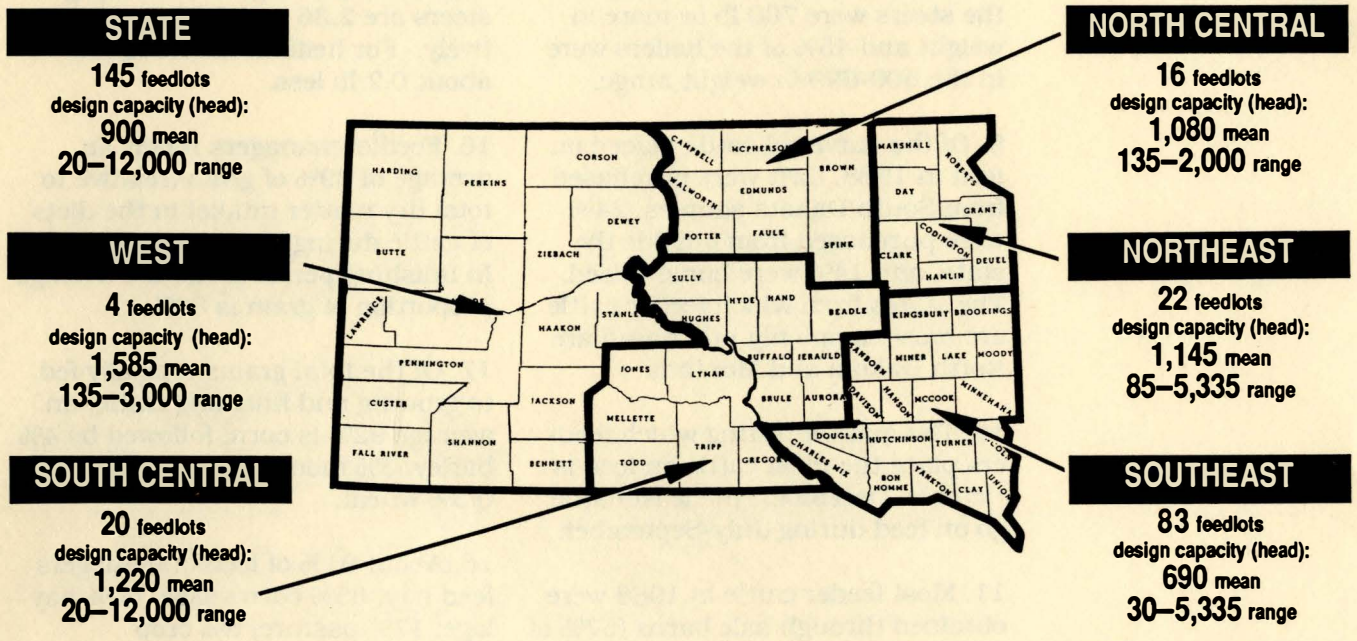
1. The surveyed feedlots range in size from 20- to 12,000-head design capacity and average 900 head each. This is 12 times larger than the state average of about 75 head per feedlot. Thus, in interpreting the findings, please bear in mind that the data on which the report is based are from generally above-average size feedlots.

2. Well over half of the reporting feedlots (83 of the 145) are in the southeastern part of the state (Fig 1). Between 16 and 22 are in each of the northeast, south-central, and north-central areas, and only 4 are in the west.

3. The average feedlot utilization for the four quarters in 1988 is 80% of design capacity. The highest quarter is January-March (90%); the lowest quarter is July-September (67%). Feedlot utilization during 1988 for the 145 feedlots collectively did not differ from that during the prior 5 years.

4. The most common feedlot physical feature--in addition to fences

Fig 1. Boundaries for and numbers of reporting feedlots, cattle feeding study, by region, South Dakota



and feedbunks--is a tree windbreak (80% of feedlots), followed by mounds (57%), fence windbreaks (51%), and partial paving with concrete (47%).

5. Relative to other farms in the state, the proportions of corporate (18%) and partnership (15%) cattle feedlots are above average. The proportion of single-family proprietorship feedlots (67%) is below average.

6. About 55% of the feedlots use no hired labor; only 3% use no family labor.

7. Nearly 31% of the reporting feedlot managers have typically received 80% or more of their gross farm income from the sale of slaughter cattle over the past 5 years. Between 20% and 22% of the feedlots fit into one of three other categories: slaughter cattle providing 20-39%, 40-59%, or 60-79% of gross farm income.

8. Of the surveyed cattle placed on feed in 1988, (a) 51% were yearlings, 42% calves, and 7% cattle 2 yr or older; (b) 56% were steers, 39% heifers, 4% cows, and 1% bulls; (c) 63% were exotic European beef breeds/crosses, 30% English beef breeds, 4% beef-dairy crosses, and 3% dairy cattle; and (d) 43% of the steers were 700 lb or more in weight and 45% of the heifers were in the 500-699 lb weight range.

9. Of the surveyed cattle placed on feed in 1988, 62% were purchased from South Dakota sources, 24% were purchased from outside the state, and 14% were home-raised. The states from which feeder cattle are most commonly purchased are North Dakota and Montana.

10. The quarter during which feeders place the most cattle on feed is October-December; the least cattle go on feed during July-September.

11. Most feeder cattle in 1988 were obtained through sale barns (57% of the surveyed cattle), followed by order buyers (20%), custom feeding (17%), and private treaty from cow-calf producers (6%). About 12% of reporting feedlots used the futures market to hedge feeder cattle purchases.

12. Nearly 76% of the cattle in this survey were owned by the feedlot where they were being fed. The remaining cattle were owned as follows: 16% by outside investors, 5% by the rancher that raised the feeders, and 3% by the feedlot with a partner. Retained ownership of feeder cattle by cow-calf producers appears to be rather uncommon in South Dakota.

13. The average targeted finishing weights for steers and heifers in the reporting feedlots are 1,230 and 1,105 lb, respectively. These finishing weights are considerably greater than those reported in other states.

14. Steer calves are typically on feed for an average of 208 days and yearling steers for 129 days. Steer calves are kept on feed for an average of 5 days longer than heifer calves, and yearling steers for 10 days longer than yearling heifers.

15. The average targeted daily rates of gain for growing and finishing steers are 2.36 and 3.05 lb, respectively. For heifers, the rates are about 0.2 lb less.

16. Feedlot managers report an average of 39% of grain (relative to total dry matter intake) in the diets of cattle during the growing period. In finishing period diets, the average proportion of grain is 80%.

17. Of the total grains typically fed to growing and finishing cattle, an average 92% is corn, followed by 4% barley, 3% milo, 0.5% oats, and 0.3% wheat.

18. About 91% of feedlot managers feed hay, 85% corn silage, 40% haylage, 17% pasture, 8% crop

residues, and 13% other roughage (oatlage and milo/sorghum/sudan silage).

19. The average proportions of cattle receiving feedstuffs typically home-raised are 99% corn silage, 97% haylage, 58% hay, 53% high moisture grain, and 43% dry grain.

20. About 90% of feedlots feed dry grain and 58% feed high moisture grain. Dry grain is fed cracked (59% of feedlots), ground (44%), whole kernel (36%), steam flaked (3%), and reconstituted (1.4%). About 67% of feedlots feed ground hay, 49% unprocessed, and 4% other (haylage, green chop). About 66% of feedlots feed protein supplements only in dry form, 18% only in liquid form, and 16% in both forms.

21. About 73% of feedlots report the continuous use of ionophores (e.g., Rumensin and Bovatec) that alter rumen fermentation processes; 59% report the continuous use of growth implants. Between 45% and 69% of feedlots use, at selected times only, antibiotics therapeutically, antibiotics sub-therapeutically, and/or coccidiosis control. At the other extreme, 47% of feedlots do not use antibiotics sub-therapeutically at all, 39% do not control coccidiosis, and 30% do not use antibiotics therapeutically.

22. About 55% of feedlots sell their slaughter cattle directly to the packer, 51% through public stockyards, and 23% through order buyers at the feedlot (some feedlots use more than one outlet). Seventeen percent of reporting feedlots indicate that they market cattle through using futures markets (hedging), 15% contract for future delivery (forward contracts), and 12% use the options market.

23. Of the total surveyed cattle slaughtered in 1988, 23% were sold in South Dakota, 38% in Nebraska, 25% in Minnesota, and 12% in Iowa.

24. The most common source of price and other market information on fed cattle is radio (85% of feedlots), followed by television (54%) and newspapers (30%).

25. About 64% of feedlot managers test feeds for nutrient composition at least once each year, 63% have grain storage facilities to take advantage of price drops in purchased feed grains, 57% use feed scales to monitor and control feeding rates, 35% keep feed records for separate pens of cattle, and 21% check cattle weights periodically to track performance.

26. Slightly over 21% of the reporting feedlots indicate use of a microcomputer as a management tool. The most common use of microcomputers is for determining feedlot production costs/profitability (81% of micro users), followed by projecting cattle performance (77%), formulating rations (65%), keeping feed records (65%), and keeping weight gain records (48%).

27. Factors determined through statistical analysis to have direct (i.e., the values for the factors are **larger for larger feedlots**) and statistically significant associations with size-of-feedlot include:

Rate of feedlot use during each quarter of the year, except during the fourth quarter;
Use of tree windbreaks, mounds, fence windbreaks, and partial paving of feedlots with concrete;
Feedlot partnerships and family held corporations;
Hired labor use;
Percentage of gross farm income from sale of slaughter cattle;
Exotic European beef breeds/ crosses on feed;
Heavier (700 lb or more) heifers placed on feed;
Feeder cattle purchased from South Dakota sources and out-of-state (rather than home-raised);
Third quarter placements of cattle on feed;
Targeted daily rates of gain for fin-

ishing steers and heifers;
Feeding of high moisture grain, cracked dry grain, ground hay, and both dry and liquid protein supplements;
Continuous use of ionophores and growth implants and the use, at selected times, of antibiotics therapeutically;
Slaughter cattle sold direct to the packer;
Use of hedging and forward contracting in marketing of slaughter cattle;
Use of electronic communication for acquiring price and other market information;
Use of microcomputers as a management tool; and
Testing of feeds for nutrient composition at least once each year, using grain storage facilities to take advantage of price drops in purchased feed grains, using feed scales to monitor and control feeding rates, keeping feed records for separate pens of cattle, and hiring consultants to formulate rations, market cattle, and advise on legal/accounting matters.

28. Factors with an inverse (i.e., the values for the factors are **smaller for larger feedlots**) and statistically significant relationship with size-of-feedlot are:
Single-family proprietor ownership of feedlots;
Lighter steers (under 500 lb) placed on feed;
Home-raised cattle on feed;
Ownership of the cattle by the feedlot in which they are fed;
Days yearling steers and yearling heifers on feed;
Home-raised hay, dry grain, and high moisture grain primarily used;
Feeding of only dry (versus liquid) protein supplement and unprocessed hay;
Ionophores and antibiotics not used therapeutically;
Selling of slaughter cattle in South Dakota; and
Use of newspapers and radio to acquire price and other market information.

## Conclusions

The results of this survey clearly show that tremendous variation exists in the nature of South Dakota feedlots and in the management practices followed by the state's cattle feeders. Such diversity presents critical challenges to educators, research scientists, industry representatives, and policy makers connected with South Dakota's cattle feeding industry.

Diversification may indeed be this industry's strongest quality. Diversification can allow farmers to use their various sets of resources efficiently. It can be an excellent way for managers to reduce risks.

However, diversification can also cause managers to spread themselves so thinly that efficiency suffers in some of their enterprises. Such may be the case with some South Dakota cattle feeders.

Large feedlots use feed testing, feed scales, feed records, and microcomputers to monitor feeding rates and performance. They use growth promotants and feed additives. Large feedlots are more likely than small feedlots to use electronic media to obtain market information and to use the futures market, options, and forward contracting for price protection. They are more likely to hire outside professionals to help develop their nutrition, health, management, and marketing programs.

Not all these technologies will be appropriate for all feedlots in South Dakota. However, there appears to be an opportunity for many feedlot managers to improve their competitive position by adapting for their own use those practices that have been shown to work for others.

# SOUTH DAKOTA FEEDLOT MANAGEMENT

South Dakota's livestock industry is a major contributor to the economy of the state and the livestock industry of the nation.[1] South Dakota usually ranks in the top 10 in the U.S. in beef cows that calve, cattle and calves on feed, all hogs and pigs, all sheep and lambs, and total red meat production (SD Ag Stat Serv 1990a). From 1985 through 1987, livestock accounted for 57% of South Dakota's total annual farm cash receipts of slightly over $3 billion. Cattle and calves account for 65% of the livestock total.

This report focuses on the cattle feeding component of South Dakota's livestock industry and is based on findings from a survey of cattle feedlot managers in South Dakota.

First, however, is a discussion of trends over time in the nation's cattle feeding industry and of how such trends in South Dakota compare to those of other important cattle feeding states.

## South Dakota cattle feeding in perspective

Of the 11.5 million cattle on feed in the U.S. on January 1, 1988, 38% were in the Central Plains (Nebraska, Kansas, Colorado),[2] 24% in the Southern Plains (Texas, Oklahoma, New Mexico), and 13% in the Corn Belt (Iowa, Illinois, Indiana, Ohio, Missouri) (USDA 1989).

Of regions with fewer cattle, those most pertinent to South Dakota are the Lake States (Minnesota, Michigan, Wisconsin: 5.4%) and the Northern Plains (South Dakota and North Dakota: 3.0%).[3]

Over the past 30 years, major changes have taken place in the regional location of cattle feeding in the U.S. (Fig 2). The Corn Belt's regional share has dropped from 38% in 1960 to 13% in 1988.[4] This decline was most dramatic in the early 1970s and occurred again, to a lesser extent, during the mid-1980s.

Counterbalancing the Corn Belt decline are increases since 1960 in the regional shares for the Central Plains (from 18% to 38%) and for

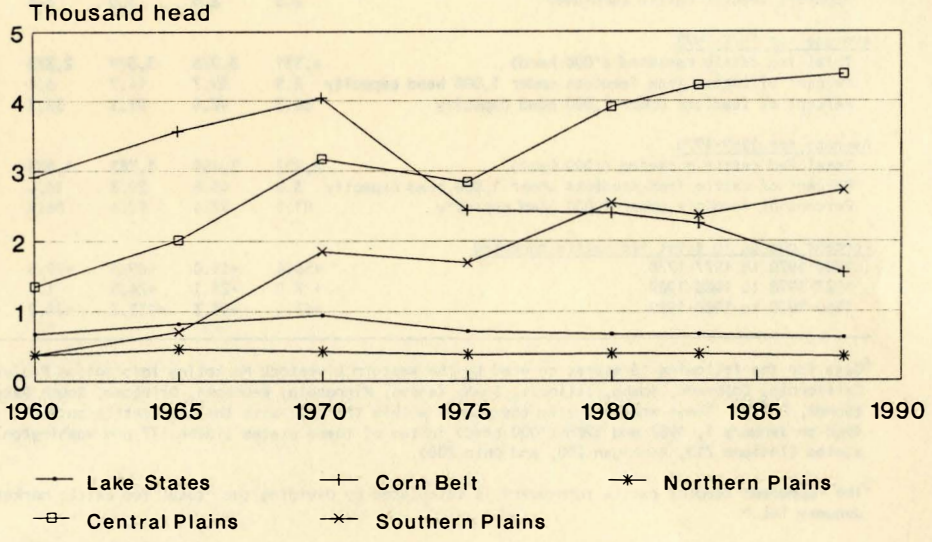
[1]For a brief overview of South Dakota's cattle industry, see Murra and Mends (1987).

[2]This regional breakdown is based on Dietrich et al (1985). In this and the other state listings, the states are listed in their order of importance for cattle feeding.

[3]The other two regions with more cattle than the Northern Plains are the Southwest (California and Arizona), 6.8% of cattle on feed on January 1, 1988, and the Mountain Region (Idaho, Wyoming, Montana, Utah, and Nevada), 3.9% of cattle on feed.

[4]If the Corn Belt were defined to include eastern Nebraska, conclusions about the declining role over time of the Corn Belt as a producer of fed cattle would be quite different.

Fig 2. Cattle on feed, by selected region, U.S., January 1, 1960-1988.




Sources: Dietrich et al. (1985) and USDA (1989).

the Southern Plains (from 4.9% to 24%). Growth in the number of cattle on feed in both these regions has been rather steady over time, except that growth in the Southern Plains essentially stagnated in the 1980s.

The shift of fed cattle to the Plains states was encouraged by expanded irrigated grain supplies, the development of new milo varieties (Johnson et al 1989),[5] increased EPA concerns in the Midwest, and increased financing opportunities in the Southwest. The growing dominance of the Central Plains during the past decade is shown by (1) increases between 1977-1978 and 1988-1989 of over 24% in the fed cattle marketed in Nebraska and Kansas[6] and (2) Nebraska having come to surpass Texas as the top fed-cattle producer in the nation (Sands 1990; USDA 1989).[7]

Numbers of cattle on feed in the Lake States and Northern Plains have remained rather steady over the past 30 years.

[5]Johnson et al (1989) indicate packer relocation in the Plains states to be another cause for the shift of cattle feeding to that region. Our own interpretation, however, is that the packing industry has tended to follow the cattle, rather than vice versa.

[6]In the other Central Plains state (Colorado), no more fed cattle were marketed in 1988-1989 than in 1977-1978.

[7]Two studies of regional comparative advantage in cattle feeding in the U.S. were conducted in the early 1980s. Clary et al (1984) concluded from their study of interregional competition in the U.S. fed-cattle economy that the natural competitive advantages of the Southern and Central Plains states were stable and should continue for some time in the future. Trapp's (1984) analysis of the changing profitability and efficiency of High Plains and Corn Belt (western Iowa and eastern Nebraska) feedlots over the 1970s and early 1980s showed the Corn Belt to have regained much of the production cost competitiveness that it had lost. He indicated, however, that it was too early to conclude whether cattle feeding activities would begin to shift back to the Corn Belt.

Table 1. Feedlot cattle data, South Dakota and selected other states, selected 2-year periods between 1969-1970 and 1988-1989.

| Years and feedlot cattle characteristic | Texas | Nebraska | Kansas | Colorado | Iowa | Minnesota | South Dakota | Thirteen states[a] |
|---|---|---|---|---|---|---|---|---|
| Average for 1987-1988 | | | | | | | | |
| Cattle and calves on feed, January 1st ('000 head) | 2,150 | 1,930 | 1,418 | 930 | 665 | 308 | 303 | 9,769 |
| Number of feedlots | 900 | 9,300 | 1,900 | 303 | 16,000 | 6,000 | 4,150 | 47,622 |
| Cattle per feedlot on January 1st | 2,389 | 208 | 746 | 3,069 | 42 | 51 | 73 | 205 |
| Average for 1988-1989 | | | | | | | | |
| Total fed cattle marketed ('000 head) | 4,890 | 5,095 | 4,200 | 2,350 | 1,810 | 528 | 575 | 23,207 |
| Percent of cattle from feedlots under 1,000 head capacity | 0.7 | 23.9 | 1.4 | 1.7 | 67.7 | 82.0 | 35.9 | 16.3 |
| Percent of feedlots under 1,000 head capacity | 79.8 | 94.8 | 85.3 | 44.3 | 98.5 | 99.0 | 98.6 | 96.5 |
| Apparent feedlot cattle turn-over[b] | 2.3 | 2.6 | 3.0 | 2.5 | 2.7 | 1.7 | 1.9 | 2.4 |
| Average for 1977-1978 | | | | | | | | |
| Total fed cattle marketed ('000 head) | 4,571 | 3,978 | 3,379 | 2,373 | 3,052 | 757 | 564 | 23,433 |
| Percent of cattle from feedlots under 1,000 head capacity | 2.5 | 39.7 | 14.7 | 6.4 | 79.8 | 91.4 | 64.4 | 30.2 |
| Percent of feedlots under 1,000 head capacity | 86.3 | 97.4 | 97.1 | 55.1 | 99.1 | 99.5 | 99.3 | 97.1 |
| Average for 1969-1970 | | | | | | | | |
| Total fed cattle marketed ('000 head) | 2,922 | 3,459 | 1,782 | 1,833 | 4,567 | 836 | 552 | 21,305 |
| Percent of cattle from feedlots under 1,000 head capacity | 3.6 | 45.6 | 29.3 | 16.4 | 90.4 | 93.7 | 83.5 | 43.0 |
| Percent of feedlots under 1,000 head capacity | 81.1 | 97.4 | 98.6 | 86.8 | 99.6 | 99.8 | 99.4 | 98.5 |
| Percent change in total fed cattle marketed | | | | | | | | |
| 1969-1970 to 1977-1978 | +56.4 | +15.0 | +89.6 | +29.5 | -33.2 | - 9.4 | + 2.2 | +10.0 |
| 1977-1978 to 1988-1989 | + 7.0 | +28.1 | +24.5 | - 1.0 | -40.7 | -30.3 | + 2.0 | - 1.0 |
| 1969-1970 to 1988-1989 | +67.4 | +47.3 | +135.7 | +28.2 | -60.4 | -36.8 | + 4.2 | + 8.9 |

[a]Data for the following 13 states covered by the Western Livestock Marketing Information Project are reported in this column: Arizona, California, Colorado, Idaho, Illinois, Iowa, Kansas, Minnesota, Nebraska, Oklahoma, South Dakota, Texas, and Washington. (Sands, 1990). These are generally the states within the U.S. with the most cattle on feed. However, the average cattle and calves on feed on January 1, 1987 and 1988 ('000 head) in two of these states (Idaho 177 and Washington 168) is less than that in three other states (Indiana 218, Michigan 200, and Ohio 200).

[b]The "apparent feedlot cattle turn-over" is calculated by dividing the "total fed cattle marketed" by the "cattle and calves on feed, January 1st."

Sources: Based on Sands (1990) for 1988 and 1989 data; USDA (1971, 1979, and 1989) for other years' data.

South Dakota generally ranks about 10th among the states in number of cattle and calves on feed (USDA 1989). Data for the five major cattle feeding states in 1988-1989, for Minnesota and South Dakota, and collectively for the 13 states covered by the Western Livestock Marketing Information Project (WLMIP) (Sands, 1990)[8] are shown in Table 1.[9]

Some relationships appear:

Nebraska, the nation's number-one producer, Kansas (third), and Colorado (fourth) comprise the Central Plains;

Texas, which during a few years in the 1970s was the nation's number-one producer (but now is in second position), is by far the dominant cattle feeding state in the Southern Plains, accounting for 83% of that region's cattle on feed;

Iowa, ranking fifth nationally and the main cattle feeding state in the Corn Belt, accounts for 42% of that region's cattle on feed;

Minnesota, the main cattle feeding state in the Lake States, accounts for 50% of that region's cattle on feed; and

South Dakota accounts for 87% of Northern Plains cattle on feed.

The "big five" states covered in Table 1 account for 75% of the cattle on feed in the WLMIP's 13 states. Those 13 states, in turn, account for 85% of all cattle on feed in the U.S.

Variations in feedlot size among the seven selected states are considerable. The average feedlot size of 3,069 head in Colorado is 15 times larger than the average of 205 head per feedlot for the 13 major cattle feeding states. At the other extreme, Iowa's 16,000 feedlots, which account for 34% of all feedlots in the 13 states, average only 42 head per feedlot--only 20% of the 13-state average.

South Dakota's average feedlot size of 73 head is below average for the 13 states, but it is larger than the average feedlot size in either Iowa or Minnesota.

In 1988-1989, 97% of the feedlots in the 13 states had a capacity of under 1,000 head each. The corresponding figures for Iowa, Minnesota, and South Dakota are 98-99%. Colorado is unique among the seven states in its position, with only 44% of its feedlots having under 1,000-head capacity.

In terms of cattle marketed, however, a very different picture emerges.

Feedlots under 1,000 head in capacity account for only 16% of the total fed cattle marketed in the 13 states. This proportion varies widely among the seven selected states, ranging from less than 2% in Texas, Kansas, and Colorado to more than 67% in Iowa and Minnesota. Again, South Dakota is close to mid-range, with 36% of its fed cattle marketed from feedlots under 1,000-head capacity.

The average "apparent feedlot cattle turnover" in the 13 states is 2.4 per year. Each of the "big five" states except Texas has an above-average turnover; Kansas is at the top with a turnover of 3.0 per year.

Feedlots in Minnesota and South Dakota, on the other hand, appear to turn over on the average less than two batches of cattle per year.

[8]These same 13 states are reported separately in the "cattle and calves on feed" section of USDA's Livestock and Meat Statistics (e.g., USDA 1989).

[9]The other three states in the "top 10" for cattle and calves on feed in the U.S. are California (415,000 head during 1987-1988), Illinois (410,000), and Arizona (347,000).

Compared to 1969-1970, the 13 states collectively now are marketing 9% more fed cattle.[10] The greatest increase has taken place in Kansas, where the absolute and relative increases are over 2.4 million head and 136%, respectively. In three of the other "big five" states, substantially increased numbers of cattle are being marketed: Texas (67% increase), Nebraska (47%), and Colorado (28%). In Iowa, on the other hand, 60% fewer cattle were marketed in the late 1980s than in the late 1960s.

South Dakota again is middle-of-the-road, with fed cattle numbers increasing by a modest 4%.

The relative increases in fed cattle marketings in Texas, Kansas, and Colorado were greater during the 1970s than the 1980s, whereas the relative increase in Nebraska was greater during the 1980s. The losses in cattle numbers in Iowa and Minnesota were greater during the 1980s than the 1970s.

Since 1969-1970, the relative number of fed cattle marketed from feedlots under 1,000-head capacity for the 13 states has dropped by 27 percentage points. The corresponding decrease for South Dakota is 48 percentage points (84% to 36%).[11] This drop is associated with a 45% decrease in the number of feedlots in South Dakota with under 1,000-head capacity (mainly between 1975 and 1985), a 54% decrease in the number of fed cattle marketed from these smaller feedlots, essentially no change in the number of feedlots with over 1,000-head capacity, and a 2.9-fold increase in the number of fed cattle marketed from these larger feedlots (Sands, 1990).

## Mail survey data collection and analysis

### Mail survey

A mail survey of South Dakota cattle feedlots was conducted in March 1989 (see Annex A for a copy of the questionnaire). The purpose of the survey was to characterize the cattle feeding industry in South Dakota and the relationships between (1) size-of-feedlot and geographic location within the state and (2) management practices used by cattle feeders.

The questionnaire was sent to managers of 431 feedlots with a capacity of 499 head or less (a 12% sample) and all of the state's 150 feedlots with a capacity of 500 head or more.[12]

Taking into account feedlots no longer in operation, the overall survey response rate was 35.5%. This includes 145 and 30 usable questionnaires for cattle finishing and cattle backgrounding operations, respectively.[13] For the cattle finishing feedlots, the response rate for under-500 head capacity feedlots was 17%. For over-500 head capacity feedlots, the response rate was 45%.

[10]For the U.S., total fed cattle marketed has decreased 4.6% since 1969-1970.

[11]The next greatest percentage point decrease is 23 for Iowa. The six WMLIP "big 13" cattle feeding states not shown in Table 1 have changes in the shares of fed cattle marketed from feedlots under 1,000 head capacity from 1969-1970 to 1988-1989 as follows: Arizona 0.3% to 3.9%, California from 0.9% to 0.3%, Idaho 15.4% to 2.3%, Illinois from 92.2% to 82.5%, Oklahoma 11.0% to 1.8%, and Washington 13.9% to 1.5%.

[12]The reason for unequal sampling fractions was to help insure an adequate number of the relatively scarce larger feedlots to analyze in relation to relatively common smaller feedlots.

[13]Data based on the 145 cattle finishing feedlots are presented in this report. Tables showing the findings for the 30 backgrounding feedlots are available from the authors (Economics Department, South Dakota State University, Box 504a, Brookings, S.D. 57007).

Seventy-two responses were received from cattle finishing feedlots with under 500-head capacity, and 68 responses were from feedlots with more than 500-head capacity (Table 2). The responses cover about 1.4% of the state's feedlots with under 500-head capacity and 32% of the state's feedlots with more than 500-head capacity.

## Data analysis

Cattle finishing survey responses were first analyzed for all 145 feedlot respondents collectively and then by size-of-feedlot and area within the state.[14] Size-of-feedlot was defined by "feedlot design capacity" (based on the linear feet of feedbunk space in the respective feedlots). The following feedlot size categories were established:

"Small," under 200 head;
"Intermediate I," 200-999 head;
"Intermediate II," 1,000-2,499 head; and
"Large," 2,500 head or more.

These size categories were selected to reflect potential differences in management requirements and to reflect expected possible differences in the respective feedlots' commitment to cattle feeding.

The survey questionnaires called for two types of responses: (1) "yes" or "no" to categorical questions (e.g., Question 2 in Annex A) and (2) percentages of animals/feeds fitting into alternative categories (e.g., Question 6 in Annex A).

The first type of responses involves discrete (0, 1) variables in which percentages of reporting feedlots responding "yes" to each question were determined. The statistical significance of differences in report-

[14]Data were analyzed via the SAS-Micro Computer Stat Package (SAS Institute 1988).

Table 2. 1989 cattle feedlot survey respondents vs. 1982 cattle feeders in South Dakota, by size-of-feedlot.

| | 1989 survey respondents | | | 1987 South Dakota feedlots | | | Respondents as a percent of 1987 S.D. cattle feeders |
|---|---|---|---|---|---|---|---|
| Size-of-feedlot category | No. of feedlots | Percent of feedlots with <500 and >500 head | Percent of total feedlots | No. of feedlots[e] | Percent of feedlots with <500 and >500 head | Percent of total feedlots | |
| Less than 10 | 0 | 0 | 0 | 855 | 17.1 | 16.4 | 0 |
| 10 - 19 | 0 | 0 | 0 | 839 | 16.8 | 16.1 | 0 |
| 20 - 40 | 7 | 9.7 | 5.0 | 1,470 | 29.4 | 28.2 | 0.5 |
| 50 - 99 | 12 | 16.7 | 8.6 | 917 | 18.4 | 17.6 | 1.3 |
| 100 - 199 | 24 | 33.3 | 17.1 | 596 | 11.9 | 11.5 | 4.0 |
| 200 - 499 | 29 | 40.3 | 20.7 | 319 | 6.4 | 6.1 | 9.1 |
| Subtotal <500 | 72[a] | 100.0 | 51.4 | 4,996 | 100.0 | 95.9 | 1.4 |
| 500 - 999 | 27 | 39.7 | 19.3 | 102 | 47.2 | 2.0 | 24.8 |
| 1,000 - 2,499 | 31 | 45.6 | 22.2 | 75 | 34.7 | 1.4 | 41.3 |
| 2,500 or more | 10 | 14.7 | 7.1 | 39 | 18.1 | 0.7 | 25.6 |
| Subtotal >500 | 68[b] | 100.0 | 48.6 | 216 | 100.0 | 4.1 | 31.5[c] |
| Total | 140[d] | n/a | 100.0 | 5,212[c] | n/a | 100.0 | 2.8 |

[a]The survey response rate for feedlots with less than a 500 head capacity was 17% plus (72+ of the 431 feedlots sampled).

[b]The survey response rate for feedlots with a capacity of 500 head or more was 45% plus (68+ of the 150 feedlots with 500 head or more in 1989).

[c]The South Dakota Agricultural Statistics Service (SD Agric Stat Serv 1989) shows a total of 4,100 feedlots in South Dakota in 1988, with 56 of the feedlots having a reported capacity of 1,000 head or more. The 41 feeders with a capacity of 1,000 head or more that responded to the survey are 73% of the state total of 56.

[d]Information on the feedlot capacity for 5 of the feedlot respondents was unclear; hence, data are shown in this table for only 140 of the 145 respondents.

[e]Data from USDC (1989, 28).

ing feedlots among size-of-feedlot categories and among areas within the state for such variables was determined using the standard Pearson Chi-Square statistic. If a particular Chi-Square test involved more than 25% of the cells with expected counts of less than five, the results of the testing were considered as insignificant (SAS Institute 1988).

The second type of responses involves continuous variables involving percentages. Two types of averages for such variables were calculated: (1) "head-day" averages, in which the unit of analysis was the estimated average number of cattle on feed in each feedlot during the four quarters of 1988, and (2) "feedlot" averages, in which the unit of analysis was the individual feedlot.

These averages are used in the report as follows: The state-level data (in the text) are "head-day" averages for all the cattle covered in the survey. The average values for the respective size-of-feedlot categories (reported in the figures), on the other hand, are "feedlot" averages. The procedures in calculating and the rationale for establishing these two types of averages are presented in Annex B. The significance of differences collectively among the "feedlot" averages for various size-of-feedlot categories for continuous variables was determined through a GLM (general linear model) LSMEANS test (SAS Institute 1988).

## Nature of feedlots

### Location and size of feedlots

Respondents provided information on the design capacity of their feedlots by indicating (1) the total number of feet of feed bunks that they have at 100% feedlot utilization and (2) feet of feed bunks that are accessible from one side (vs. both) by cattle.[15] The total feet of feed bunk space was then divided by an assumed requirement of 1.5 feet per animal (MPS 1987) to determine the number of head that could be accommodated in each feedlot, i.e., the design capacity of each feedlot.[16]

The 145 feedlots range in size from 20- to 12,000-head design capacity each and average 900 head each. This average is 12 times larger than the state average of about 75 head per feedlot. Consequently, in interpreting the results presented in this report, readers should bear in mind that the data in this survey are based on generally above-average size feedlots in South Dakota.

The numbers and sizes of reporting feedlots in the five areas in South Dakota are shown in Fig 1. Well over half of the reporting feedlots (83 of 145) are located in the southeastern area,[17] presumably because of their proximity to (a) locally produced corn, (b) packing plants in

[15]The percentages of feedlots with feedbunks involving one- vs. two-sided feeders are as follows:

34.0 One-sided feeders only;
27.7 Two-sided feeders only;
37.6 Both one- and two-sided feeders; and
0.7 Self feeder (one feedlot).

[16]Some producers, particularly if they feed twice a day, may provide less than 1.5 ft of bunk space per animal. To whatever extent that the 1.5-ft assumption may be too liberal, the estimated design capacity of feedlots in the survey would be biased down. Relationships among different sizes-of-feedlot, however, would not be altered.

southwestern Minnesota, northeastern Nebraska, and Iowa, and (c) the Sioux Falls public stockyards.

The southeastern feedlots include 13 cattle feeders in Brookings County, 11 in Minnehaha County, and 10 in Kingsbury County. Between 16 and 22 of the reporting feedlots are in each of the northeast, south-central, and north-central areas, and only 4 are in the west. The mean size-of-feedlot ranges from 690 head in the southeast to 1,585 head in the west, but the differences in feedlot size among areas are not statistically significant.[18]

## Feedlot utilization in 1988

For all 145 feedlots in South Dakota, the average feedlot utilization rates for the four quarters of 1988 was 80% of design capacity. Among the four quarters of the year, the highest utilization rate for the state was 90% in January-March, followed by 84% for October-December, 81% for April-June, and 67% for July-September.

The percentage of feedlots reported to be fully (i.e., 100%) utilized ranged among quarters from 56% for January-March to 14% for July-September. At the other extreme, the percentage of empty (0% utilization) feedlots ranged from 17% in July-September to 5% in January-March.

Feedlot utilization rates varied directly with size-of-feedlot during each of the quarters except the fourth.[19] The difference in feedlot utilization rates between "small" and "large" feedlots was least during January-March when 77% of the design capacity in "small" feedlots and 96% of the design capacity in "large" feedlots was used (Fig 3). The size-of-feedlot difference in utilization rates was greatest during July-September when only 46% of the design capacity of "small" feedlots was used and as much as 83% of that in "large" feedlots was used.

A possible reason for higher feedlot utilization rates in larger feedlots is that managers of these feedlots have a greater commitment to cattle feeding, relative to other enterprises, than do the managers of smaller feedlots.[20] Larger feedlots may have higher turnover rates, partly because some small feedlots tend to fill their feedlots with one batch of cattle in the fall and to empty the feedlots in the summer. Gaarder (1971) also suggests that larger feedlots may be economically motivated to maintain high utilization rates to offset relatively high fixed investment costs.

[17]Gaarder (1972) shows a similar concentration of cattle feedlots in the southeastern part of South Dakota.

[18]When differences among means are reported to not be statistically significant, the test is with Prob < 0.05.

[19]Van Arsdall and Nelson (1983) also point out a tendency for higher utilization rates with larger farm feedlots in the Midwest.

[20]Results of analysis show a direct association in this study between the percentage of gross farm income from sale of slaughter cattle and size-of-feedlot.

Fig 3. Rate of feedlot utilization, by quarter and size-of-feedlot.

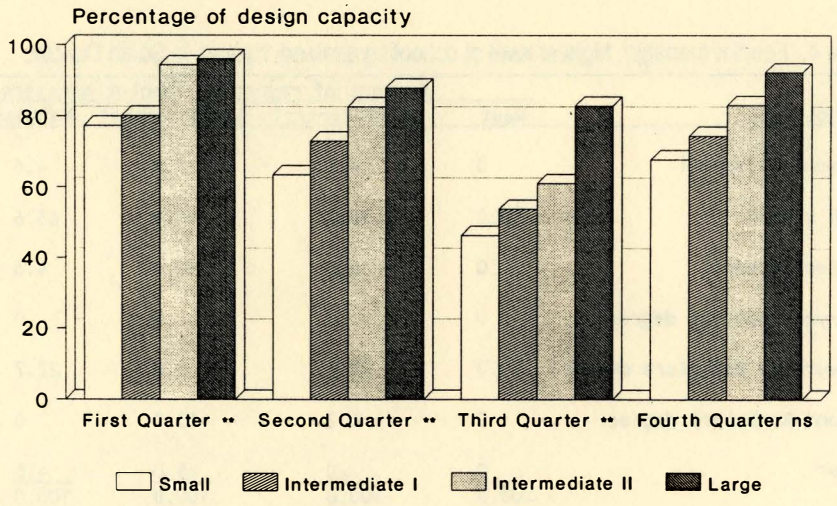


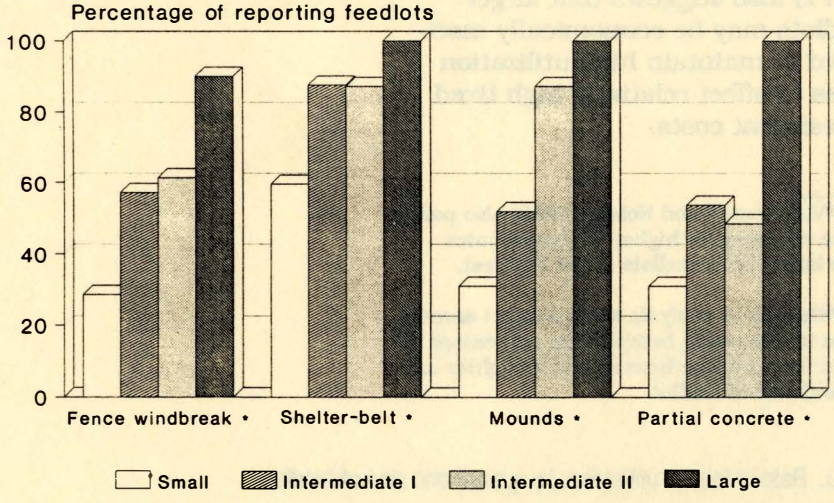
Table 3. South Dakota cattle feedlot physical features.

| Feedlot feature | Percent of reporting feedlots[a] |
|---|---|
| Shelter-belt windbreak | 79.9 |
| Mounds | 56.9 |
| Fence windbreak | 51.4 |
| Partially paved with concrete | 47.2 |
| Covered protection from wind and snow | 25.7 |
| Pollution control facilities[b] | 13.9 |
| Completely paved with concrete | 6.2 |
| Confinement barn | 4.9 |

[a]Because more than one feature characterizes some feedlots, the column percentage does not total to 100.

[b]The most commonly reported types of pollution control facilities are directed drainage areas and runoff containment lagoons/ponds. Manure slurry is stored above-ground in two feedlots.

Fig 4. Feedlot physical features, by size-of-feedlot.




About 62% of the responding feedlot managers reported their 1988 feedlot utilization did not differ from that of the past 5 years (1984-1988). Equal percentages (19%) of the managers reported their 1988 feedlot utilization rates were either lower or higher than that generally during the prior 5 years. Thus, although much of South Dakota experienced drought in 1988, that year appears to have been more or less normal for respondents from the standpoint of their cattle feedlot utilization.

## Feedlot physical features

About 80% of the reporting feedlots have tree windbreaks to provide protection for their finishing cattle (Table 3). Between 51% and 57% of the feedlots have mounds and fence windbreaks, and 47% have feedlots partially paved with concrete.

Differences in the presence of these four physical features among size-of-feedlot categories are statistically significant, with a generally positive relationship between the presence of the physical feature and size-of-feedlot (Fig 4). At the other extreme, only 5-6% of the feedlots are completely paved with concrete or have confinement feeding barns.

Table 4. Feedlot manager, highest level of schooling attained, by area in South Dakota.

| School level | Percent of reporting feedlot managers, by area[a] | | | | | |
|---|---|---|---|---|---|---|
| | West | North Central | South Central | Northeast | Southeast | State |
| Elementary school | 0 | 6.3 | 15.0 | 4.6 | 7.3 | 7.6 |
| High school | 50.0 | 56.2 | 50.0 | 63.6 | 46.4 | 50.7 |
| Vo Tech school | 0 | 6.3 | 10.0 | 4.6 | 14.6 | 11.1 |
| Two-year college degree | 0 | 0 | 0 | 0 | 1.2 | 0.7 |
| University Bachelors degree | 50.0 | 25.0 | 5.0 | 22.7 | 28.1 | 24.3 |
| Beyond Bachelors degree | 0 | 6.2 | 15.0 | 0 | 1.2 | 3.5 |
| Other | 0 | 0 | 5.0 | 4.5 | 1.2 | 2.1 |
| | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 |

[a]Differences in the responses among areas are not statistically significant at the 0.05 level.

## Feedlot management

Over 92% of the reporting feedlot managers have completed high school (Table 4). Nearly 28% have at least a bachelor's degree.

Nearly 67% of the reporting feedlots are operated as single-family proprietorships (Table 5). This compares to 87% for all farms in South Dakota (USDC 1989). The other relatively common types of feedlot organization are family-held corporations (18%) and partnerships (15%). For all of South Dakota's farms, the percentages of corporations and partnerships are 3% and 9%, respectively. The proportions of corporate and partnership feedlots are above average and the proportion of single-family proprietorship feedlots is below average, relative to farms in general in the state.[21]

The percentage of single-family proprietorships varies inversely with size-of-feedlot, with 91% of the "small" feedlots being proprietorships and only 30% of the "large" feedlots being proprietorships (Fig 5). The percentage of partnerships varies directly with size-of-feedlot, with 7% of the "small" feedlots in partnerships and 31% of the "large" feedlots in partnerships. The percentage of family held corporations also generally varies directly with size-of-feedlot.[22]

With the estimated cattle on feed in the reporting feedlots during 1988 as the unit of analysis, the percentage of hired labor used in the surveyed cattle feedlot operations is 49%.

About 55% of the reporting feedlots use no hired labor. On the other hand, only 3% of the feedlots use no family labor. A strong direct relationship exists between percent of hired labor and size-of-feedlot. For example, all "large" feedlots hire some labor, whereas only 4% of "small" feedlots do (Fig 6). Hired labor represents an average of 80%

[21]Clauson's (1983) 1981 survey of South Dakota cattle producers shows 85% sole proprietorships, 13% partnerships, and 2% corporations. Van Arsdall's and Nelson's (1983) survey of Midwest farmer feedlots shows 82% sole proprietorships, 16% partnerships, and 2% corporations. Dietrich et al (1985) show a very different picture for feedlots in Texas. Nearly 74% of their surveyed feedlots are corporations, 19% are partnerships, and only 6% are sole proprietorships.

[22]Van Arsdall and Nelson (1983) show similar patterns of relationship between type of feedlot business organization and size-of-feedlot for farmer feedlots in the Midwest.

Fig 5. Type of feedlot organization, by size-of-feedlot.

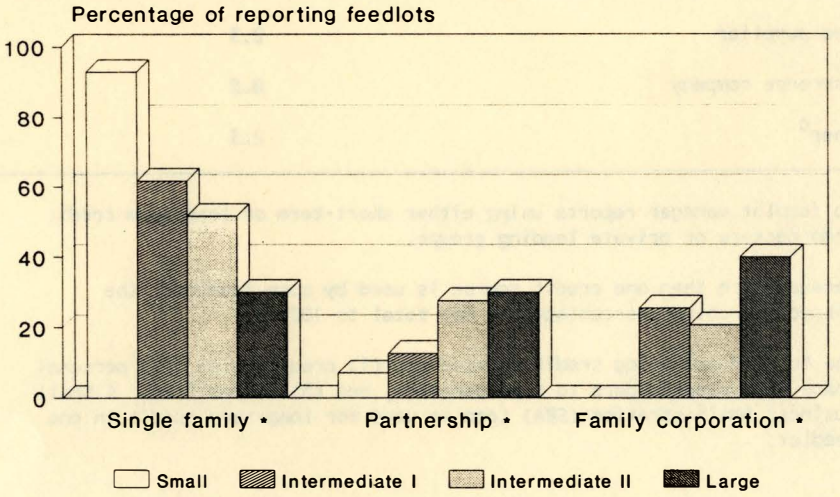



Table 5. Type of feedlot organization, by area in South Dakota.

| Organization type | Percent of reporting feedlots, by area[a] | | | | | |
|---|---|---|---|---|---|---|
| | West | North Central | South Central | Northeast | Southeast | State |
| Single-family proprietorship | 25.0 | 60.0 | 65.0 | 72.7 | 68.3 | 66.4 |
| Family held corporation | 0 | 13.3 | 20.0 | 13.7 | 19.5 | 17.5 |
| Partnership | 75.0 | 20.0 | 15.0 | 13.6 | 11.0 | 14.7 |
| Other | 0 | 6.7 | 0 | 0 | 1.2 | 1.4[b] |
| | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 |

[a]Differences in the responses among areas are not statistically significant at the 0.05 level.

[b]The other reported types of feedlot organizations are "joint enterprise" and "state owned".

of total labor in "large" feedlots and only 2% of total labor in "small" feedlots.[23]

Three sources of long-term credit are commonly used by reporting feedlots, in the following proportions: 37% Farm Credit Services, 31% in-state commercial banks, and 26% Farmers Home Administration (Table 6). An additional 11% of feedlots use long-term credit from private individuals.

About 77% use in-state commercial bank short-term credit. The next most common short-term sources of credit are Farm Credit Services (8% of feedlots) and private individuals (7%).[24]

Nearly 31% of the reporting feedlots typically received 80% or more of gross farm income from the sale of

[23]Four of the 145 reporting feedlots use only hired labor; they have design capacities of 1,335, 1,465, 3,265, and 5,335 head. The percentages of hired labor for other feedlots with 3,000 head or more design capacity are as follows: 80% for 12,000 head, 80% for 5,335 head, 80% and 50% for 3,335 head, and 75% for 3,000 head.

Van Arsdall and Nelson (1983) also report the proportion of hired labor in farmer feedlots in the Midwest to vary directly with size-of-feedlot.

Table 6. Sources of operating and long-term credit used in feedlot.[a]

| Credit source | Percent of reporting feedlots with borrowed[b] | |
|---|---|---|
| | Operating capital | Long-term capital |
| Farm Credit Services | 7.7 | 37.1 |
| In-state commercial bank | 76.9 | 30.5 |
| Farmers Home Administration | 1.5 | 25.7 |
| Private individuals | 6.9 | 11.4 |
| Out-of-state commercial bank | 3.8 | 2.9 |
| Feed supplier | 2.3 | 0 |
| Insurance company | 0.8 | 1.0 |
| Other[c] | 2.3 | 1.0 |

[a]No feedlot manager reports using either short-term or long-term credit from packers or private lending groups.

[b]Because more than one credit source is used by some feedlots, the respective column percentages do not total to 100.

[c]The "other" operating credit sources are (1) credit union, (2) personal loans from stockholders to a corporation, and (3) unspecified. A Small Business Administration (SBA) loan is used for long-term credit in one feedlot.

Table 7. Gross farm sales from total farm operation, by area in South Dakota.

| Gross farm sales (dollar range) | Percent of reporting feedlots, by area[a] | | | | | |
|---|---|---|---|---|---|---|
| | West | North Central | South Central | Northeast | Southeast | State |
| Less than $100,000 | 0 | 6.3 | 5.3 | 13.6 | 23.8 | 17.0 |
| $100,000-$249,999 | 0 | 31.2 | 36.8 | 22.7 | 28.8 | 28.4 |
| $250,000-$499,999 | 25.0 | 18.8 | 26.3 | 9.1 | 10.0 | 13.5 |
| $500,000-$999,999 | 50.0 | 0 | 10.5 | 9.1 | 16.2 | 13.5 |
| $1,000,000 or more | 25.0 | 43.7 | 21.1 | 45.5 | 16.2 | 27.6 |
| | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 |

[a]Differences in the responses among areas are not statistically significant at the 0.05 level.

slaughter cattle over the past 5 years. Between 20% and 22% received either 20-39%, 40-59%, or 60-79% of respective gross farm incomes from the sale of slaughter cattle. Only 7% earned less than 20% of their gross farm income from the sale of slaughter cattle.

The relationship between percentage of gross farm income from sale of slaughter cattle and size-of-feedlot is direct, with an average percentage of 38% for "small" feedlots and 78% for "large" feedlots (Fig 7).

About 41% of the reporting feedlots had gross farm sales from farming of $500,000 or more, an additional 42% between $100,000 and $499,999, and 17% less than $100,000 (Table 7). These levels are considerably greater than for all farms in South Dakota, where respective percentages are 1%, 18%, and 81% (USDC 1989).

In interpreting this apparent contrast in farming scale, however, remember that "gross farm sales" generally overstates the "real" value-added by cattle feeders who purchase feeder cattle. Such off-farm purchases may amount to 50% or more of the gross farm sales for many cattle feeders, but a **much smaller** percentage for most other types of farms. Thus, the contrast in average gross farm sales for cattle feeders, vs. for all farms, overportrays the "real" difference in farming scale between the two groups of farms.

Fig 6. Feedlot hired labor use, by size-of-feedlot.

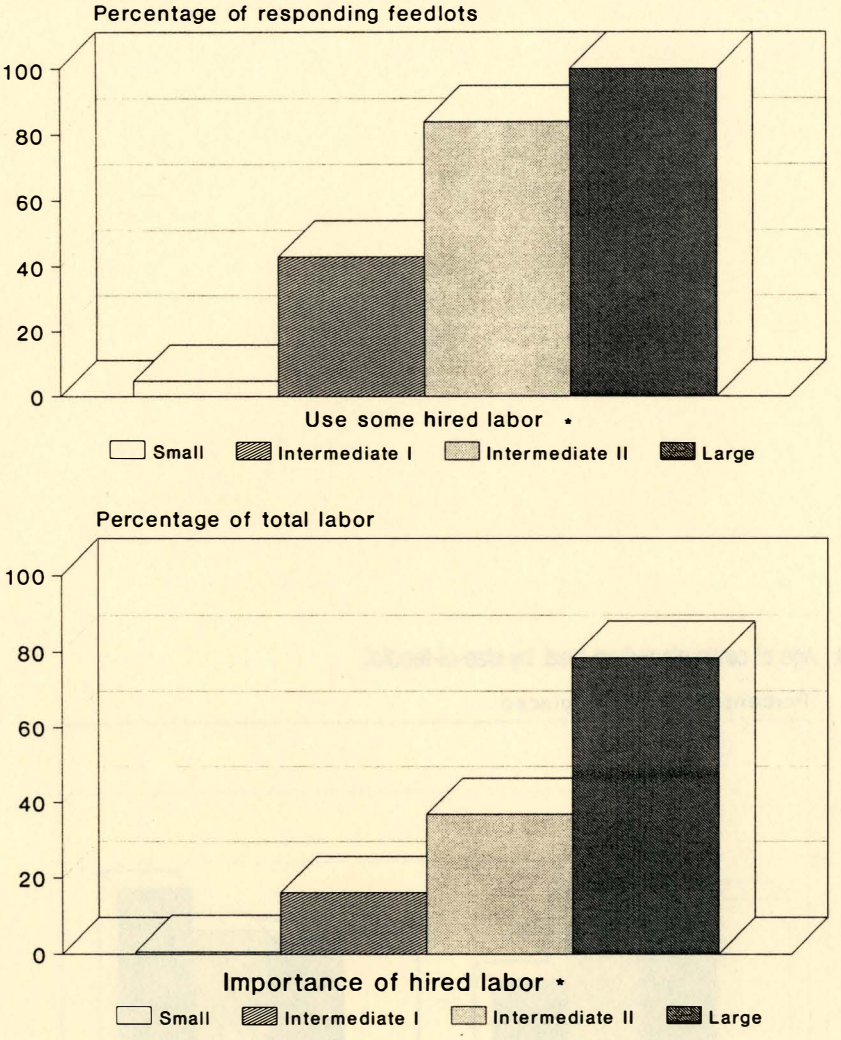
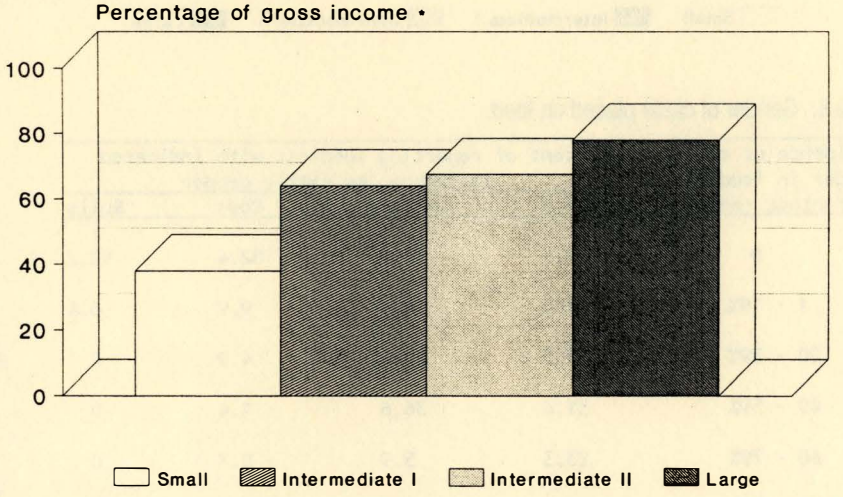



Fig 7. Gross farm sales from slaughter cattle, by size-of-feedlot.




[24]Dietrich et al (1985) show commercial banks, followed by the Farm Credit system, to be the major sources of operating credit in their survey of cattle feedlots in Texas. They show commercial banks to also be the main overall source of long-term credit, but with larger feedlots making relatively more use of long-term credit from insurance companies.

## Feeder cattle placement in 1988

### Age, gender, breed, and weight

Slightly over 51% of the surveyed cattle placed on feed in 1988 were yearlings (10-24 mo), 42% were calves, and 7% were cattle 2 yr or more of age. Larger feedlots tend to place fewer calves and more yearlings on feed (Fig 8). Differences in the percentages of calves and yearlings among size-of-feedlot categories are not statistically significant, however.[25]

About 27% of reporting feedlots placed only calves on feed in 1988, and 20% placed only yearlings on feed. At the other extreme, 26% of feedlots placed no calves on feed, 31% no yearlings, and 81% no cattle 2 yr or older.

Of the cattle, 56% were steers, 39% heifers, 4% cows, and 1% bulls. About 17% of the feedlots placed only steers on feed, 4% only heifers, 1% only cows, and 1% only bulls (Table 8). At the other extreme, 8% of feedlots placed no steers on feed, 21% no heifers, 82% no cows, and 92% no bulls.[26]

Of the surveyed cattle, 63% were exotic European beef breeds/

Fig 8. Age of cattle placed on feed, by size-of-feedlot.

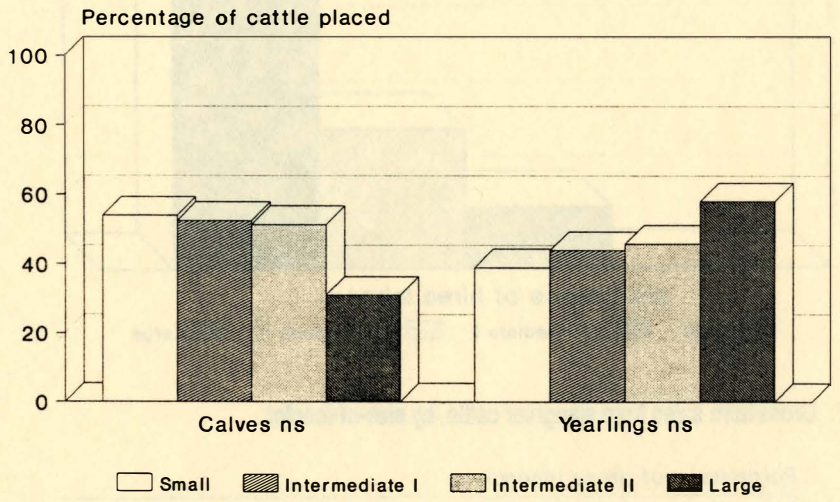



Table 8. Gender of cattle placed on feed.

| Incidence of cattle gender in feedlot (percentage range) | Percent of reporting feedlots with indicated incidence, by cattle gender | | | |
|---|---|---|---|---|
| | Steers | Heifers | Cows | Bulls |
| 0 | 7.5 | 20.9 | 82.4 | 92.2 |
| 1 - 19% | 3.0 | 6.0 | 9.9 | 6.4 |
| 20 - 39% | 7.5 | 22.4 | 4.9 | 0 |
| 40 - 59% | 31.6 | 36.6 | 1.4 | 0 |
| 60 - 79% | 23.3 | 5.9 | 0.7 | 0 |
| 80 - 99% | 9.8 | 4.5 | 0 | 0 |
| 100% | 17.3 | 3.7 | 0.7 | 1.4 |
| | 100.0 | 100.0 | 100.0 | 100.0 |

[25]Van Arsdall and Nelson (1983) report larger farmer feedlots in the Midwest place on feed more yearlings (relative to calves). They suggest that smaller feedlots more often purchase calves because these farmers have the more readily available forages for growing cattle on their more diversified farms. Their tendencies to match purchased with home-raised feeders and to feed only one lot of cattle each year may be other factors.

[26]Roughly similar proportions of steers and heifers are reported in two other surveys: 58% steers and 42% heifers in Colorado (Madsen and Gee 1986) and 57% steers and 43% heifers in Texas (Dietrich et al 1985). Van Arsdall and Nelson (1983) report 70% steers and 30% heifers in farmer feedlots in the Midwest.

crosses, 30% English beef breeds, 4% beef-dairy crosses, and 3% dairy cattle. About 24% of the feedlots had only exotic European beef breeds/crosses, 14% only English beef breeds, 4% only dairy cattle, and 1% only beef-dairy crosses. On the other hand, 25% of feedlots placed on feed no exotic European beef breeds/crosses, 35% no English beef breeds, 81% no beef-dairy crosses, and 85% no dairy cattle.[27]

A direct and statistically significant relationship exists between the percentage of exotic European beef breeds/crosses placed on feed and size-of-feedlot, with the proportion being 39% for "small" feedlots and 66% for "large" feedlots (Fig 9). On the other hand, an inverse and statistically significant relationship exists between the percentage of dairy cattle placed on feed and size-of-feedlot, with the percentage being 18% for "small" feedlots and 2% for "large" feedlots.

Slightly over 43% of the surveyed steers placed on feed in 1988 weighed 700 lb or more. About 41% were in the 500-699 lb weight range, and 16% were lighter than 500 lb. The weights of heifers less than 2 yr old placed on feed were slightly lighter, with the following percentages in the respective weight ranges: 38% 700 lb or more, 45% 500-699 lb, and 17% under 500 lb.[28]

The relationship between the percentage of steers weighing under 500 lb placed on feed and size-of-feedlot is statistically significant and inverse (Fig 10). Conversely, the percentage of heifers weighing 700 lb or more placed on feed varies directly with size-of-feedlot.[29]

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[27]Dietrich et al (1985) report a very different mix of cattle breeds in Texas feedlots: 51% English breeds and English crosses, 34% Brahman and Brahman crosses, 7% exotic European crosses, and 8% other.

[28]For a more detailed breakdown on the weight of steers and heifers (< 2 yr) placed on feed in 1988, see Table 9.

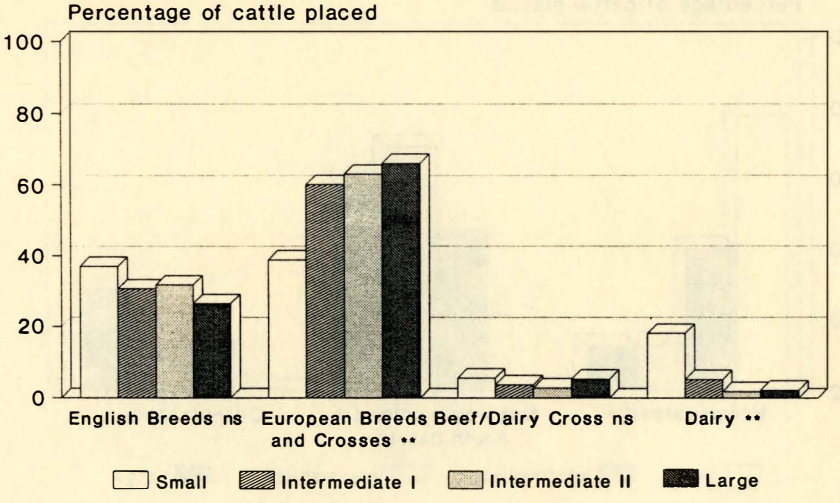
In comparison to the 1989 findings, Clauson (1983) showed South Dakota cattle producers placed lighter weight cattle in the feedlot: (a) in 1972, 55% of placements < 500 lb and 24% 500-699 lb and (b) in 1980, 39% < 500 lb and 31% 500-699 lb. Dietrich et al (1985) show somewhat heavier cattle in Texas feedlots than is shown in the 1989 South Dakota survey. Beginning feeder cattle weights commonly in excess of 700 lb are reported by (a) Hoelscher (1990) for 22 feedlots covering more than 300,000 cattle in the High Plains, (b) Madsen and Gee (1986) for surveyed feedlots in Colorado, and (c) Trapp (1984) for High Plains and Corn Belt feedlots in 1983.

[29]Van Arsdall and Nelson (1983), on the other hand, report no consistent relationship between weight of feeder cattle and size-of-feedlot in Midwest farmer feedlots.

Table 9. Weight of cattle placed on feed.

| Weight range (lb.) | Percent of cattle placed on feed | |
|---|---|---|
| | Steers | Heifers (< 2 yr.) |
| Less than 400 | 2.9 | 3.0 |
| 400 - 499 | 12.7 | 14.7 |
| 500 - 599 | 23.2 | 24.8 |
| 600 - 699 | 18.0 | 19.8 |
| 700 - 799 | 14.2 | 17.2 |
| 800 - 899 | 16.0 | 8.4 |
| 900 or more | 13.0 | 12.1 |
| | 100.0 | 100.0 |

Fig 9. Breed of cattle placed on feed, by size-of-feedlot.



## Place of origin

About 62% of the cattle were purchased from South Dakota sources, 24% were purchased from out-of-state, and 14% were home-raised.[30] The relationship between percent of home-raised cattle and size-of-feedlot is inverse, with 78% of the cattle in "small" feedlots being home-raised and only 13% of the cattle in "large" feedlots being home-raised (Fig 11). Conversely, the relationships between (1) the percentages of cattle purchased from both South Dakota sources and out-of-state and (2) size-of-feedlot are generally direct.[31]

[30]Madsen and Gee (1986) report 28% of the cattle fed in their surveyed feedlots in Colorado were purchased from Colorado sources. Dietrich et al (1985) report more than 60% of the cattle placed on feed in their surveyed feedlots in Texas originated from sources within Texas.

Fig 10. Weight of cattle placed on feed, by size-of-feedlot.

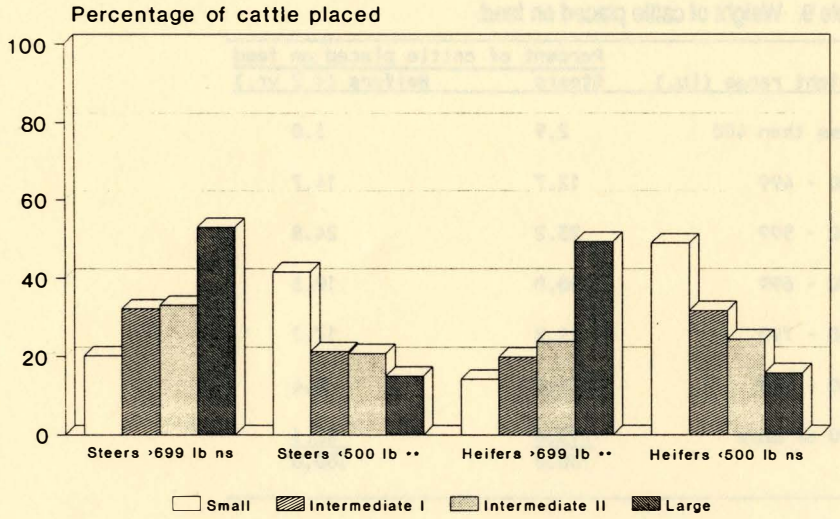
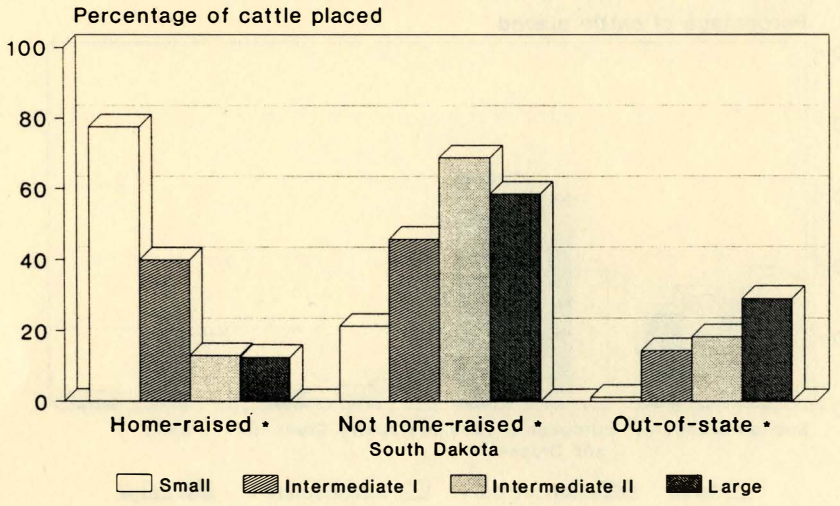



Fig 11. Place of origin of cattle placed on feed, by size-of-feedlot.




About 33% of feedlots reported home-raising all the cattle they placed on feed in 1988, whereas only 17% purchased all their feeder cattle from South Dakota sources. No feedlots purchased all their feeder cattle from out-of-state. On the other hand, 39% of feedlots home-raised none of their feeder cattle, 36% purchased no feeder cattle from South Dakota sources, and 68% purchased no feeder cattle from out-of-state sources.

Of the 46 feeders who imported at least some of their feeder cattle from out-of-state in 1988, 24 (52%) imported their feeders from North Dakota, 21 (31%) from Montana, 6 (9%) from both Minnesota and Wyoming, 4 (6%) from Nebraska, 2 (3%) from each of Iowa, Kansas, and Oklahoma, and 1 from Texas. Nine feeders imported at least 60% of their feeder cattle in 1988 from other states: 4 from Montana, 3 from North Dakota, and 2 from elsewhere.

## Timing of placement

About 40% of the surveyed cattle were placed on feed in the fourth quarter of 1988. This is a relatively heavy placement period: 33% of reporting feeders put all their cattle on feed during October-December, and only 17% put no cattle on feed during this quarter.

The second most common quarter for 1988 was January-March, when 23% of the cattle were placed on feed. About 19% of the cattle were

[31]Van Arsdall and Nelson (1983) report for farmer feedlots in the Midwest a similar inverse relationship between percentage of home-raised feeder cattle and size-of-feedlot.

placed on feed during the second quarter and 18% during the third quarter. Third quarter placement is relatively light: only 2% of reporting feeders put all their cattle on feed during July-September, and 64% placed no cattle on feed during this quarter.

Larger feedlots generally have higher feedlot utilization rates and tend to place cattle in their feedlots more uniformly throughout the year than smaller feedlots (Fig 12).[32] For example, the first- to fourth-quarter placements of cattle by "large" feedlots are 25%, 19%, 19%, and 37%, respectively. Corresponding figures for "small" feedlots are 25%, 10%, 6%, and 59%.

Differences among size-of-feedlot categories in the percentages of cattle placed on feed in various quarters, however, are statistically significant only in the third quarter.

## Means of procuring non-home-raised calves

The most common means for the reporting feedlots to procure feeder calves in 1988 was through sale barns (57% of the surveyed cattle), followed by order buyers (20%), custom feeding (17%), and private treaty from cow-calf producers (6%).[33] Differences among size-of-feedlot categories in the means of feeder calf procurement are not statistically significant.

The dominance of sale barn purchases is also indicated by 39% of feeders procuring all of their feeder cattle through them and by only 22% of them buying no cattle through sale barns.

Nearly 14% of feedlots buy all their cattle through order buyers, and nearly 59% buy none of their cattle by this means. Less than 6% of the feeders acquire all their feeder cattle via either custom feeding or directly from cow-calf producers. More than 84% procure no cattle through either of these two means.

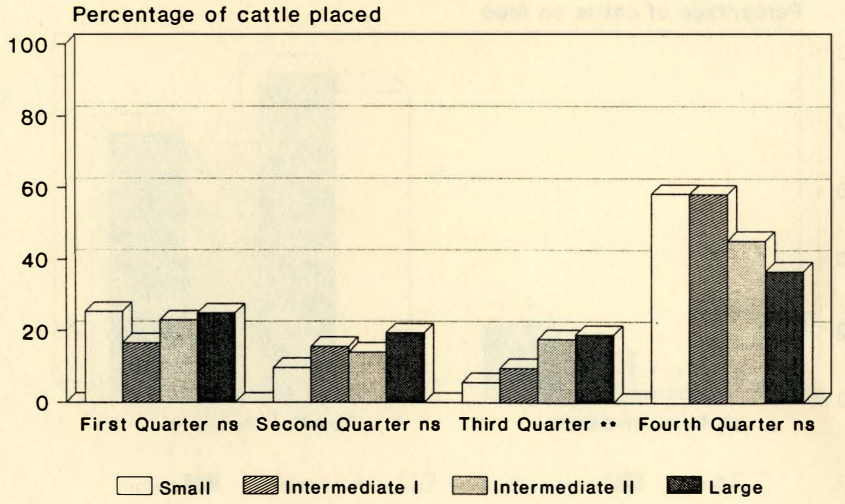
Eleven (12%) of 96 reporting feedlots use the futures market to hedge the purchase of feeder cattle. Differences among size-of-feedlot categories and the futures market purchase of feeder cattle are not statistically significant.

Slightly over 9% of the surveyed calves placed on feed in 1988 were pre-conditioned through the South

[32]Van Arsdall and Nelson (1983) show the following percentages of cattle placement, by quarter, in farmer feedlots in the Midwest: 37% October-December, 28% January-March, 16% April-June, and 19% July-September. Dietrich et al (1985) report a quite different seasonal distribution of cattle placement in Texas, with peak placement months being August-October (coinciding with early fall calf weaning practices of many Texas cow-calf producers), followed by April-May.

[33]Of the 14 feedlots reporting that they purchased calves private treaty from cow-calf producers, 10 (71%) indicated that they mixed those cattle with other cattle in the feedlot. Therefore, tracking carcasses back to ranch-of-origin may be difficult. In states such as Texas with larger feedlots, however, tracking carcasses back to ranch-of-origin may be easier (National Cattleman's Association, 1990).

Fig 12. Quarter of cattle placement, by size-of-feedlot.



Dakota Green Tag Program.[34] About 4% of the managers purchased only pre-conditioned calves, and 48% purchased no pre-conditioned calves. Differences among size-of-feedlot categories and the purchasing of pre-conditioned calves are not statistically significant.

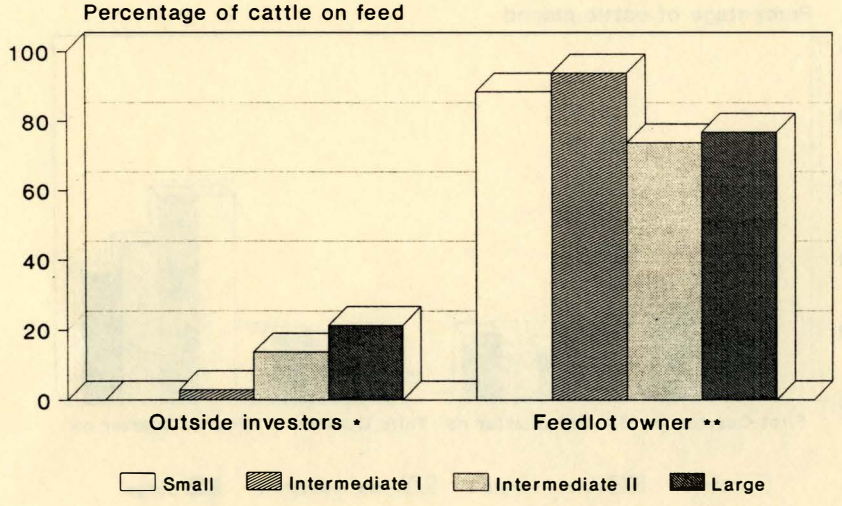
### Ownership of cattle in feedlot

Nearly 76% of the surveyed cattle were owned by the feedlot where the cattle were being fed. About 80% of the reporting feedlots owned all the cattle, and only 8% owned no cattle that they placed on feed in 1988.

The remaining cattle were owned as follows: 16% by outside investors, 5% by the rancher that raised the feeders, and 3% by the feedlot with a partner. Only 1% of the feedlots reported all their feeder cattle and 94% reported none of their feeder cattle being owned by the rancher that raised the feeders.

[34]The South Dakota Green Tag Program requires that calves be vaccinated, castrated, de-horned, and weaned 30 days before they are sold.

Fig 13. Ownership of cattle in the feedlot, by size-of-feedlot.




Consequently, retained ownership of cattle fed in South Dakota by the state's cow-calf producers appears to be rather uncommon for the reporting feedlots.[35]

A generally inverse and statistically significant relationship exists between cattle being owned by the feedlot where the cattle are fed and size-of-feedlot. Between 88 and 94% of the cattle in "small" and "intermediate I" feedlots are feedlot-owned, and 74-77% of the cattle in "intermediate II" and "large" feedlots are feedlot-owned (Fig 13).

On the other hand, a direct and statistically significant relationship exists between cattle owned by outside investors and size-of-feedlot. No cattle in "small" feedlots and 21% of the cattle in "large" feedlots were owned by outside investors.

## Typical feeding practices[36]

### Days cattle on feed

Steer calves and yearling steers were reported to be typically on feed for averages of 208 and 129 days, respectively. Steer calves are kept on feed for an average of 5 days longer than heifer calves and yearling steers for 10 days longer than yearling heifers.

The feeding periods vary widely among feedlots, but generally they

[35]This statement requires two qualifications. The retaining of ownership of calves by South Dakota cow-calf operators who send their calves for feeding outside the state is not reflected in the survey findings. It is generally known that several South Dakota producers retain ownership in calves that are fed to the south (e.g., in Nebraska). Furthermore, "retained ownership" also can be used to characterize feedlot managers who feed home-raised cattle (14% of the surveyed cattle placed on feed in 1988). This is not reflected in the data reported in the text.

[36]An overview of the findings from the survey on feeding practices is covered in Taylor et al (1989).

are somewhat greater than those normally recommended by Extension Service beef specialists. At the long end of the ranges, 26% of the feedlots keep both steer and heifer calves on feed for 275 days or longer (Table 10). About 20% of feedlots keep yearling steers and 14% of feedlots keep yearling heifers on feed for 180 days or longer (Table 11).[37] The surveyed cull cows are on feed for an average 66 days and cull bulls for 63 days.[38]

In general, feeding periods vary inversely with size-of-feedlot. For both yearling steers and yearling heifers, differences in the average feeding period among sizes-of-feedlot are statistically significant. The greatest differences are between "small" feedlots (average days on feed exceed 190) and the "intermediate II" feedlots (average days on feed are less than or equal to 125) (Fig 14). While the days steer and heifer calves are on feed appear to be inversely related to size-of-feedlot, differences in the feeding period lengths for the calves among size-of-feedlot categories are not statistically significant.

## Weight targets

Closely related to days on feed is the targeted finishing weight. The average targeted finishing weights for steers and heifers in the reporting feedlots are 1,230 lb and 1,105 lb,

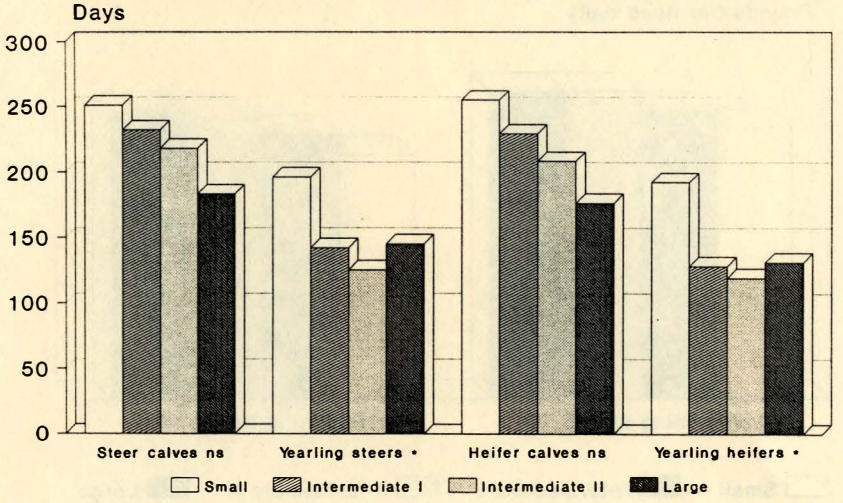
Table 10. Days steer and heifer calves are on feed.

| Feeding period (days range) | Percent of reporting feedlots | |
|---|---|---|
| | Steer calves | Heifer calves |
| Less than 125 | 8.3 | 9.1 |
| 125 - 149 | 2.8 | 1.1 |
| 150 - 174 | 7.4 | 11.4 |
| 175 - 199 | 14.8 | 18.2 |
| 200 - 224 | 18.5 | 13.6 |
| 225 - 249 | 8.3 | 8.0 |
| 250 - 274 | 13.9 | 12.5 |
| 275 - 299 | 5.6 | 3.4 |
| 300 - 324 | 10.2 | 12.5 |
| 325 or more | 10.2 | 10.2 |
| | 100.0 | 100.0 |

Table 11. Days yearling steers and heifers are on feed.

| Feeding period (days range) | Percent of reporting feedlots | |
|---|---|---|
| | Yearling steers | Yearling heifers |
| Less than 100 | 5.3 | 8.9 |
| 100 - 119 | 16.0 | 21.4 |
| 120 - 139 | 34.7 | 39.3 |
| 140 - 159 | 21.3 | 12.5 |
| 160 - 179 | 2.7 | 3.6 |
| 180 - 199 | 13.3 | 8.9 |
| 200 and more | 6.7 | 5.4 |
| | 100.0 | 100.0 |

Fig 14. Average days on feed, by cattle type and size-of-feedlot.




[37]These feeding periods are generally longer than the average feeding period for all steers of 138-151 days reported by Hoelscher (1990) for the High Plains, 134 days reported by Madsen and Gee (1986) for Colorado, and 149 days by Dietrich et al (1985) for Texas. The steer-heifer feeding period differential is about the same as that reported by Hoelscher and Dietrich et al. Madsen and Gee report an average days on feed for heifers 1 day greater than the 134 day average for steers.

[38]Much larger proportions of cull cows and cull bulls are fed for 60-69 days than for any other 10-day range.

Table 12. Targeted average daily gain and final finishing weights, by type of cattle.

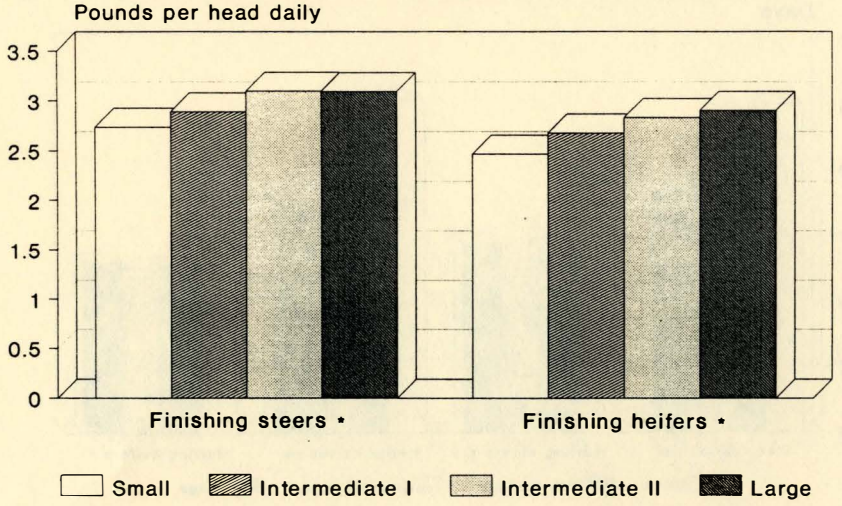
| Type of cattle | Targeted daily rate of gain (lb./day) | Targeted final finishing weight (lb.) |
|---|---|---|
| Growing steers | 2.36 | n/a |
| Growing heifers | 2.17 | n/a |
| Finishing steers | 3.05 | 1,230 |
| Finishing heifers | 2.82 | 1,105 |
| Cull cows | 3.15 | 1,265 |
| Cull bulls | 3.18 | 1,685 |

Table 13. Targeted final finishing weights, by type of cattle[a]

| Target weight (lb.) | Percent of reporting feedlots with indicated finishing weights, by type of cattle | | |
|---|---|---|---|
| | Steers | Heifers | Cull cows |
| Less than 1,050 | 0.8 | 5.7 | 4.8 |
| 1,050 - 1,099 | 0 | 27.9 | 4.8 |
| 1,100 - 1,149 | 3.2 | 38.5 | 4.8 |
| 1,150 - 1,199 | 16.7 | 13.5 | 9.5 |
| 1,200 - 1,249 | 33.3 | 11.5 | 19.0 |
| 1,250 - 1,299 | 22.2 | 1.9 | 4.8 |
| 1,300 - 1,349 | 16.7 | 1.0 | 38.1 |
| 1,250 - 1,399 | 4.7 | 0 | 4.7 |
| 1,400 and more | 2.4 | 0 | 9.5 |
| | 100.0 | 100.0 | 100.0 |

[a]The targeted finishing weights (lb.) for the eight reporting bull feeders are as follows: 1-1,300; 1-1,500; 2-1,600; 101,900; and 3-2,000.

Fig 15. Targeted average daily gain for finishing cattle, by size-of-feedlot.




respectively (Table 12).[39] Table 13 shows that 46% of steers are fed to targeted final finishing weights of 1,250 lb or more and 28% of heifers to 1,150 lb or more.

The average targeted rates of gain for the surveyed growing and finishing steers are 2.36 and 3.05 lb/day, respectively (Table 12). For heifers, the rates are about 0.2 lb/day less.[40]

About 37% of the managers target one or the other of two ranges in daily gain for growing steers: 2.0-2.5 or 2.5-3.0 lb/day. Nearly 57% target 2.0-2.5 lb/day for growing heifers. Slightly over 50% of the feedlots target 3.0-3.5 lb/day for finishing steers and 2.5-3.0 lb/day for finishing heifers.

A direct and statistically significant relationship exists between the targeted daily rates of gain for both finishing steers and finishing heifers and size-of-feedlot, with the targeted rates of gain for cattle in "large" feedlots 13-18% greater than for those in "small" feedlots (Fig 15).

[39]These targeted finishing weights are roughly consistent with the average liveweight of 1,222 lb for cattle slaughtered in South Dakota during 1989 (S.D. Ag Stat Serv, 1990b). This weight is considerably greater than the 1,134 lb reported on average for the U.S. The 1989 South Dakota survey weights also are considerably greater than those reported elsewhere in the literature: 1,168 lb for steers and 999 lb for heifers for farmer feedlots in the Midwest (Van Arsdall and Nelson 1983); 1,115 lb for steers and 1,002 lb for heifers in Colorado (Madsen and Gee 1986); 1,110-1,154 lb for steers and 1,001-1,024 lb for heifers for the High Plains (Hoelscher 1990); 1,136 lb for steers and 998 lb for heifers in Kansas (Kuhl 1990); 1,129 lb for Iowa (Loy et al 1986); and 1,108 lb for the Corn Belt and 1,130 lb for the High Plains (Trapp 1984).

[40]Actual daily rates of gain for steers covered in survey reports are as follows:
2.79 - 2.93, High Plains (Hoelscher 1990);
2.80 for calves and 3.22 for yearlings, Kansas (Schroeder and Blair 1989);
2.87, Kansas (Kuhl 1990); and
2.87, Colorado (Madsen and Gee 1986).

The average targeted final finishing weights for the surveyed cull cows and bulls are 1,265 and 1,685 lb, respectively (Table 12). Average targeted daily rates of gain for both cull cows and cull bulls are 3.2 lb. The average targeted daily rate of gain for 88% of the reporting feedlots for cull cows is 3.0 lb/day or more.

## Feed rations

**Grain versus roughage**. Feedlot managers report an average of 39% grain--relative to total dry matter--in the diets of cattle during the **growing period**. At the extremes, 10% of the feedlots feed less than 20% grain during the growing period, and 11% feed more than 60% grain.

A direct relationship appears to exist between size-of-feedlot and percent of grain in growing cattle diets (Fig 16). However, the relationship is not statistically significant.

During the **finishing period**, the average percentage of grain in cattle diets is 80% of total feed intake. At the extremes, 12% of the feedlots feed less than 60% grain and 20% of the feedlots 90% or more grain.[41] The apparent direct relationship between size-of-feedlot and percent of grain in finishing cattle diets is not statistically significant (Fig 16).

**Types of grain fed**. About 92% of the surveyed cattle receive corn, followed by 4% barley, 3% milo, 0.5% oats, and 0.3 wheat. Only 60% of feedlot managers, however, reported corn as the only grain used in the cattle rations. Nearly 40% of feedlots feed at least one grain other than corn. The exclusive use of corn in cattle rations appears more common in larger than smaller feedlots.

Other grains represent more than 40% of total grains fed in only two situations: 3% of the feedlots for milo and 2% for barley. At the other extreme, the following percentages of feedlot managers reported using none of the following grains in their rations: 79% barley, 83% oats, 94% milo, and 97% wheat.

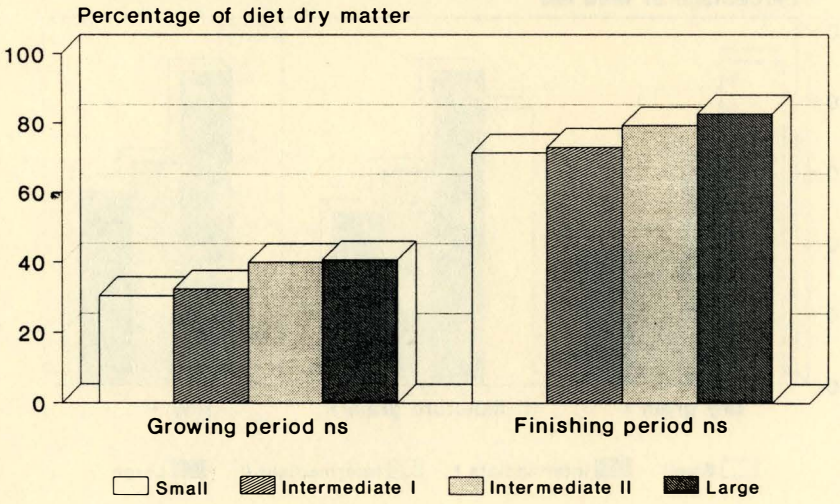
**Types of roughage fed**. The following percentages of feedlot managers reported feeding the respective types of roughages: 91% hay, 85% corn silage, 40% haylage, 17% grazing pasture, 8% grazing residues, and 13% other (oatlage and milo/sorghum/sudan silage).[42]

Corresponding data for heifers are as follows:
2.54 - 2.64, High Plains (Hoelscher 1990);
2.58 for calves and 2.91 for yearlings, Kansas (Schroeder and Blair 1989);
2.43, Iowa (Loy et al 1986);
2.46, Kansas (Kuhl 1990); and
2.60, Colorado (Madsen and Gee 1986).

[41]Madsen and Gee (1986) report the following average growing and finishing rations for yearlings:
Growing: 31% grain, 39% silage, 23% alfalfa hay, 5% protein, and 2% other supplements; and
Finishing: 75% grain, 13% silage, 5% alfalfa hay, 5% protein, and 2% other supplements.

[42]Van Arsdall and Nelson (1983) report the following percentages of farmer feedlots in the Midwest to feed the following roughages: 77% legume hay, 63% corn silage, 18% hay silage, and 7% other hay.

Fig 16. Importance of grain in cattle rations, by size-of-feedlot.



The percentage of feedlots feeding hay differs significantly among size-of-feedlot categories, but not with a clear pattern relative to size-of-feedlot: 100% for "small" and "large" feedlots and 84-86% for "intermediate I" and "intermediate II" feedlots (Fig 17).

The percentage of feedlots feeding corn silage differs significantly among size-of-feedlot categories, but again without a clear pattern relative to size-of-feedlot: 70% for "small" feedlots, 91% for "intermediate I" feedlots, 100% for "intermediate II" feedlots, and 67% for "large" feedlots.

Possible reasons for fewer small and large feedlots feeding corn silage are as follows: Small feedlots tend to more commonly home-raise their feeders and hence may have less time to raise corn silage. Large feedlots tend to be located farther west where corn silage is less common.

Fig 17. Roughages fed to cattle, by size-of-feedlot.

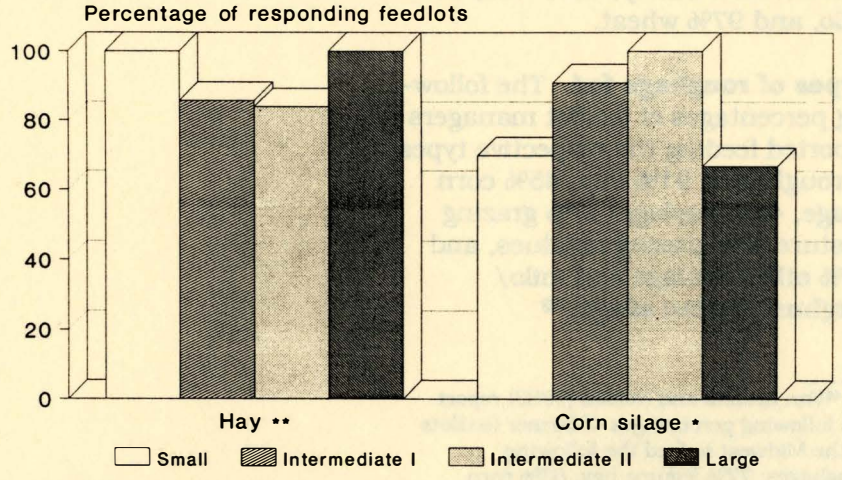
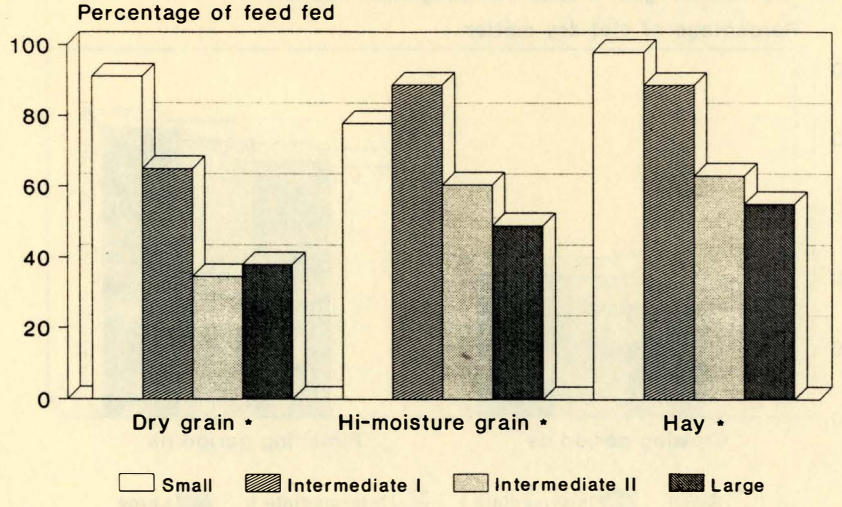



Fig 18. Importance of home-raised feed fed to cattle, by size-of-feedlot.




**Source of grains and roughages.** The average proportions of cattle receiving feedstuffs typically home-raised (i.e., raised on the farm/ranch that has the feedlot) are as follows: 99% corn silage; 97% haylage; 58% hay; 53% high moisture grain; and 43% dry grain.

Statistically significant differences exist between the home-raised percentages of hay, high moisture grain, and dry grain and size-of-feedlot (Fig 18). The relationship is clearly inverse for hay (43 percentage points higher for "small" than for "large" feedlots) and generally inverse for both dry and high moisture grain.

The percentages of feedlots that home-raise 100% of their feedstuffs are as follows: 95% corn silage, 94% haylage, 70% hay, 54% high moisture grain, and 40% dry grain.[43] At the other extreme, the percentages of feedlots that home-raise none of their feedstuffs are as follows: 15% dry grain, 7% high moisture grain, 4% both haylage and hay, and 2% corn silage.

**Forms of feed fed to cattle.** About 90% of the managers reported feeding dry grain and 58% high moisture grain.[44] The relationship between the percentage of high

[43]Madsen and Gee (1986) report the following percentages of commercial feedlots in Colorado to home-raise the following feedstuffs: 23% corn silage, 15% alfalfa, and 7% corn grain. Van Arsdall and Nelson (1983) report the following percentages of farmer feedlots in the Midwest to home-raise the following feedstuffs: 100% silage, 99% hay, 95% corn, and 84% of the other grains.

[44]Van Arsdall and Nelson (1983) report the following percentages of farmer feedlots in the Midwest to feed the following types of grain: 68% dry and 32% high moisture.

moisture grain and size-of-feedlot is direct and statistically significant, with the relative importance of high moisture grain 67 percentage points greater for "large" than "small" feedlots (Fig 19). Less than 12% of "small" and "intermediate I" feedlots use both dry and high moisture grain, whereas 87-89% of "intermediate II" and "large" feedlots do.

The following percentages of feedlot managers report feeding dry grain in the indicated forms: 59% cracked, 44% ground, 36% whole kernel, 3% steam flaked, 1% reconstituted, and 3% other (ear corn, earlage, and corn screenings). Only for cracked grain do the percentages differ significantly for different sizes-of-feedlots. Cracked grain tends to be more common in larger feedlots: 26% "small," 66% "intermediate I," 84% "intermediate II," and 80% "large" (Fig 20). Ground grain appears to be somewhat inversely related to size-of-feedlot, but the relationship is not statistically significant.

The following percentages of feedlot managers reported feeding hay in the following forms: 67% ground, 49% unprocessed, and 4% other (haylage, green chop).[45] For both ground and unprocessed hay, the percentages differ significantly for different sizes-of-feedlots. Ground hay tends to be more common with larger feedlots: 26% "small," 78% "intermediate I," 96% "intermediate II," and 90% "large" (Fig 21). The converse tends to hold with unprocessed hay: 84% "small," 46% "intermediate I," 7% "intermediate II," and 30% "large."

The following percentages of feedlot managers reported feeding protein supplements in the following forms: 66% dry only, 18% liquid only, and 16% both dry and liquid. An inverse and statistically significant relationship exists between the percentage of feedlots that feeds only

[45]No one reported feeding "pelleted" hay.

Fig 19. High moisture vs. dry grain fed to cattle, by size-of-feedlot.

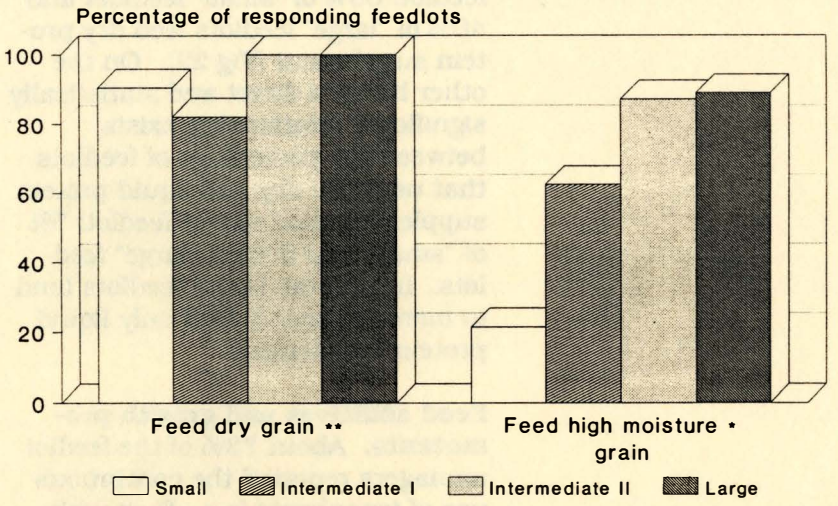



Fig 20. Form of dry grain fed to cattle, by size-of-feedlot.

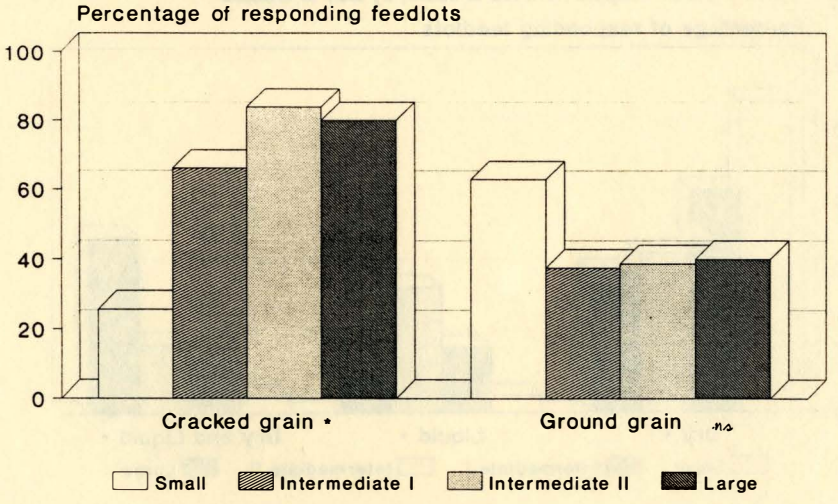
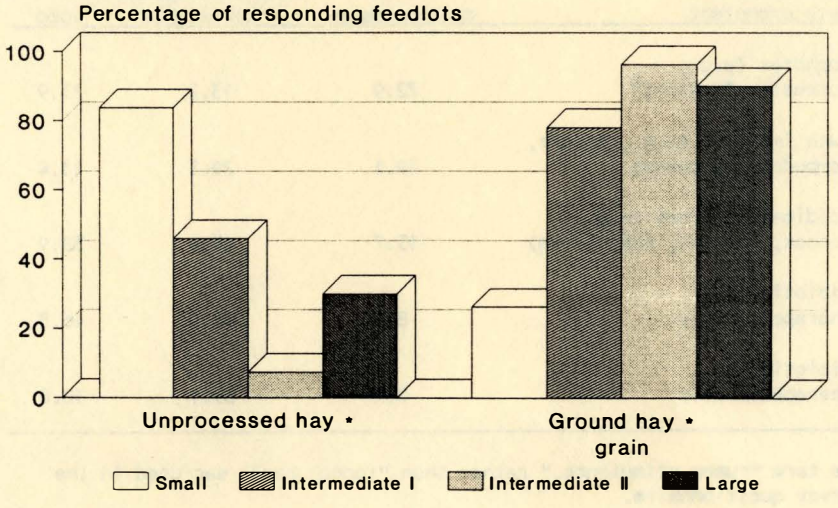



Fig 21. Form of hay fed to cattle, by size-of-feedlot.



dry protein supplement and size-of-feedlot: 88% of "small" feedlots and 40% of "large" feedlots feed dry protein supplement (Fig 22). On the other hand, a direct and statistically significant relationship exists between the percentage of feedlots that use both dry and liquid protein supplement and size-of-feedlot: 5% of "small" and 50% of "large" feedlots. In general, larger feedlots tend to more commonly feed only liquid protein supplement.

**Feed additives and growth promotants.** About 73% of the feedlot managers reported the continuous use of ionophores (e.g., Rumensin and Bovatec)[46] that alter fermentation in the rumen; 59% continuously use growth implants (e.g., Ralgro, Compudose, Synovex)[47] (Table 14). Fewer than 14% of the feedlots reported not using either ionophores or growth implants at any time.

About 45% to 69% of the feedlot managers reported using, at selected times only, each of (1) coccidiosis control (e.g., Deccox, Bovatec, Amprollium),[48] (2) antibiotics sub-therapeutically, and (3) antibiotics therapeutically. About 47% of the feedlot managers reported not using antibiotics sub-therapeutically, 39% not controlling coccidiosis, and 30% not using antibiotics therapeutically.

Incidences of usage do not differ significantly by area of the state for any of the various feed additives and growth promotants. In several cases, however, usage levels are significantly related to size-of-feedlot:

Continuous use of:
Ionophores, a direct relationship, with 53 percentage points more for "large" than "small" feedlots ($P < 0.01$); and
Growth implants, a direct relationship, with 65 percentage points more for "large" than "small" feedlots ($P < 0.01$);

Use at selected times only:
Growth implants, a generally inverse relationship, with 46% for "small," 21% for "intermediate I," 31% for "intermediate II," and 0 for "large" feedlots ($P < 0.05$); and
Antibiotics therapeutically, a direct relationship, with 43 percentage

Fig 22. Form of protein supplement fed to cattle, by size-of-feedlot.

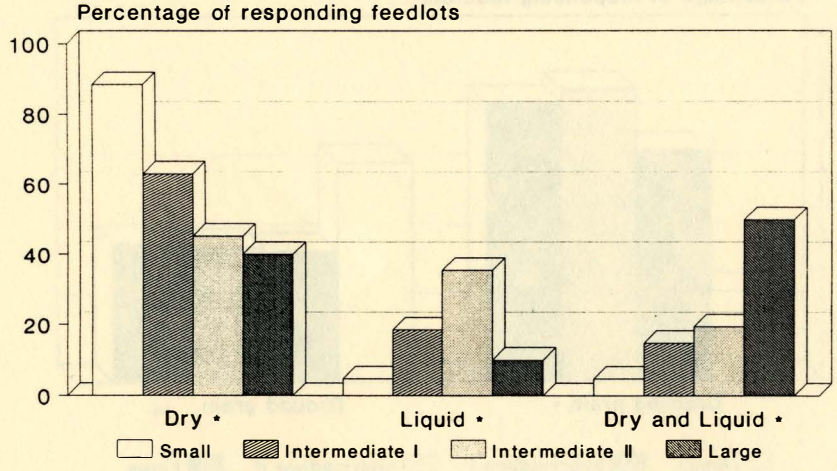



Table 14. Use of feed additives and growth promotants.

| Feed additive and growth promotant | Percent of reporting feedlots indicating feed additives and growth promotants: Used continuously | Used at selected times only | Not used |
|---|---|---|---|
| Ionophores (e.g., Rumensin, Bovatec)[a] | 72.9 | 13.2 | 13.9 |
| Growth implants (e.g., Ralgro, Compudose, Synovex) | 59.1 | 29.5 | 11.4 |
| Coccidiosis control (e.g., Deccox, Bovatec, Amprollium) | 15.7 | 45.4 | 38.9 |
| Antibiotics sub-therapeutically | 8.3 | 44.9 | 46.8 |
| Antibiotics therapeutically | 0.9 | 69.1 | 30.0 |

[a]The term "rumen stimulants," rather than "ionophores", was used in the survey questionnaire.

[46]Rumensin is a product of Elanco Products Company, Indianapolis, IN; Bovatec is a product of Roche Animal Nutrition, Nutley, NJ.

[47]Ralgro is a product of Pitman-Moore, Terre Haute, IN; Compudose is a product of Elanco; and Synovex is a product of Syntex Animal Health, West Des Moines, IA.

[48]Deccox is a product of Rhone Poulec, Atlanta, GA and Amprollium is a product of MSDAGVET-Merck, Rahway, NJ.

points more for "large" than "small" feedlots ($P < 0.01$); and

Not used:

Ionophores, an inverse relationship, with 29 percentage points more for "small" than for "intermediate II" and "large" feedlots ($P < 0.01$); and

Antibiotics therapeutically, an inverse relationship with 43 percentage points more for "small" than "large" feedlots ($P < 0.01$).

## Marketing practices in 1988[49]

### Means of selling slaughter cattle

About 55% of the slaughter cattle from the reporting feedlots go directly to the packer. The cattle are most often sold "in the beef," followed by liveweight and grade/yield.[50]

Almost as many of the reporting feedlots (51%) sell through public stockyards. About 23% sell through order buyers at the feedlot, again with "in the beef" being most common, followed by liveweight and grade/yield. About 6% of the feedlots sell at least some cattle directly to consumers.[51]

A statistically significant and inverse relationship exists between selling slaughter cattle through the public stockyards and size-of-feedlot: 71% of "small" feedlots and only 20% of "large" feedlots (Fig 23).

On the other hand, the relationship between selling slaughter cattle directly to the packer and size-of-feedlot is generally direct and statistically significant. The percentages are as follows: 23% "small," 57% "intermediate I," 87% "intermediate II," and 80% "large".[52] Except for the "small" feedlots, the relationship between selling through on-farm

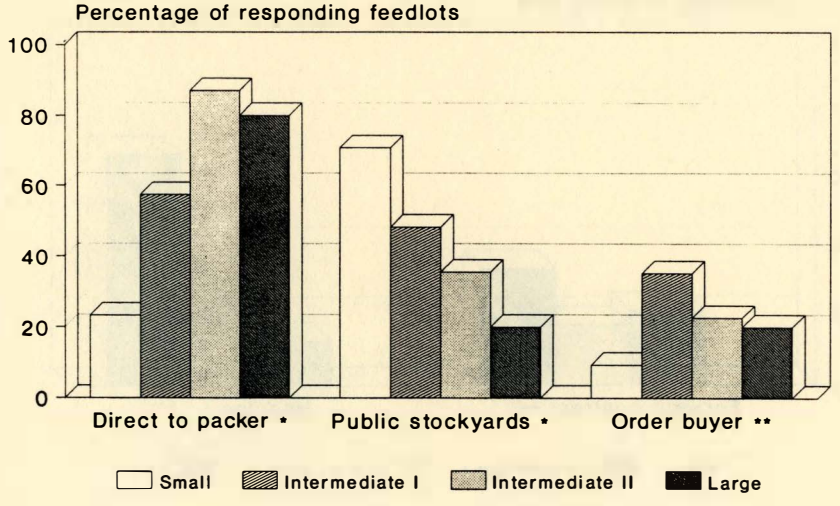
[49]For two recent insightful reviews of issues concerning U.S. beef cattle marketing, pricing, and international trade, see Ward (1988) and Johnson et al (1989).

[50]With "in the beef," a packer-buyer bids a carcass price to the feeder. No adjustments are made to accord with the actual quality and yield grades of the carcasses. With "grade and yield," on the other hand, a feeder is offered a base price for choice and Yield Grades 2 and 3 carcasses of a particular weight. Price adjustments are made for any differences in the actual carcasses in quality, yield grade, and weight from that prescribed in the offer.

[51]Gaarder (1972) reports a quite different pattern of slaughter cattle sales in South Dakota in 1970: 64% auction markets, 12% directly to packers, 12% public stockyards, and 12% farm-to-farm and other. Similar data for cattle feedlots in two other states are as follows: (a) Texas in 1980-81, 93% direct liveweight, 4% grade and carcass weight, and 3% rail or carcass weight (Dietrich et al 1985) and (b) Kansas in 1987, 88% liveweight, 9% packer contract, 2% in the beef, and 1% other (Schroeder and Blair 1989). Van Arsdall and Nelson (1983) report the following sales pattern for farmer feedlots in the Midwest in 1980: 53% direct to packer, 28% terminals, 11% country commission firm, and 8% regular auction. Johnson et al (1989) report feedlots nationally selling 90% of their cattle directly to packers, 5% through auction markets, 2% in terminal cash markets, and 4% through internal transactions (vertical integration).

[52]The extent to which direct-to-packer sales may result in higher prices received by producers is a topic for further research.

Fig 23. Means of selling fed cattle, by size-of-feedlot.



order buyers and size-of-feedlot is inverse.[53]

Slaughter cattle are sold as weighed on feedlot scales by 13% of the reporting feedlots. A direct and statistically significant relationship exists between this practice and size-of-feedlot: 5% for "small" and 60% for "large" feedlots (Fig 24). About 90% of the reporting feedlots indicated that they sell their slaughter cattle on the basis of buyers' scales.

[53]Van Arsdall and Nelson (1983) indicate the "largest" farmer feedlots in the Midwest to sell a much above-average percentage (81%) of their slaughter cattle directly to packers and those with the "fewest cattle" to extensively use terminal and auction markets.

Fig 24. Use of feedlot scales to determine sale weight, by size-of-feedlot.

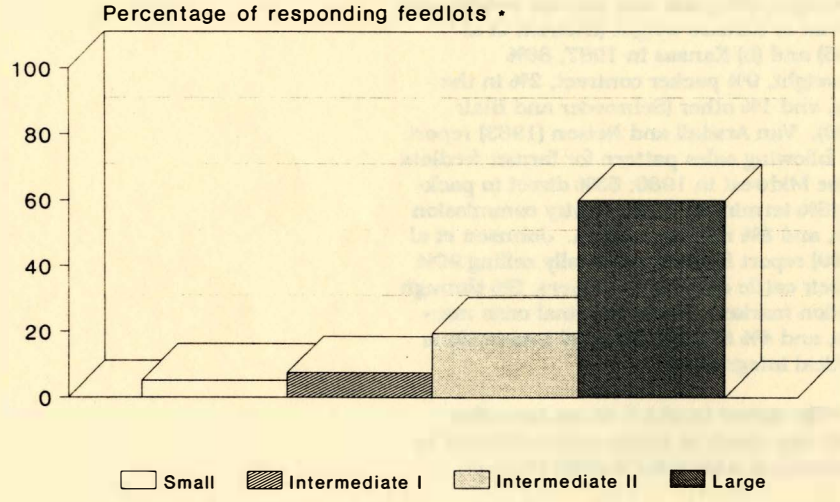
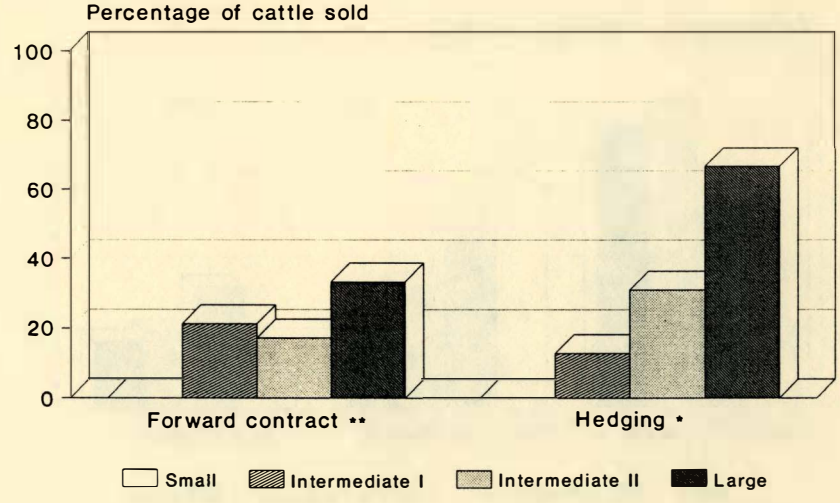



Fig 25. Tools for pricing fed cattle, by size-of-feedlot.




Fifty-three percent of those who sell slaughter cattle on the basis of feedlot scale weights indicated receiving a 3% "pencil shrink." The next most common "pencil shrink" is 4% (29% of feedlots), followed by 2% (12% of feedlots) and 3.5% (6% of feedlots).[54]

Of the reporting feedlots, 17% indicated the use of futures markets (hedging), 15% contracting for future delivery (forward contracts), and 12% the options market.[55] Only one feedlot (0.8%) sells all its slaughter cattle through any one of these means.

By far the most common situation, however, is for feedlots to make no use of these marketing tools, as illustrated by the following percentages of feedlots who sell no cattle via these means: 82% hedging, 86% forward contracting, and 91% options market.

Generally positive and statistically significant relationships exist between the use of both hedging and forward contracting and size-of-feedlot (Fig 25). For example, 67% and 33% of the "large" feedlots use hedging and forward contracts, respectively. On the other hand, no "small" feedlots use either of these tools--a likely reason being that they individually have too few cattle to fill a futures contract.

Of the 22 feedlots (15% of all feedlots) that custom feed cattle,[56] 16

[54]Schroeder and Blair (1989) report the most common pencil shrink in surveyed custom feedlots in Kansas to be 4%.

[55]In a report several years ago, Van Arsdall and Nelson (1983) report 2% of farmer feedlots in the Midwest to hedge their slaughter cattle on the futures market and 1% to forward price their cattle. Murra (personal communication, May 1990) states that our study's reported use of these marketing tools is greater than that generally in South Dakota.

[56]Far higher percentages of feedlots are reported to custom feed cattle in other states: 73% in Colorado (Madsen and Gee 1986) and 83% in Texas (Dietrich et al 1985).

reported that marketing decisions are made jointly by the feedlot manager and cattle owner. For 4 feedlots, decisions are made by the cattle owner, for 2 by the feedlot manager, and for 1 by a private consultant.

## Market destination of slaughter cattle

Of the total surveyed cattle slaughtered in 1988, 23% were sold in South Dakota, 38% to Nebraska, 25% to Minnesota, 12% to Iowa, and 2% to other states (Colorado, North Dakota, Montana).[57] Statistically significant relationships exist between size-of-feedlot and selling in South Dakota, Nebraska, and Minnesota.

The relationship for slaughter cattle sold in South Dakota is inverse, with as many as 84% cattle from "small" feedlots and as few as 15% from "large" feedlots sold in the state (Fig 26). On the other hand, the percentages of slaughter cattle sold in both Nebraska and Minnesota tend to vary directly with size-of-feedlot: 3% from "small" feedlots and 48% from "large" feedlots are sold in Nebraska.

Slightly less than 38% of the reporting feedlots sell all their slaughter cattle in South Dakota. Nearly 8% sell all their cattle in Nebraska, 6% in Iowa, and 2% in Minnesota. On the other hand, the following percentages of feedlots indicate selling no cattle in the following states: 34% South Dakota, 62% Nebraska, 66% Minnesota, and 72% Iowa.

## Sources of market information

The most common source of pricing and other market information on fed cattle is radio, with 85% of managers using this medium (Table 15). Next most common are television (54%) and newspapers (30%). Between 10% and 20% of the managers rely on each of the following: electronic communication, private consultants, newsletters, independent market agencies, and farm magazines for market information.[58]

The use of information sources varies significantly by size-of-feedlot as follows:

- A clear, inverse relationship for newspapers: 45% of "small" and no "large" feedlots rely on them;
- A generally inverse relationship for radio; and
- A clear, direct relationship for electronic communication: 2% of "small" and 70% of "large" feedlots use such electronic sources as Data Transmission Network (DTN) and Dataline (Fig 27).

[57]Gaarder (1971) reports about 70% of South Dakota's slaughter cattle in the early 1970s were slaughtered outside the state. Dietrich et al (1985), on the other hand, report over 90% of Texas-fed cattle were sold in Texas.

Of the total slaughter cattle exported from South Dakota, Clauson (1983) reports 95% going to Iowa, Minnesota, and Nebraska in 1972 and 94% in 1980. Bau (1987) reports 78% of South Dakota's cattle outshipments in 1985 went to these three states.

[58]Clauson (1983) reports the two most important sources of South Dakota producer information on marketing and purchasing cattle were radio and television, followed by sales bills/reports and local papers.

Fig 26. State in which fed cattle were sold, by size-of-feedlot.

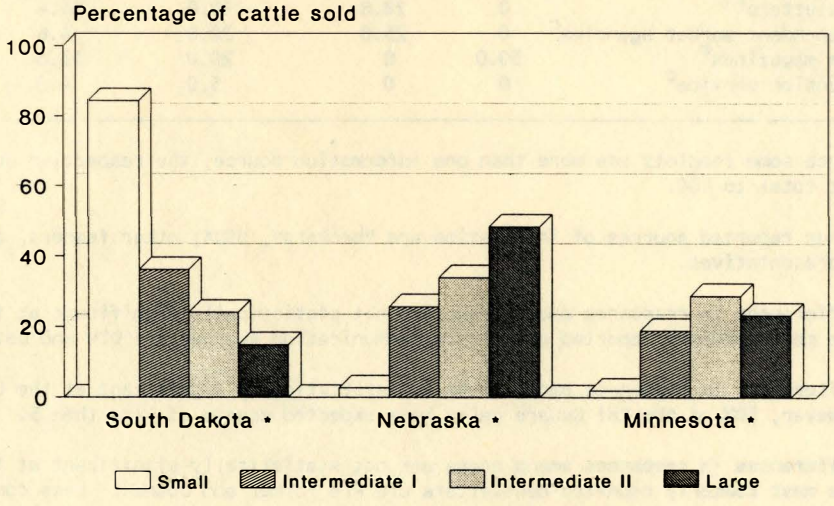


Fig 27. Sources of price and market information on cattle, by size-of-feedlot.

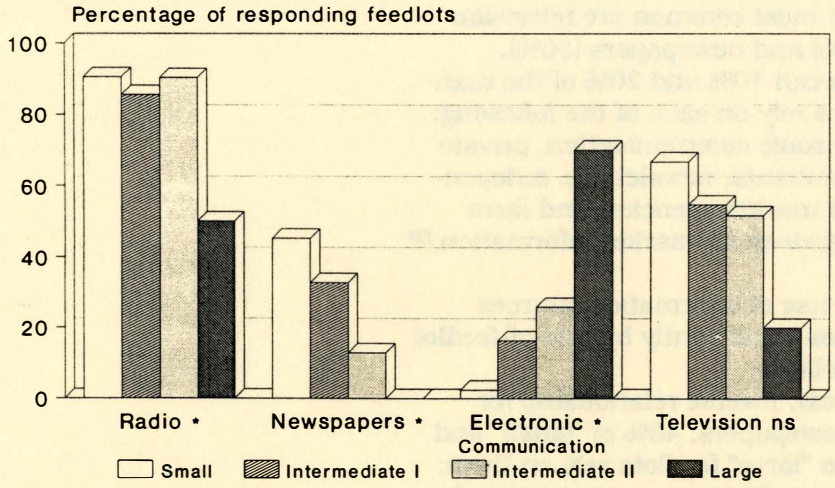
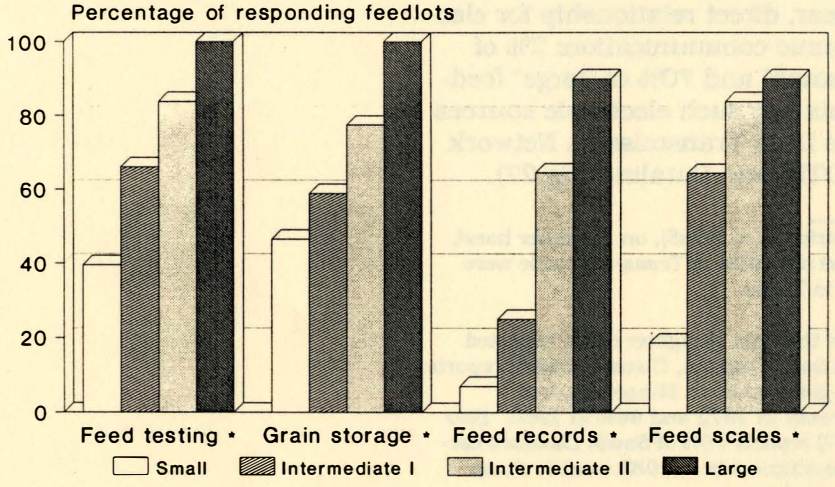



Fig 28. Selected management practices used by managers, by size-of-feedlot.




## Other feedlot management practices

The following percentages of feedlot managers indicated their use of various additional management practices:

64% test feeds for nutrient composition at least once a year;
63% have grain storage facilities to take advantage of price drops in purchased feed grains;
57% use feed scales to monitor and control feeding rates;
35% keep feed records for separate pens of cattle; and
21% check cattle weights periodically to track performance.

For all except the fifth practice, direct and statistically significant relationships exist between following the practice and size-of-feedlot (Fig 28).

Feedlot managers formulate cattle rations as follows: 68% by a feed company, 47% by the feedlot man-

Table 15. Sources of price and market information on cattle, by area in South Dakota.

| Information source | Percent of reporting feedlots, by area[a] | | | | | |
|---|---|---|---|---|---|---|
| | West | North Central | South Central | Northeast | Southeast | State[b] |
| Radio[c] | 75.0 | 87.5 | 80.0 | 77.3 | 87.7 | 84.6 |
| Television[c] | 25.0 | 43.8 | 55.0 | 36.4 | 61.7 | 53.8 |
| Newspapers[c] | 0 | 37.5 | 30.0 | 27.3 | 30.9 | 30.1 |
| Electronic communication[c] | 25.0 | 18.8 | 20.0 | 22.7 | 18.5 | 19.6 |
| Private consultants[d] | 75.0 | 18.8 | 5.0 | 22.7 | 16.1 | 17.5 |
| Newsletters[e] | 0 | 18.8 | 10.0 | 36.4 | 13.6 | 16.8 |
| Independent market agencies[c] | 0 | 25.0 | 20.0 | 4.6 | 15.9 | 15.3 |
| Farm magazines[e] | 50.0 | 0 | 20.0 | 13.6 | 9.9 | 11.9 |
| Extension service[c] | 0 | 0 | 5.0 | 4.6 | 1.2 | 2.1 |

[a]Since some feedlots use more than one information source, the respective column percentages do not total to 100.

[b]Other reported sources of information are "brokers", USDA, other feeders, and sales representatives.

[c]Differences in responses among areas are not statistically significant at the 0.05 level. The most commonly reported electronic communication sources are DTN and Dataline.

[d]Differences in responses among areas are statistically significant at the 0.05 level. However, 50% of the Chi Square cells have expected counts of less than 5.

[e]Differences in responses among areas are not statistically significant at the 0.05 level. The most commonly reported newsletters are Pro Farmer and Doanes. Less common newsletters are Cattle Fox, Kipplinger, Anca, FGL, and NCA.

ager, 5% by a private consultant, and 2% by the Extension Service. Ration formulators do not vary significantly with size-of-feedlot except for private consultants ($P < 0.05$). In this case, the relationship is direct, with no "small" feedlots, 4% of "intermediate I" feedlots, 10% of "intermediate II" feedlots, and 20% of "large" feedlots using private consultants to formulate their rations.

Slightly over 21% of the reporting feedlots indicated use of a microcomputer. Use of micros is directly and significantly related to size-of-feedlot: 4% of "small" and 56% of "large" feedlots use micros (Fig 29).

The most common use of micros (81%) is in determining feedlot production costs/profitability (Table 16). The next most common uses are for projecting cattle performance (77%), formulating rations (65%), keeping feed records (65%), and keeping weight gain records (48%).

Variation in management uses of micros among different sizes of feedlots tend to be rather limited, except for "small" feedlots that appear to make relatively more use of micros for determining production costs/profitability and formulating rations and "large" feedlots that appear to make relatively less use of micros in formulating rations.

Nearly 88% of reporting feedlots indicated hiring veterinarians. This is by far the most common outside professional service hired in connection with feedlots. Next most common, however, are consultants for ration formulation (27% of feedlots), legal/accounting matters (22%), and marketing (14%). Of the outside professional services covered in the questionnaire, the least commonly used ones are non-veterinarians for health care (6%) and consultants for overall management of the feedlot (2%).

Hiring of veterinarians does not vary significantly by size-of-feedlot. Clearly direct relationships between size-of-feedlot and the hiring of consultants for both marketing and legal/accounting matters do exist, however (Fig 30). Generally direct

Table 16. Management uses of micrcomputers.

| Management use | Percent of micro-computer-users, by size-of-feedlot, with various management uses | | | | |
|---|---|---|---|---|---|
| | Small | Intermediate I | Intermediate II | Large | State |
| Determine production costs/profitability | 100.0 | 66.7 | 80.0 | 100.0 | 80.7 |
| Project cattle performance | 50.0 | 77.8 | 80.0 | 80.0 | 77.4 |
| Formulate rations | 100.0 | 55.6 | 73.3 | 40.0 | 64.5 |
| Keep feed records | 0 | 55.6 | 73.3 | 80.0 | 64.5 |
| Keep weight gain records | 0 | 44.4 | 46.7 | 80.0 | 48.4 |
| Keep medicine/health records[b] | 0 | 11.1 | 40.0 | 80.0 | 35.5 |
| Other[c] | 0 | 11.1 | 13.3 | 40.0 | 16.1 |

[a]Since the feedlots make more than one use of microcomputers, the column percentages do not total to 100.

[b]This is the only management use of microcomputers that is significantly (0.05 level) related to size-of-feedlot.

[c]Other reported management uses of the computer are "billing", "accounting", and "hedging".

relationships exist between size-of-feedlot and hiring consultants for both ration formulation and overall management of the feedlot.

Readers are encouraged to return to the first section of the report to find the summary and conclusions.

Fig 29. Use of microcomputers as a management tool, by size-of-feedlot.

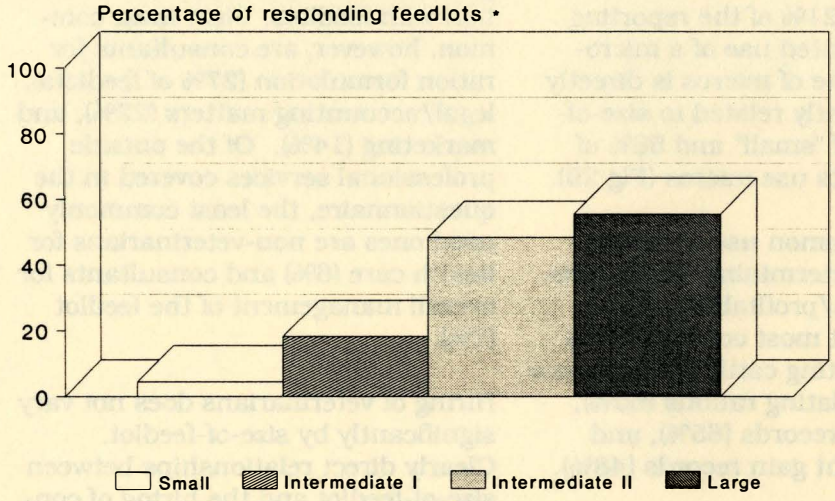
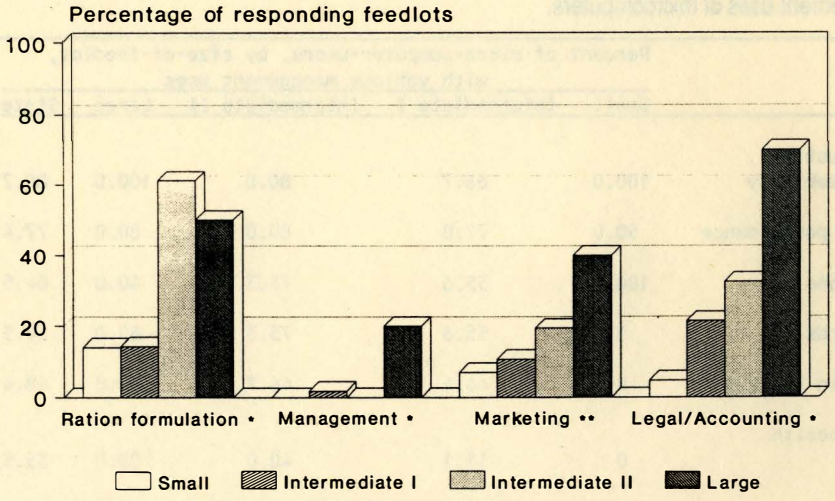



Fig 30. Use of outside consultants, by size-of-feedlot.



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Annex A

# CATTLE FEEDER SURVEY
## SOUTH DAKOTA STATE UNIVERSITY AGRICULTURAL EXPERIMENT STATION

**FEEDLOT**

1. In what **county** is your feedlot located? _____

2. Which of the following **features** are part of your **feedlot**? (please check as many as apply)

___ Confinement barn
___ Covered protection from wind and snow
___ Fence windbreak
___ Shelter-belt windbreak
___ Mounds
___ Completely paved with concrete
___ Partially paved with concrete
___ Pollution control facilities (if so, please briefly describe:_____)

3. This question concerns the **design capacity** of your **feedlot**. About how many **feet** (to the nearest 25) of **feed bunks** do you have at **100% feedlot utilization**? _____ feet. Of this total footage, how many feet are designed for feeding from:

a. **One** side (fenceline) _____ feet
b. **Two** sides (portable) _____ feet

4. On the average during each quarter of **1988**, about what **percent** of this **design capacity** was actually **used**?

_____ Jan-Mar _____ July-Sept
_____ Apr-June _____ Oct-Dec

5. How does this **1988 utilization** generally **compare** with the **typical** use of your feedlot over the past 5 years (1984-1988)? (please check one)

___ About the same
___ Lower utilization in 1988 than typically in past 5 years
___ Greater utilization in 1988 than typically in past 5 years

**FEEDER CATTLE PLACEMENT (in 1988)**

6. In 1988, approximately what percentage of the following **types** of **cattle**--by each of **age**, **gender**, and **breed**--did you **place on feed**?

a. Age
_____ Calves (<9 mo)
_____ Yearlings(10 mo-2yr)
_____ Cattle >2 yr
100%

b. Gender
_____ Steers
_____ Heifers
_____ Cows
_____ Bulls
100%

c. Breed
_____ Exotic European beef breeds/crosses
_____ English beef breeds
_____ Beef-dairy crosses
_____ Dairy
100%

7. For each of steers and heifers in 1988, approximately what percent of the **cattle placed on feed** were in the following **weight** ranges?

| Pounds | Steers | Heifers (<2 yrs) |
|---|---|---|
| up to 400 | _____ | _____ |
| 400-499 | _____ | _____ |
| 500-599 | _____ | _____ |
| 600-699 | _____ | _____ |
| 700-799 | _____ | _____ |
| 800-899 | _____ | _____ |
| over 900 | _____ | _____ |
| | 100% | 100% |

8. Approximately what percentage of the **cattle** you **placed on feed** in 1988 **originated** from each of the following places?

_____ South Dakota: raised on your own farm/ranch
_____ South Dakota: not raised on your farm/ranch

Other states (please specify which states)
_____ _____
_____ _____
_____ _____
100%

9. Approximately what percentage of the **cattle** you fed in 1988 were **placed on feed** during each of the following **quarters**?

_____ Jan-Mar _____ July-Sept
_____ Apr-June _____ Oct-Dec
100%

10. Do you use the **futures market** in buying **feeders**? ___yes ___no

11. Of the **calves** you purchased to place on feed in 1988, about what percentage was **pre-conditioned** (S.D. Green Tag Program) _____%

12. Of the **non-home raised calves** you placed on feed in 1988, about what percentage was **procured** in each of the following ways?

_____ Purchased private treaty from cow-calf producers (if any, were these cattle mixed with other cattle in your feedlot? ___ yes ___ no)

_____ Purchased at on-ranch auction
_____ Purchased through an order buyer
_____ Purchased at a sale barn
_____ Custom fed for someone else
_____ Other (please specify:_____)
100%

13. Who **owns** the **cattle** in your feedlot? (please show approximate percentages)

_____ Feedlot owner
_____ Feedlot owner in partnership with someone else
_____ Rancher(s) that raised the feeders
_____ Packer or retailer
_____ Outside investors
_____ Other (please specify:_____)
100%

**FEEDING PRACTICES**

14. For about how many **days** do you typically **feed** each of the following types of cattle? (please show "n/a" if not applicable)

_____ Steer calves _____ Heifer calves
_____ Yrlg steers _____ Yrlg heifers
_____ Cull bulls _____ Cull cows

15. To what **targeted** daily **rates** of **gain** (nearest 0.1 lb/day) and **final finishing weights** (nearest 25 lb) do you most commonly feed each of the following types of cattle (please show "n/a" if not applicable)

| | Daily rate of gain | | Finish |
|---|---|---|---|
| | Growing | Finishing | weight |
| Steers | _____ | _____ | _____ |
| Heifers | _____ | _____ | _____ |
| Cull cows | n/a | _____ | _____ |
| Cull bulls | n/a | _____ | _____ |

16. This question concerns the **types** of **feed** you most commonly feed your **growing** and **finishing** cattle. Please show below the approximate **percentages** of grain and **roughage** (rough dry matter basis) that you feed, on the average, over each of the growing and finishing periods.

| | Percentages of | | |
|---|---|---|---|
| | Grain | Roughage | Total |
| Growing period | _____ | _____ | 100% |
| Finishing period | _____ | _____ | 100% |

a. What is the form of the grain that you feed? (please check one or both) ___ Dry ___ High moisture

b. What roughages do you feed? (please check as many as apply)

___ Hay ___ Grazing pasture
___ Corn silage ___ Grazing crop residues
___ Haylage ___ Other (please specify: _____)

17. About what **percent** of each of the following types of **feed** used in your feedlot do you typically **raise on your farm** (rather than purchase it)?

_____ Dry grain _____ Corn silage
_____ High moisture grain _____ Haylage
_____ Hay

18. Of the **grains** you feed, about what **percent** is represented by each of the following grains?

_____ Corn _____ Oats
_____ Barley _____ Wheat
_____ Milo _____ Other (please specify: _____)
100%

19. In what **form(s)** is the grain that you feed your cattle? (please check as many as apply)

___ Whole kernel ___ Cracked
___ Steam flaked ___ Ground
___ Reconstituted ___ Other (please specify:_____)

20. In what **form(s)** is the hay that you feed your cattle? (please check as many as apply)

___ Unprocessed ___ Ground
___ Pelleted ___ Other (please specify:_____)

21. In what **form(s)** are the **protein supplements** that you feed your cattle (please check one or both)
___ Dry ___ Liquid

22. What **feed additives** and **growth promotants** do you generally use, and is the use **continuous** over the feeding period or at **selected times** only? (please check one blank for each additive or promotant)

| Additive or promotant | Use continuously | Use at selected times only | Not used |
|---|---|---|---|
| Antibiotics at sub-therapeutic levels | ___ | ___ | ___ |
| Antibiotics at therapeutic levels | ___ | ___ | ___ |
| Growth implants (e.g., Ralgro, Compudose, Synovex) | ___ | ___ | ___ |
| Rumen stimulants (e.g., Rumensin, Bovatec) | ___ | ___ | ___ |
| Coccidiosis control (e.g., Deccox, Bovatec, Amprollium) | ___ | ___ | ___ |
| Other (please specify: _____) | ___ | ___ | ___ |

**MARKETING PRACTICES (in 1988)**

23. By which **means** did you **sell** your **slaughter cattle** in 1988? (please check as many as apply)

Direct to packer
___ Liveweight
___ Grade and yield
___ "In the beef"

Order buyer at your farm
___ Liveweight
___ Grade and yield
___ "In the beef"

___ Public stockyards
___ Direct to consumer
___ Other (please specify:_____)

24. On **whose scales** is the sale **weight** of your **slaughter animals** determined? (please check one or both)

___ Feedlot scales (if so, what is the most common pencil shrink? ___%)
___ Buyers' scales

25. About what percentages of your slaughter cattle in 1988 were **priced** using the following **additional tools**? (please show "0" if none)

_____ Contracting for future delivery (forward contracts)
_____ Futures market (hedging)
_____ Options market
_____ Other (please specify:_____)

26. About what **percentage** of your slaughter cattle in 1988 did you **sell** in the following states?

_____ South Dakota
_____ Nebraska
_____ Iowa
_____ Minnesota

Other states (please specify which states)
_____ _____
_____ _____
100%

27. Do you **custom feed** cattle? ___ yes ___ no. If yes, who makes the **marketing decisions** on these custom fed cattle? (please check as many as apply)

___ You
___ You and cattle owner
___ Cattle owner
___ Private consultant
___ Other (please specify:_____)

28. Please check your **2** or **3** most important **sources** of pricing and other **market information** on fed cattle.

___ Radio
___ Newspapers
___ Private consultants
___ Television
___ Extension service
___ Independent market agencies
___ Farm magazines (please specify: _____)
___ Newsletters (please specify:_____)
___ Electronic communication (please specify: _____)
___ Other (please specify:_____)

**OTHER MANAGEMENT PRACTICES**

29. Please place a check before each of the practices that you follow:

___ **Feeds** are **tested** for nutrient composition at least once a year
___ Have **grain storage facilities** to take advantage of price drops in purchased feed grains
___ **Feed records** are kept for separate pens of cattle
___ **Cattle weights** are checked periodically to track performance
___ **Feed scales** are used to monitor and control feeding rates

30. **Who formulates** your **rations** ? (please check as many as apply)

___ Feedlot
___ Feed company
___ Extension service
___ Private consultant
___ Other (please specify:_____)

31. Do you use a **microcomputer** as a management tool? ___ yes ___ no. If yes, for what **purposes(s)** do you use the micro? (please check as many as apply)

___ Formulate rations
___ Keep feed records
___ Keep medicine/health records
___ Keep weight gain records
___ Project cattle performance
___ Determine production costs/profitability
___ Other (please specify:_____)

32. What types of **outside professional services** do you hire in connection with your feedlot? (please check as many as apply)

___ Veterinarians for health care
___ Other consultants for health care
___ Consultants for ration formulation
___ Consultants on marketing
___ Consultants for legal/accounting matters
___ Consultants for the overall management of the feedlot
___ Other (please specify:_____)

33. Approximately what **percentage** of the **labor** required in your feedlot operation is provided by the following sources?

_____ Family labor
_____ Hired labor
100%

**FEEDLOT MANAGER**

34. How much schooling have you completed? (please check the highest level attained)

___ Elementary School
___ High School
___ Vo Tech School
___ University Bachelors degree
___ Beyond Bachelors degree

35. Under what **type of organization** is your feedlot operated? (please check one)

___ A single-family proprietorship
___ A partnership
___ A family held corporation
___ Other (please specify:_____)

36. Approximately what **percent** of your **gross farm income** over the past five years has typically been from the sale of **slaughter cattle**? _____%

37. In 1988, what were the approximate **gross farm sales** from your farm operation? (please check one)

___ Less than $100,000
___ $100,000-$249,999
___ $250,000-$499,999
___ $500,000-$1,000,000
___ More than $1,000,000

38. What are the **sources** of **your borrowed** operating and long-term **capital** used in your feedlot? (for each type of capital, please check as many as apply)

| | Operating capital | Long-term capital |
|---|---|---|
| Farm Credit Services | ___ | ___ |
| FmHA | ___ | ___ |
| In-state commercial bank | ___ | ___ |
| Out-of-state commercial bank | ___ | ___ |
| Insurance company | ___ | ___ |
| Feed supplier | ___ | ___ |
| Packers | ___ | ___ |
| Private individuals | ___ | ___ |
| Private lender groups | ___ | ___ |
| Other (please specify:_____) | ___ | ___ |

39. Please share any specific **suggestions** that you may have concerning **extension** and **research needs** on cattle feeding.

40. **Thank you very much** for taking the time to complete this questionnaire. If you would like to receive a **copy** of the **results** of this survey, please check below and a copy will be sent to you. _____

Annex B

Procedures for computing "head-day" and "feedlot" average percentages.

Two types of averages for various feedlot characteristics and management practices were calculated: (1) "head-day" averages, in which the unit of analysis was the estimated average number of cattle on feed in each feedlot during the four quarters of 1988, and (2) "feedlot" averages, in which the unit of analysis was the individual feedlot. Procedures for calculating these two types of averages are illustrated with an example in which the average percentage of calves for two feedlot managers with assumed 80% and 60% calves (versus older cattle), respectively, is calculated.

| | *Feedlot A* | *Feedlot B* |
|---|---|---|
| Percent calves | 80 | 60 |
| Design capacity (head) | 50 | 1,000 |
| Percent utilization | | |
| Jan-Mar | 80 | 60 |
| Apr-June | 80 | 60 |
| Jul-Sept | 60 | 20 |
| Oct-Dec | 100 | 100 |

1. In computing the "head-day" average, the first step is to determine the average number of cattle on feed in each feedlot during the four quarters of 1988. For Feedlot A, the numbers of cattle during the respective quarters are 40, 40, 30, and 50, or an average of 40 for the year. For Feedlot B, the corresponding figures are 600, 600, 200, and 1,000, or an average of 600 for the year. Thus, the estimated total "average" (across quarters) number of cattle on feed in the two feedlots in 1988 is 640.

The second step in computing the "head-day" average is to determine a "weighted average" percentage of calves for the two feedlots. To do this, the respective percentages of calves in the two feedlots (80% and 60% for A and B, respectively) are weighted by the estimated average number of cattle on feed in 1988 in the respective feedlots (40 and 600 for A and B, respectively). The weighted "head-day" average percentage of calves is:

$$\frac{0.80 \times 40 \text{ head} + 0.60 \times 600 \text{ head}}{640 \text{ head in total}} = \frac{32 + 360}{640} = 0.6125 \text{ or } 61.3\%.$$

The analogous "head-day" average calculated for the 145 responding feedlots can be interpreted to represent the percent of the total surveyed cattle in South Dakota that are calves.

2. In computing the "feedlot" average, i.e., in computing an average with the individual feedlot as the unit of analysis, the average percentage of calves fed by these two feedlots is simply the average of 80% and 60%, or 70%.

The analogous "feedlot" average for the 145 responding feedlots can be interpreted as the average percentage of cattle fed in the reporting feedlots that are calves. The "feedlot" average--with equal weight to each of the surveyed feedlots--provides a picture of the average relative importance of calves in the state's individual feedlots. The "head-day" average, on the other hand, provides a picture of the relative importance of calves in the state's feedlots collectively.

The two averages are used in the report as follows. The state-level data reported in the text are "head-day" averages for all the cattle covered in the survey. The average values for the various size-of-feedlot categories (reported in the figures), on the other hand, are "feedlot" averages. By using "feedlot" averages, in which the unit of analysis is the individual feedlot, we were able to employ statistical tests to determine whether the "feedlot" averages for the feedlots comprising each of the respective size-of-feedlot categories differed significantly from one another. If "head-day" data had been used in the size-of-feedlot analysis, the testing of the statistical significance of the values for particular variables among size-of-feedlot categories would have been precluded.