Cattle - Feeding

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WHERE ARE WE GOING IN THE CATTLE FEEDING BUSINESS?

Edward Uvacek, Jr.
Department of Agricultural Economics and Sociology
Texas A&M University*
College Station, Texas

Before we can examine the future of the cattle feeding industry and try to predict what changes might occur, we must first look at where we've been in the cattle business and what the current trends are right now.

Beef and Veal Production

The production of beef and veal in the United States has been increasing at a tremendous rate. In fact, its growth is even faster than the human population increase (Figure 1). The result of this more rapid growth rate in production is the much publicized increased per capita consumption of beef. Since all the beef that we produce in the U.S. will be consumed and storage and imports are relatively minor, the per capita consumption figure is about equivalent to per capita production.

Prior to the 1930's, changes in beef and veal production were highly related to the adjustments in numbers of cattle and calves on farms. When numbers increased, beef and veal production gained at about the same magnitude. A complementary situation occurred when numbers declined. Since this period, however, the trend lines of these two series have spread further and further apart, indicating that the growth rates are radically changing. The reason for the spread in these two lines is primarily the increased amount of cattle feeding in the United States.

Cattle Feeding Industry Growth

Cattle feeding in this country has almost consistently increased each year since the 1940's, (Figure 2). The feeding industry, which back in the 1930's and 40's was relatively unimportant, has now reached fantastic proportions. Nowhere in the U.S. has this rapid growth of cattle feeding been more spectacular than here in the Southwest. Of course, the emphasis upon cattle feeding in this area has been caused by a number of economic factors, but probably the foremost consideration has been the increased demand for higher quality beef in the region.[1]

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* Livestock Marketing Specialist and Assistant Professor.

[1] Much of this material is taken from : Uvacek, Edward, Economic Trends of Texas Cattle Feeding, Texas Agricultural Experiment Station, B-1055, College Station, Texas 1966.

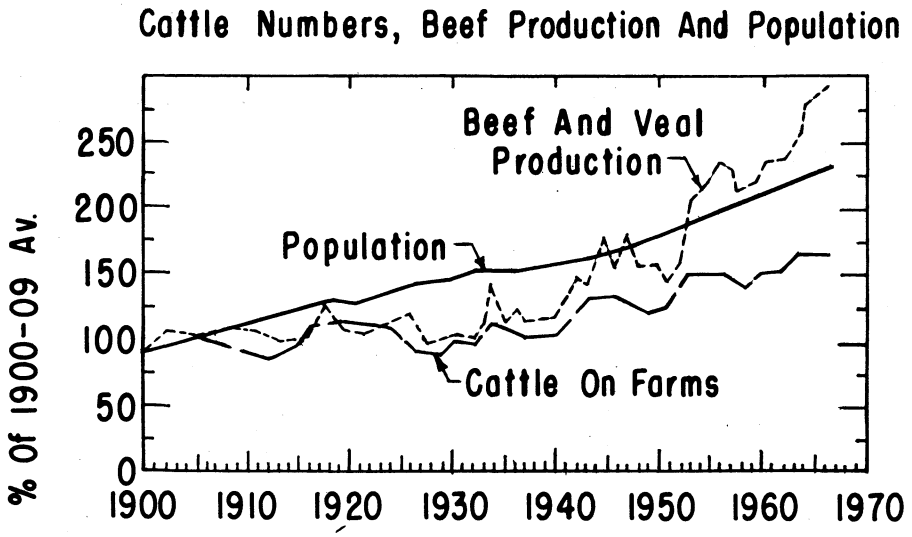

Figure 1

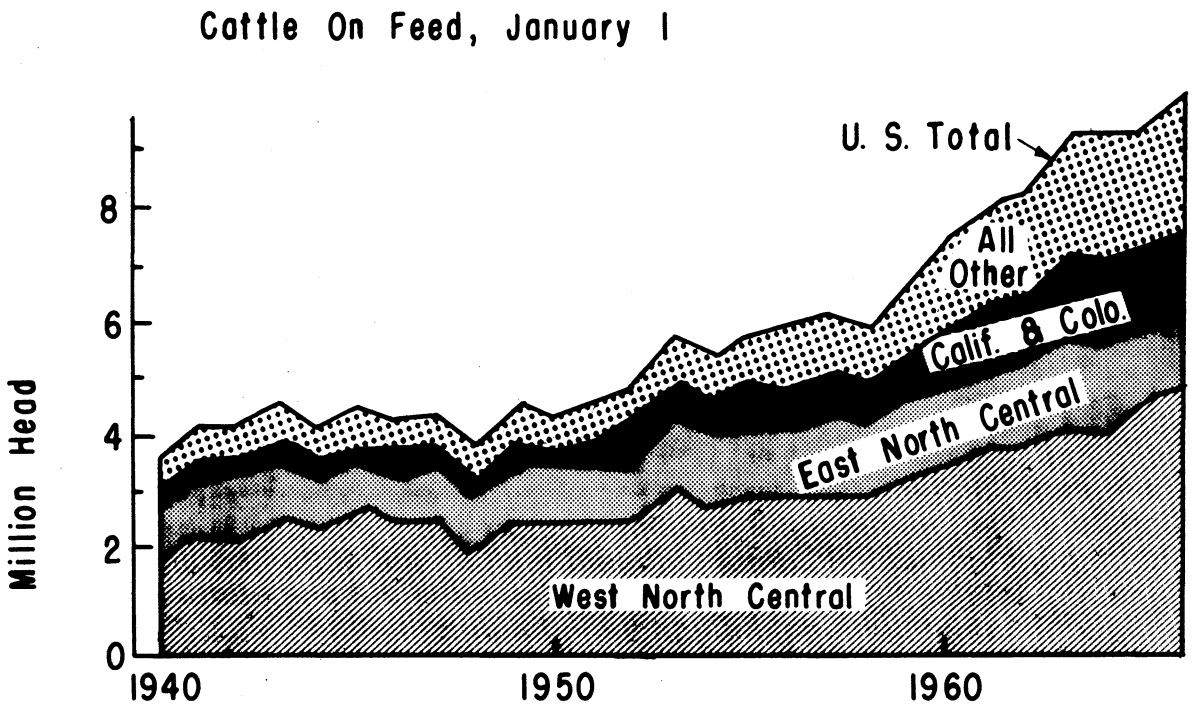

Figure 2

The reliance of the large retail chains upon rigid buying specifications for higher quality beef forced packers to seek new supply sources of these types. The immediate effect was, of course, an increase in the price level for such animals with the result that this, in turn, stimulated the production of higher quality beef through the feeding of cattle.

Even though the Western North Central region of the nation still leads in the proportion of numbers of cattle fed, the most spectacular gains have been registered in the Southwestern states and along the Pacific Coast. For example, Texas feedlot marketings of cattle and calves in 1966 were about 400 percent above the 1958 level. Here in Oklahoma, you folks have increased about 163 percent during the same period. In 1958, Texas ranked as the 13th most important cattle feeding state, now it ranks 4th. Oklahoma, back in 1958, was in 22nd position; right now, it is 15th.

These phenomenal growths are typical of the type of expansion we have experienced in the cattle feeding industry in the Southwest. Not only has our growth rate been different than the rest of the nation, but so has the type of our feeding enterprises. Unlike the cattle feeding operations of the midwest, although the trend is now somewhat in the same direction even in those areas, southwestern cattle feeding is fairly well concentrated in the larger type commercial operations. In 1963, over 92 percent of all the cattle that were on feed as of the first of the year in the combined states of Oklahoma, Texas, New Mexico, Arizona, Nevada, and California, were in feedlots of a thousand or more head capacity. Here in Oklahoma, on January 1, 1966, you had 1753 feedlots, of which 1700 had capacities of less than 1000 head. The 53 feedlots with 1000 head and more capacity, however, accounted for 75 percent of the cattle fed in the state. Down in Texas, the larger feedlots are responsible for about 88 percent of the total number fed.

Integration

Now let's briefly look at who is actually doing the cattle feeding in the Southwest. Recent publicity would have us believe that there is a high degree of integration in the cattle feeding industry among packers and retail food chains. Yet, Packers and Stockyards Division records indicate that only about seven percent of the fed cattle marketings in the U.S. can be traced to the integrated units of packers (Table 1).

About 70 percent of all the packer feeding of cattle in this country is accomplished in the states of California, Texas, Washington, Kansas, Arizona, Nebraska and Colorado. Heavy feeding by packers seems to be the general rule for most of the western cattle feeding states while the midwestern states have only a very small proportion of packer feeding.

Integration in the cattle feeding industry will probably continue to gain in popularity--that is providing no legislation is enacted that will prevent it. The emphasis in the future may not be, however, by meat packers, or retailers, but rather by feed manufacturers and livestock producers through custom feeding arrangements.

TABLE 1. CATTLE AND CALVES FED BY MEAT PACKERS[1]

States	1963 Fed By Packers	1963 Total Fed Marketing	1963 Percent Fed By Packers	1964 Fed By Packers	1964 Total Fed Marketing	1964 Percent Fed By Packers	1965 Fed By Packers	1965 Total Fed Marketing	1965 Percent Fed By Packers
	----1000 Head----		%	----1000 Head----		%	----1000 Head----		%
North Central									
Ohio	7.1	297	2.4	5.8	293	2.0	6.1	289	2.1
Indiana	[2]	315	---	7.1	366	1.9	6.3	342	1.8
Illinois	8.6	1,245	.7	8.5	1,240	.7	11.4	1,160	1.0
Minnesota	10.4	626	1.7	12.4	703	1.8	11.8	649	1.8
Iowa	8.0	2,862	.3	15.8	2,969	.5	19.8	3,013	.7
Missouri	16.7	415	4.0	13.4	496	2.7	17.6	476	3.7
North Dakota	9.0	189	4.8	16.6	222	7.5	16.8	188	8.9
South Dakota	11.2	446	2.5	13.4	591	2.3	16.0	556	2.9
Nebraska	55.9	2,012	2.8	66.6	2,436	2.7	72.3	2,438	3.0
Kansas	59.3	617	9.6	64.9	686	9.5	85.1	635	13.4
South									
North Carolina	15.6	[3]	---	12.1	[3]	---	8.7	[3]	---
Georgia	11.1	97	11.4	7.6	126	6.0	9.1	139	6.5
Florida	16.9	[3]	---	30.6	121	25.3	38.9	146	26.6
Kentucky	11.3	[3]	---	10.1	93	10.9	6.3	90	7.0
Tennessee	[2]	[3]	---	6.0	66	9.1	11.3	51	22.2
Alabama	12.9	58	22.2	7.7	56	13.8	[2]	71	3.5
Mississippi	5.2	[3]	---	6.5	45	14.4	11.4	64	17.8
Oklahoma	23.8	216	11.0	27.5	270	10.2	29.4	300	9.8
Texas	187.2	896	20.9	160.0	971	16.5	175.1	1,094	16.0
Western									
Montana	15.6	100	15.6	16.4	128	12.8	12.9	141	9.1
Idaho	73.9	233	31.7	55.6	251	22.2	39.0	272	14.3
Colorado	64.5	900	7.2	52.0	945	5.5	67.5	1,144	5.9
New Mexico	32.4	145	22.3	27.4	166	16.5	29.6	173	17.1
Arizona	75.7	608	12.5	65.7	597	11.0	81.9	650	12.6
Utah	19.8	114	17.4	18.6	131	14.2	17.1	125	13.7
Nevada	[2]	30	---	5.0	35	14.3	6.8	50	13.6
Washington	78.5	267	29.4	110.1	290	38.0	106.2	306	34.7
Oregon	5.9	135	4.4	6.2	147	4.2	7.9	167	4.7
California	273.4	1,899	14.4	217.3	2,061	10.5	310.3	2,282	12.2
Hawaii	8.9	[3]	---	16.0	[3]	---	[2]	[3]	---
30 States	1,118.8			1,082.9			1,232.6		
Others	57.0			43.9			58.8		
TOTAL	1,175.8	15,830	7.4	1,126.8	17,295	6.5	1,291.4	17,850	7.2

[1] By or for meat packers. Data summarized from annual reports of packers filed with Packers & Stockyards Division, Agricultural Marketing Service, USDA, July 1964.

[2] Fewer than 5,000 head

[3] Data not available

Many of the newer selling techniques that are used today, such as grade and yield and grade and weight, are actually considered by some as being a form of integration in themselves. The total number of cattle and calves bought by packers this way has increased three-fold in the last four years. These purchasing methods, however, are often criticized because they do not involve the usuall coveted concept of a large number of buyers and sellers on the same market, on the same day, and at the same place. Since the competitive picture presented is somewhat different, these methods of selling are often times regarded as bad. Yet, these pricing techniques are probably even more effective in accomplishing their own ultimate goal of communication between the producer and the processor. A carcass that does not quite reach the grade or is not proper weight, is immediately priced accordingly and this price paid to the feeder. In turn, the feedlot can make rapid adjustments to obtain different grades or higher dressing percentages, either by adjustments in feeding or purchasing different types of feeder animals. This doesn't mean that the normal pricing system of live cattle is ineffective, but since it involves a tremendous amount of estimating and averaging, the conglomerate result is very difficult to interpret. Each factor--grade, weight, cutability, dressing percentage, within grade quality, breed and even type of buyer--affects the final value of an animal. However, all these factors must be expressed together in one common term--a price. Is there any wonder why there may be some misinterpretation or lack of communication in the system?

Beef Grading

The federal grading system for livestock was set up so that a more effective means of market news price and volume information could be disseminated and to facilitate comparisons between different areas of the country. It originally served as a sort of universal terminology. In the modern cattle business, however, the connotation of grading has a much different significance. Higher grades of beef are normally accepted as meaning a higher value. It's doubtful, for example, that the average cattle producer realizes that a USDA Standard grade beef carcass can actually sell for a higher price than a USDA Choice carcass, at the same market on the same day. This is, however, quite common in many areas of the country.

About half of all the beef sold today is federally graded. With such a large proportion in this category, the livestock and meat industry naturally relies heavily on these grade names in the trading and sale of beef. Because of this dependence, the grade standards for beef have been changed four times since their initiation in order to conform to the up-to-date needs of the industry. Three of these changes have occurred since 1950.

The grading system we have right now uses the typical standards of the earlier grading specifications on quality and conformation to determine the official grade of the carcass, with some changes in maturity and finish. In addition, and probably more significant than these other revisions was the adoption of a voluntary "cutability" or "yield" grade system. Yield differences, percent of trimmed retail cuts from the carcass, can be predicted by using only four physical indications of the carcass. Now don't confuse this with the "dual grading system" that was tried for one year starting in July 1962. It had a separate quality and cutability grade for each carcass, each based upon different characteristics and conformation was considered by neither. The new system provides for two separate grades, but overlaps in the determination of each. For example, the Choice grade designation is dependent upon the age, finish, marbling, and conformation of the carcass. The "yield" grade (1 through 5) is determined by thickness over ribeye, percent of kidney fat, area of ribeye, and carcass weight.

There are several things about this new grading system that particularly disturb me: (1) the indirect approach used to implement it, (2) the lack of sufficient notification about the change to the industry, (3) the feasibility of physical conflicts in the two sets of standards, and (4) the lack of any research to determine the economic effects of such a grading system upon the cattle and beef pricing system.

Let's examine this last point for just a second. A USDA publication dealing with carcass evaluation developed a method to combine the "quality" and "cutability" factors into a single index to describe the value of the carcass. Using the oversimplified assumption that each higher one-third of a grade has an equivalent higher value, a quality value was assigned to each of ten typical carcasses. The cutability percentage was used directly as a value indicator. The basic price relationship computed from average price spreads, was combined into an index by the USDA that implies a two percent change in cutability has approximately the same affect on value as a change in one full USDA grade in carcass quality. Stated in terms of a one-third quality grade the index becomes:

$$I = \frac{\text{Cutability}}{2} + \frac{\text{Quality Grade}}{3}$$

Even though the assumptions lack much, the results are still quite revealing. The rank in value for the separate carcasses, evaluating both their cutability and their quality, gives the highest value to average Prime with low Choice and low Good next.

We went a little further in this analysis, and used a slightly different weighting for the within grade quality, in line with an earlier study on beef pricing in California. This study showed that the affects of changes in one-third grade quality had very little influence on the wholesale price levels within the Choice grade, but that this price-quality relationship was of foremost importance in the USDA Good grade carcasses. Table 2 shows the original numerical weightings used in the USDA report and those we can develop from the pricing study.

Table 2. Numerical Values of One-Third Grade Qualities

Carcass Grade	Original Numerical Values[1]	Adjusted Numerical Values[2]
High Prime	52	50.75
Average Prime	51	50.60
Low Prime	50	50.45
High Choice	49	50.30
Average Choice	48	50.15
Low Choice	47	50.00
High Good	46	49.00
Average Good	45	48.00
Low Good	44	47.00
High Standard	43	46.00
Average Standard	42	45.00
Low Standard	41	44.00

[1] Gregory, Keith E. Beef Cattle Breeding, Agricultural Information Bulletin No. 286, USDA, September 1964, pp. 30-31.

[2] Based upon regressions developed in Williams and Uvacek, Pricing and Competition of Beef in Los Angeles, USDA Mktg. Res. Rpt. No. 413, 1960.

Table 3. Carcass Value (Based on Index of Within Grade Quality and Cutability)

Rank in Value	Original Ranking[1]	Adjusted Ranking[2]
1	Average Prime	Low Choice
2	Low Choice	Low Good
3	Low Good	Average Good
4	Average Good	Average Prime
5	Average Choice	Average Choice
6	Low Prime	Low Prime
7	Average Choice	Average Choice
8	High Good	High Good
9	High Choice	High Good
10	High Good	High Choice

[1] Gregory, Keith E. Beef Cattle Breeding, Agricultural Information Bulletin No. 286, USDA, September 1964, pp. 30-31.

[2] Using price-quality regressions developed in Williams, Willard F. and Uvacek, Edward. Pricing and Competition on Beef in Los Angeles, USDA Marketing Research Report No. 413, 1960, pp. 79-80.

By thus combining these two studies and using this index, it was found that using different weights for the quality characteristic in the higher grades than in the lower ones, alters the values of some carcasses so that the lower grades rank even higher. These adjusted beef carcass rankings are not too different than in the original study but they do further emphasize the high value of low Choice carcass (Table 3).

This high rank in value for the low Choice carcass is somewhat substantiated by the obvious strong trade demand for these type carcasses in the meat trade. Of course, in today's market the word "Choice" itself has some merchandising ability, and this is reflected in the demand for these carcasses. In our ranking, lower thirds within a grade probably received a greater value because of their higher cutabilities or yields.

Now comes the big problem. How can we re-educate the producer in light of this new information? For 38 years we have tried to teach him that the Prime grade carcass is the thing to produce because this will net him maximum dollars.. Now, how do we convince him that the lower grade carcasses can be even more valuable? The answer is, of course, more effective and meaningful price information--the old communication problem. But, as we pointed out before, communication is a tough area to cope with, especially when so many factors have to be averaged into just one price.

Feeder Grades

As most feedlot operators know, there has always been an opportunity to squeeze extra profits from his operations by "upgrading" some feeder animals. In other words, he took a so-called lower grade calf and fed him to be a higher quality slaughter animal. Southwestern feedlots have been accomplishing this upgrading for several years. As a consequence, they have demanded the crossbred type calves while the "higher" quality calves moved to the Corn Belt area of the country for feeding. Recent research accomplished at universities in Iowa and Colorado have confirmed that this upgrading is both possible and profitable in the northern feeding areas (Figure 3).

In the past, there has been price discounts for the "lower-quality" crossbred type calves. It is anticipated that as the midwest cattle feeders become more exposed to the results of this and similar research, the demand for the old "higher" quality calves will decrease somewhat, while demands for those animals that can be upgraded, will be strengthened. The final result of this shift in emphasis will probably be resolved by a moving together of price levels between these different quality calves. Discounts and premiums could disappear entirely or even possibly reverse themselves.

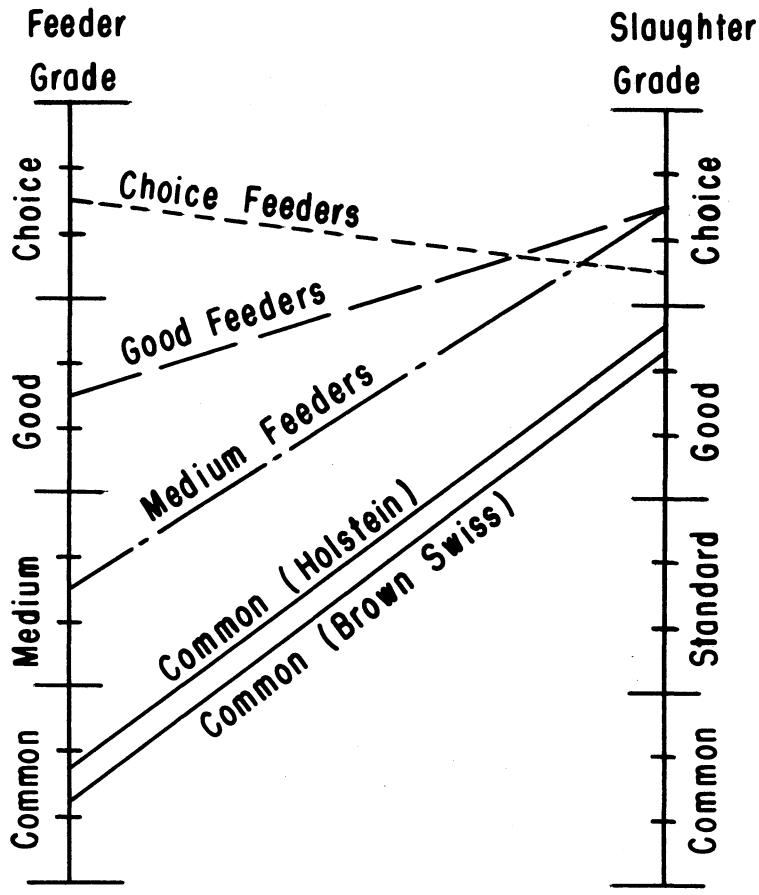

Figure 3. Changes from feeder cattle grade to slaughter grade during a 160-day finishing period. Source: Feedlot performance, slaughter grades and financial returns from different grades of yearling feeder cattle fed a full feed of corn for 160 days. Iowa Exp. Sta.

A major change has occured in the federal grading system for feeder cattle, however, that will affect this adjustment. Under the previous unofficial, but universally used grade classifications, the physical condition of the feeder calf determined the grade. Effective September 25, 1965, the U.S. Department of Agriculture adopted an official set of standards for seven grades of feeder cattle. These new grades are determined by an evaluation of the factors which indicate the feeder animal's potential slaughter grade after a thrifty feeding period. This could represent an important departure from the previously used grade names. Since grade classifications are now based upon the final attainable carcass grade, the old upgrading concept should not be theoretically possible anymore.

This means then that any feeder that can reach the grade of Choice or Good should be classified as such. Of course, practically any animal will grade at least Good. This probably indicates that the new grades are too wide and that some within grade standards may be required in order for efficient pricing of calves to develop. So some changes are probably due in these federal grades for feeders.

Market Demands

Let's now turn directly to the future. The market demands will continue to dictate the types and classes of cattle to be produced in the years to come. We have seen, particularly here in the Southwest, a shift toward a heavier weight slaughter calf, so much so, that the distinction between beef and calf is becoming very difficult. Yet, at the same time, the shifts in some areas of the country have been toward a lighter weight heavy beef carcass because of the higher cutability of these types. Both of these trends are, however, for Good and Choice grade carcasses with minimum amount of fat. It could very well be that tomorrow's modern type of beef carcass is somewhere in between these two concepts.

Efficient Cattle

In the past, feed grains have always been in surplus, so that the trend has been to feed as much of the grain through the animal in order to obtain higher profits. The picture now, however, has almost reversed itself, and we can possibly even see some feed grain shortages developing in the future. This means that the emphasis will shift from marketing grain through the animal, to obtaining the most efficient type of animal to feed. The type of animal that is efficient in the feedlot, and the type of animal that produces the most desirable type carcass at the least cost. This will be the meat-type steer. It may not belong to any particular breed, color, creed, or type of beef animal known today. It might very well be the mixture, the "Okies," the crossbreds, even the dairy breed mixes, the animals that are today considered the mavericks in the cattle business. More than likely it will be just beef--with no Utopia breed solving all the problems.

This industry trend toward a goal of a light weight low Choice carcass, will probably not depend upon the color of the hide, just as long as the carcass conforms with the standards that are required to obtain the desired federal grades. Recognition of this goal and a break with some past traditions, should lessen much of the confusion in the industry about types of cattle to raise or feed. This might not, however, be too palatable to the modern part-time cattleman's concept of having some good-looking cattle out in the backyard. To him good-looking cattle, rather than a productive unit, are a goal.

Feeding Profits

An examination of price spreads between feeder and fat slaughter steers shows that the seasonal price level and feeding margins move in the same direction. In other words, when steer prices are high--margins are wide. We can illustrate this concept by merely reversing the situation, and examining the profit obtainable from feeding when a zero price spread is assumed, (Table 4).

Table 4. Cattle Feeding Profits versus Market Price Level[1]

Price paid for feeder (dollars)	Cost of gain[2] Cents/Pound	Selling price for fat animal[3] (dollars)	Profit per head (dollars)
35.00	.22	35.00	52.00
30.00	.22	30.00	32.00
25.00	.22	25.00	12.00
22.00	.22	22.00	break-even
20.00	.22	20.00	-8.00
15.00	.22	15.00	-28.00

[1] A 600 pound feeder calf fed and sold as a 1000 pound slaughter steer. (400 pound gain in lot).

[2] Total cost of gain of 400 pounds at 22 cents per pound = $88.00, includes all costs of feed, labor, and facilities on a per pound basis.

[3] The difference between the feeder price and the fat animal price is zero. (price spread = 0) Therefore, selling price is same as price paid for feeder.

This cost-price relationship indicates that as the general market price level for cattle moves down, the profit per head in feeding such animals also becomes less. Profits are reduced until the break-even point is reached. Potentials for profits, therefore, increase when prices are rising and decrease when they are falling. This same idea also works within a year. The high seasonal prices yield more substantial margins and vice-versa.

A further understanding of the seasonal opportunities in the feeding margins and the hedging ability of cattle futures trading, will tend to increase cattle feeding during certain periods of the year and should help reduce the risk involved in the industry. Until marketings of feeder animals become more evenly distributed throughout the year, the bunching of shipments will tend to stimulate the development of growing-type feeding operations in the area. These programs are aimed at promoting growth on calves by feeding fairly high concentrated rations, and at the same time allowing the animal to become accustomed to confined feeding facilities. Such enterprises can put weight on calves at extremely low costs of gain and thus become an additional competitor for cow-calf and stocker grazing operations.

Structural adjustments are coming rapidly in the meat marketing industry and these, in turn, are affecting the cattle feeding business. The large commercial feeding enterprise seems to be the direction that we are heading. Larger numbers and larger lots. It's doubtful, however, that the rapid growth rate of the past can be continued.

Increased emphasis will probably be placed upon the feeding of slaughter calves in the Texas and Oklahoma area. Tremendous demands exist for this type of fed animal in the Gulf Coast states. This should add considerably to their profit potentials and thus timulate production. At the same time increased demand for heavy beef in the South will continue to add incentives to the feeding of heavy beef cattle.

Cattle feeding in each section of the country and even within the states, will become more oriented to the market demands of that area. As a consequence, some severe adjustments in both types and classes of cattle and calves being fed will probably result.

Carcass weight, and therefore, cattle weights, which have long been utilized as a pricing factor will receive additional emphasis now that it is included in the new cutability grade standards. Increased emphasis should be forthcoming, not on particular breeds, but rather on yields and the ability to reach the Choice grade at a light weight.

It may not be too surprising to see more herds designed specifically to produce a meat-type animal--leaving the job of producing replacement animals for such "meat-type" herds to a completely different unit. These meat production herds may rely substantially upon crossbreds with higher vigor, and considerable dairy blood for increased milking ability.

Present utilization of capacities of large feedlots indicates that considerable expansion of number on feed can occur without the construction of additional facilities. This might mean that although shifts in locations, types, and classes may result, there will be little change in the number of large feeding enterprises in the area.

The changes and expected trends which I have discussed are merely those which can be observed by a researcher and educator. But these forecasts of things to come will not change the industry. You gentlemen are the ones who will actually cause these adjustments.

BEEF -- CONSUMER BOUND

Cecil O. Emrich, Chairman
National Live Stock and Meat Board
Chicago, Illinois

Oklahoma has a tight interrelationship with the Meat Board's program of meat research, education, information and promotion. Not only are you good supporters of the program...you play a role in planning and administering the program. I'm sure you are aware that the immediate past president of the Oklahoma Cattlemen's Association, Bill Brannan, is a member of the Beef Industry Council of the Board. J. B. Smith of Pawhuska is a member of the Board's directorate, representing the American National Cattlemen's Association -- and also serves on the Beef Industry Council -- while Mrs. J. B. Smith served for three years as vice-chairman of the Beef Industry Council. All three have been hard-working supporters of the beef promotion activities...and in this I believe they are typical of Oklahoma cattle people.

It is fitting that Oklahoma should be well-represented on the Board and its Beef Industry Council since this is one of the most important cattle-producing states in the nation. This is well-attested to by the fact that your state ranks second only to Texas in beef cow numbers.

An indication of this state's enthusiastic interest in meat promotion is the fact that substantial funds have been contributed directly to the Board by individual members of the Oklahoma cattlemen's Association ...funds contributed on the basis of cattle marketed on which no Meat Board deductions had been made at the time of marketing.

The Board has always been closely associated with Oklahoma State University -- especially in projects related to OSU's highly-respected meat science program.

And certainly in no state does the Board have a more congenial relationship with the agricultural press and radio and television farm broadcasters than in the state of Oklahoma.

Like other major agricultural organizations the Board's staff is well-represented by Oklahomans -- our Secretary-General Manager, Carl F. Neumann certainly is a well-known native of your state...and in our Industry Relations Department we have Oklahomans Glenn Thrasher and John Robinson.

I have dwelt on these Oklahoma-Meat Board connections because I think it important that you know we are aware of your cooperation and appreciate it...and also as evidence that the Board is not some distant, intangible thing way up there in Chicago, with no direct relationship to you and your business.

The Meat Board is people, many of them from your part of the country; people who are familiar with the promise, the problems and the philosophy of the cattle industry in this part of the country. In other words, the Board is close to home -- working for you. It is YOUR organization.

The Board endeavors to do a thorough-going job of building and maintaining consumer demand for the products of the livestock and meat industry. The Board's meat research, which has identified meat's unquestioned value in the human diet; the Board's food page services -- many now in color -- which daily spotlight meat menus and ideas in newspapers from coast-to-coast; its literature which helps teachers, students, homemakers, physicians and others with correct information on meat; the visual aids, exhibits, demonstrations, cooking schools, television and radio shows conducted by the Board -- these and many other services and facilities have a direct and favorable influence on the market for meat products.

Keeping step with changes in the industry, the Board's program has been expanded to include separate promotion units for beef, pork, lamb and sausage in addition to the traditional program for "all-meat" -- which itself has been greatly modernized.

A major recent development in this program is the initiation of a nation-wide market research study, in order to learn more about consumer attitudes toward meat.

The program of the National Live Stock and Meat Board is an insurance policy on the future of the livestock and meat business, and is so regarded by those members of the industry who, through the years, have supported this program...producers, marketing agencies, meat packers, retailers and restaurateurs.

In thse days of housewife boycotts and seeming consumer resistance to so-called high food prices, the general public's image of the livestock and meat industry and its products becomes doubly important.

Fortunately much has been done and continues to be done to implant a favorable image in the consumer's mind of meat and the industry which produces meat.

The recent furor about food prices points up the need for the livestock and meat industry to broaden its support of and participation in nation-wide programs of consumer education and information as carried out through the National Live Stock and Meat Board. It also points up the need for continuing the intensive meat merchandising and promotion efforts of the Board.

From all indications, consumers do not regard people in the livestock and meat industry as the "culprits" in the overly-publicized food price situation. One reason for this could be the feeling among many consumers that this industry has a genuine concern for the nutritional health and welfare of the general public; that it goes beyond promoting the sale of meat. Along with leading medical and nutrition organizations, it promotes a safe and sound total diet for people in all ages and circumstances. This industry -- through its own service organization -- not only protects itself from misleading or unfounded charges against meat ...it also makes a sincere effort to educate the general public on the dangers of unsound nutritional practices and recommendations.

The program of the Board is your investment in the future of your industry and your own operation. And an investment is made to gain dividends. Your investment in the Board's program pays dividends in these ways:

It builds consumer demand for meat; it strengthens the market for your livestock; it protects the favorable public image of your product, beef; and it informs consumers of the importance of your industry, the livestock industry. These are the direct benefits he receives from the Meat Board's nation-wide program of meat research, education, information and promotion.

It has been estimated that every dollar spent in the Meat Board's program reaps $7.00 in promotional benefits to the industry.

With some 32 billion pounds of meat...of which 18 ½ billion pounds is beef...being produced annually, it becomes readily apparent that the future of livestock and meat prices depends in large part on consumer attitudes toward; acceptance of; and demand for meat products.

Who should care more than the cattleman himself about this industry and the product it produces...beef? Who else has labor, capital and management on the line and is as dependent on the millions of meal decisions made daily affecting the cattleman's pocketbook? The changes in marketing and retailing and the changes in where people live and work have a direct bearing on the cattleman's operation.

Funds spent on meat promotion, therefore, DO represent a very real investment on the part of producers and feeders, just as expenditures for fences, buildings and equipment are investments in their livestock operations.

We have shown we can efficiently produce improved, meat-type livestock. To make such efforts worth our while, we must also concentrate on building and improving a favorable public image of our product.

The livestock and meat industry is generally recognized as a diverse industry covering varied groups and segments with many different functions and viewpoints. This means that frequently -- though we're all in the same total industry -- we see things from not the same vantage points.

We may be interested in the same program or project as people in other segments of the industry, but each of us may see it from a different angle. In other words, programs with the same goals may be launched from many different launching pads.

This is not bad. Even in the field of meat promotion, where the objectives are to the mutual advantage of everyone in every segment of the industry, we don't want to discourage the competitive aspects between those different segments and within specific branches of the industry.

At the same time, we don't want those competitive factors to cloud the issue of meat promotion.

It is here that the divergent groups within the meat industry must look beyond their own areas of specialization and concentrate on the consumer...because it is the consumer's decision to buy or not to buy that represents the difference between a strong and a weak market.

There is no doubt that a large number of people in the business of producing red meat recognize the importance of promotion. For a great many years they have expressed their interest and enthusiasm through their national, regional and state organizations. Unfortunately, in many cases the promotional programs have been launched from a high point of enthusiasm only to flounder after a while. Too often these programs have bogged down because the ultimate objective has been lost in a mire of inter-industry conflict...of intense competition between groups and individuals for identification with the program. The programs of promotion...in these instances...inevitably become ineffective when the desire to perpetuate the identity of the sponsoring groups or individuals becomes more important than the program itself. This kind of thing happens not because anyone wants it to but because we are all human and possessed with a natural pride of ownership or authorship...and a natural desire for recognition.

All of us, as individuals, have these traits which come to the surface in different ways and in varying degrees of intensity. Being human, none of us is immune from such feelings where our pet projects and ideas are concerned, regardless of what group we identify with -- whether it be national, regional, state or local...whether it be the Meat Board or any other organization.

When these very human characteristics become blown up out of proportion and take control, they drive our energy down the road of controversy...energy which could do so much more good if it were, instead, directed toward effective promotion of our products for the good of the industry and also of mankind.

This is the kind of thing that sneaks up on us and drains our promotion programs of the enthusiasm and cooperative spirit which they must have to succeed.

In meat promotion, we must forget ourselves. We must seek out and welcome the cooperation of others...always remembering that the ultimate objective, for the good of each of us and all of us, is promotion of the product. It is my earnest desire and hope that from now on we will all work together in this, regardless of our different vantage points and launching pads. This approach is guaranteed to obliterate any jealousies or conflicts which would otherwise muddy the water.

The important thing is that our industry and its products be properly promoted. It doesn't matter who does it -- or how many different groups and individuals are involved -- though needless to say, the more they work together, the better will be the total results.

President Johnson has stated that food is important to peace around the world because hunger contributes to turmoil and strife and there are more empty bellies than full bellies in this world.

That, my friends, is the understatement of the decade, especially since the U.S. has adopted the role of trying to keep peace around the world. It appears to many people in other parts of the world as well as in this country that we are trying to keep the peace by flexing our muscles -- such as in Viet Nam. While it is essential to take a strong stand against Communist expansion, military might alone will not bring peace. We know and the world knows that we could exert much more military muscle than we are doing now. We know and the world knows that those on the other side could do the same. History has too often taught us the futility of attacking the results while ignoring the causes of strife. You can sap your strength cutting weeds which always grow back. The only way you destroy them is by destroying their roots.

Unless we dig out the roots of strife and discontent, we will spend the rest of this world's life fighting wars. And if this is the route mankind chooses, then the days of life on this earth are surely numbered ...what with the unbelievable weapons of destruction that have been developed.

Undoubtedly the deepest tap-root of world trouble is hunger. We MUST find the way to solve this problem. We must find another avenue than military might if we are ever going to have peace. And this is where we come in because food is the solution and food is our business. The new avenue must be one which will take food from where it is produced to where it is needed. The sense of security which comes with a full belly is essential to peace.

Another statement which caught my eye recently was made by Robert Martin, Chairman of the Chicago Board of Trade, at a hearing of the National Advisory Commission on Food and Fiber. He said it is more important that the world learn to feed itself than that we reach the moon in the next few years. He said private industry must play a vital role in meeting world food needs; that there must be an assault on the technology of food production in the hungry nations, drawing on the full resources of our agri-business. He stressed the need for food reserves -- which would not compete with sales by farmers -- and said we must develop techniques now before the situation reaches the crisis stage.

Some good thoughts there...but also understatement. It would appear the crisis is already upon us! World population today is 3.3 billion people and is expected to double by the year 2000 -- with four-fifths of the total in the developing nations which are least able to feed themselves. To feed the world an adequate diet by then will require an increase in food output of 200 percent. Add to that the fact that many are not getting an adequate, high protein diet even NOW and you see the immensity of the problem.

I would add that nations with high protein, meat-centered diets, are usually the ones with the most stable governments and highest standards of living. Regardless of which is the cause and which the effect -- or if there even is a cause and effect relationship -- that IS the situation and it DOES give pause for thought.

It has been stated by Dr. Burr Ross of Oklahoma State University that the time could come in the western hemisphere -- including the United States -- when grain which is now fed to livestock would be fed to people because of the total food needs of constantly increasing populations in this hemisphere and throughout the world.

So, you see, it is really time we stopped thinking in terms of overproduction and surpluses in this country. Actually, we've been working under a misconception in regard to overproduction and surpluses of feed grains, livestock, etc. The problem hasn't been one of overproduction but one of under-distribution, if I may coin a phrase. You simply cannot have overproduction of foods when there are hungry people anywhere in the world.

The problem is one of getting the food to where it is needed and that involves differing levels of economy around the world. It involves world trade...and it involves politics.

It is therefore necessary for people in the food industry to become knowledgable about the politics of world trade.

We must recognize that overproduction and surpluses...even in the sense that they have been officially regarded as existing in the United States in recent years...have never really existed. Recognizing this, there are several programs in which the food industry -- and especially the livestock and meat industry -- should become involved.

One is a more far-reaching, efficient system of world food distribution. And this I have already discussed briefly. Certainly, I don't have a program outline as to how this can be achieved...but I say to you it is something all of us should be discussing and thinking about in the interest of our own enterprises, our industry and, most important of all, the peace of the world...for in this atomic age, no person, no enterprise, no industry and no country can be certain of survival should all-out war occur.

Naturally, promotion is another program in which our industry must become more deeply involved. This I have already discussed with you in some detail. I would add this, however...

Part of our promotion efforts should be directed to setting the climate for the American consumer to recognize that even in this country food can no longer be taken for granted. Certainly our industry, with its tremendous technological advancements and production efficiencies, cannot be accused of seeking to operate in a philosophy of scarcity. The livestock and meat industry's record-breaking output of beef and other meats for an expanding population is one of the marvels of the space age...and one of the least recognized marvels, I might add. It behooves us now to develop and expand on our consumer relations techniques in order to gain better public understanding and acceptance of the situation as it exists today and will exist tomorrow.

If the nation's consumers are to continue to eat a high protein, nutritious diet built around meat, then the nation's agriculturists must be allowed to make a profit on their investments. Meat should be allowed to stay on a price plateau in keeping with the country's high standard of living, which is the envy of the world. If this doesn't happen there will surely be even fewer people staying on the land to produce the food for this country and the world. Right now only about 7 percent of our population grows the food and fiber for the other 93 percent -- plus what is exported to other parts of the world.

The other program on which our industry must concentrate with progressive thinking and action is in the field of merchandising. By merchandising, I do not refer strictly to merchandising the end product, meat. I am speaking also of merchandising livestock. Since I am myself a livestock merchant, I can say in all candor that in this field more positive action is necessary by market people as well as producers. The producer must be provided with maximum service, through sound, progressive marketing practices, including support of meat promotion. It is the market operator's responsibility to see that producers get every service which is conducive to the best merchandising of his livestock.

Since these services involve considerable expense and labor on the part of the livestock merchant, it is the responsibility of the producer to acknowledge his need and desire for the ultimate in marketing services by patronizing the markets which provide them. The best way for the producer to get these services is to indicate positively to the markets that he really DOES want them.

One of the most urgent needs in expanded and improved marketing practices is that of processing producer funds into promotional channels for the good of the product, the industry and the individual producer.

This is all important!

Among long-time participants in the Board's financial support program are the marketing agencies at the Tulsa terminal market, some of the firms at the Oklahoma City Stock Yards and some of the auction markets and packers throughout the state of Oklahoma.

While the cattle industry of Oklahoma is deserving of praise for its progressive support of meat promotion, I would be less than honest not to observe that there are other states which do better...some of them much better.

As one who follows the game of football rather closely, I have observed that your state does quite a job of putting together winning combinations. Now could anyone from the state of Nebraska NOT be aware of this after what the University of Oklahoma did to the University of Nebraska! And speaking of winning combinations, look what Oklahoma State did to that same school which beat Nebraska!

I am sure that the livestock and meat industry of this state can also put together a winning combination. Its a matter of getting all the team members together into a cohesive unit where everyone knows the signals and game plan. Then when you break that huddle you can really go! You can reach your full potential.

We are well aware of the conscientious efforts being made to achieve that potential. One indication is the cooperative efforts of state livestock and farm organizations and other groups in Oklahoma...including extension...in developing new sources of meat promotion revenue.

In this regard, I am pleased to report that strong support of meat promotion is on the move throughout the country. The Certified Livestock Markets Association, at its annual meeting, passed a strong resolution giving the Association's market representative the go-ahead to increase their efforts to bring more member firms into support of the Meat Board's program.

At the annual meeting of the National Livestock Exchange that organization recommended that their members adopt the new level of 3 cents per head on cattle and one cent on hogs and sheep. The Board of Directors of the American Meat Institute, likewise, has recommeneded, in a formal resolution, that their member firms adopt the 3-1-1 rate on direct sale deductions.

Increasing numbers of long-standing supporters are converting to the new rate...including some of the firms at the Oklahoma City Union Stock Yards.

We could go on and on listing the special efforts of groups such as the American National Cattlemen's Association, the National Livestock Feeders Association, American Farm Bureau Federation, and the state affiliates of those organization (notably in Oklahoma, I might add), plus the American Stock Yards Association, National Independent Meat Packers and many others...all giving solid testimony to the industry's awareness of the need and importance of a national program of meat research, education, promotion and information.

In closing, let me come back to the theme that our food industry and our government must find ways of filling the empty bellies in this atomic-fused world as a means of alleviating conditions which stand in the way of world peace. I offer this story as a case in point. A golf ball landed on an ant hill. On the first swing made by the golfer to drive it out, he missed the ball and killed a thousand ants. On the second swing, he missed the ball and killed all the rest of the ants except two. Before he would swing a third time, one ant said to the other: "If we don't want to get blown to Kingdom Come, we better get on the ball!"

I say to you that if we don't want to get blown to Kingdom Come, the food industry, of which we are a part, and our government, of which we are also a part, had better get on the ball!

FINDINGS AND IMPLICATIONS OF THE NATIONAL COMMISSION ON FOOD MARKETING

Paul L. Farris
Professor of Agricultural Economics
Purdue University

The livestock industry received a great deal of attention from the National Commission on Food Marketing during its one and one-half year study. Cattle feeders participated actively in sponsoring legislation to establish the Commission, and they contributed in many ways to its work. As Project Leader for Meats and Poultry, I enjoyed and found beneficial my numerous contacts with cattle feeders and with others involved in the marketing of cattle and beef.

In my remarks today I plan to highlight briefly the principal findings of the Commission with respect to the total food industry, then turn to the livestock sector and discuss some of the characteristics and emerging issues relative to cattle and beef.

The Commission and Its Work

The Commission had a very broad assignment, and by its nature, one that dealt with sensitive issues. Its duties were to study and appraise the marketing structure of the food industry and to report its findings and conclusions to the President and to the Congress. It was directed to deal with the fundamental question of the distribution of economic power, that is changes "which would be appropriate to achieve a desired distribution of power as well as desired levels of efficiency". The central topic was competition, its changing nature, and policies for enhancing its effectiveness in the food industry.

The bipartisan Commission consisted of 15 members, five from the Senate, five from the House and five public members appointed by the President. Chairman of the Commission was Phil S. Gibson, Retired Chief Justice of the California Supreme Court.

Public Law 88-354, establishing the National Commission on Food Marketing was signed by the President July 3, 1964. The Commission received its first appropriation in October, 1964 and assembled its staff by January, 1964. The life of the Commission, originally one year, was extended by Public Law 89-20 to July 1, 1966.

The Commission went about its work in several ways. It held 12 public hearings and two executive session hearings in ten cities over the country. In addition, closed "formal interviews" were held with representatives of 64 firms, 11 trade associations, six farmer cooperatives and ten individuals. Commission and staff members pledged to keep confidential the details of testimony at "formal interviews" so that witnesses might speak freely about their own operations and industry problems.

Several studies were done for the Commission by other agencies of Government: the United States Department of Agriculture, Federal Trade Commission, Bureau of Labor Statistics and Bureau of the Census. A few private firms and individuals, working under contract, compiled data for the Commission.

Through its own staff, the Commission made a dozen major studies based on questionnaires sent to various branches of the industry. The staff informally interviewed hundreds of businessmen about problems and practices in food marketing. Industry, farm and consumer groups voluntarily submitted statements and studies to the Commission.

The Commission devoted all of the year 1965 to gathering information through hearings, formal interviews, data collected from industry and studies conducted by other Government agencies. The principal facts had emerged by the end of the year, and the Commission met for five days in January, 1966 to review them. From that time forward the Commission worked on its main report and technical studies.

The Commission published ten Technical Studies, in addition to its own report which included the Commission's findings and conclusions. The conclusions were supported by nine of the fifteen Commission members, four of whom filed added individual views. Six Commission members did not support the report and filed dissents.

General Findings

The Commission completed its study believing that the contribution of the food industry to a high and rising level of living in the United States was fully comparable with that of other leading sectors of the economy. Supplied by a highly productive agriculture, manufacturers and distributors have provided consumers with a varied, abundant and nutritious array of foods at generally reasonable prices. Government has made positive contributions through supervision to assure a healthful food supply, services such as product grading and market news, and regulatory activities to maintain effective competition and fair business dealings.

A general characteristic of the American economy with much influence on food marketing has been the increasing market orientation of economic activities. While physical efficiency in production and distribution is still an important component of business success, it alone is often inadequate. Ability to develop and hold markets increasingly determines growth and profits of individual firms. Access to the consumer is of prime significance. Two food industry groups are generally in strong positions because of their ability to reach consumers: (1) retailers, including many small chains, and (2) large manufacturers, usually diversified, with strong national brands. The retailer controls the shelf space from which consumers buy and for which suppliers compete. Trade practices reflect the disparities in bargaining strength. Manifestations appear in discriminatory allowances induced by buyers and general trading arrangements and services which suit the convenience of buyers rather than sellers. A wide variety of concessions, kickbacks, special favors and commercial bribery appear to exist, although there is no way to measure their frequency.

To obtain and hold markets many firms have substantially increased their advertising and sales promotion expenditures in relation to sales. Rising costs have been built into the price of foods through various forms of selling effort. A great deal of such effort is defensive, undertaken to counteract similar efforts of competitors.

The shift in emphasis from production to selling has been facilitated by the changing nature of the consumer market. Rising incomes and more women working outside the home have increased the importance of convenience in food preparation. The appeals that can be made to consumers in such a market are much more complex than offering basic foods at minimum prices. The payoff from making successful appeals and shaping consumer preferences has been increasingly rewarding to those firms whose appeals have caught on. Those who advertised and promoted but didn't quite catch the consumer's eye have been sorely disappointed.

Increasing market orientation helps explain why farm retail marketing margins are wide and widening. It encourages firm growth often by merger and acquisition beyond the size necessary to perform the physical production and distribution functions efficiently. Market orientation helps determine relative market power of various groups. It encourages rising expenditures on advertising and promotion, intensifies product proliferation, gives impetus to new product development, and contributes to the survival of distribution methods that use labor and equipment wastefully.

Advertising and Promotion

Hence, we have seen advertising and sales promotion expenditures, as a percent of sales, rising since World War II, in spite of such restraining influences within the industry as the growth of retailer label products and discount food stores. A restraining influence not arising within the industry - consumer grades - has had some effect for certain commodities, notably beef, although consumer grading generally is much less extensive than would be feasible. A number of new products have been introduced in the past two decades, some were variations of existing products and others were substantially different and of undisputed value to consumers. The motivation to introduce new products, or at least variations of existing products has been very strong, and will likely continue so.

Concentration

Concentration of an increasing share of the industry business among the larger firms has generally risen. The 100 largest food manufacturers accounted for 45.8 percent of all value added in food manufacturing in 1963, up from 41.9 percent in 1954. Concentration has also increased in several key sectors. An important exception has been meat packing, where the growth of strong intermediate size firms, particularly in cattle slaughtering, has eroded away the position of the giants. The four largest meat packing companies, ranked according to 1963 sales, accounted for about 35 percent of total beef and veal production in 1947 and 24 percent in 1964. The next group of four held their relatively small 4 percent share throughout the period.

A different pattern emerged in hog slaughtering. While the share of the largest four declined from 41 to 34 percent, that of the next group of four rose from 10 to 14 percent. As a consequence, pork produced by the top eight firms declined only slightly, from 51 percent of commercial production in 1947 to 48 percent in 1964.

For total red meat, the largest four firms produced 39 percent in 1947 and 29 percent in 1964.

A substantial reorganization and relocation is taking place in meat packing and will likely proceed further. Eventually it is expected the declining trend in concentration will reverse and the largest firms will begin increasing their market shares.

Concentration in poultry processing decreased in the 1950's, as the poultry industry was reorganized and relocated. But in the 1960's concentration increased and will likely continue to do so.

In food retailing, the largest 20 firms increased their share of the national market substantially between 1948 and 1958. From 1958 to 1963 the largest 20 firms increased their share of total food store sales from 30.3 to 31.3 percent and essentially held their own, at 34.1 and 34.0 percent respectively in total grocery store sales (grocery store sales are not as inclusive a measure as total food store sales). Omitting A & P, the largest food chain, which lost ground percentagewise between 1958 and 1963, the remaining 19 chains increased their share of food store sales from 20.4 to 22.6 percent and their share of grocery store sales from 23.0 to 24.6 percent.

Retail concentration is higher and has increased more in local markets than in the national market. In 1963 the average share of grocery store sales by the locally largest four firms in 218 markets was 50.1 percent, compared with 49.3 percent in 1958, and 45.4 percent in 1954. Since 1954, the Nation's eight largest chains have increased markedly the number of local markets in which they do business.

Economies of size are such that in most branches of food manufacturing and distribution, the smallest firms have higher unit costs of operation than medium-size and larger firms. Thus many small firms have been unable to compete successfully and have gone out of business. Those remaining are under increasing competitive pressure. However, intermediate size firms can usually realize economies in processing and physical distribution comparable to those of the largest firms. Advantages in selling, advertising and sales promotion frequently accrue to very large firms. They also may achieve purchasing economies and obtain discounts and allowances unavailable to small competitors.

Vertical and Conglomerate Integration

Vertical integration and diversification have increased considerably in some areas of the food industry. A strong motivating force has been to gain greater efficiency by coordinating various production and marketing activities under one centralized management. Feed companies and processors that integrated into broiler production made savings by coordinating formerly independent operations and by rapidly exploiting new production methods. Feeding some cattle has helped packers to even out daily slaughter schedules and to reduce procurement costs. In some cases retailers have integrated into processing - or threatened to do so - to pressure other groups with substantial power into meeting retailers' demands for changes in distribution methods or for private label products.

Forward integration by cooperatives has been important in fruit, vegetable and dairy marketing. Some producers as individuals have become shippers, distributors, or full or part owners of meat packing plants.

Firm growth through diversification has been an outstanding development in foods, particularly the rapidly growing parts of the industry. Moreover, growth by the largest firms has been into leading positions in other sectors. The percent of the top four positions in 4-digit food industries held by the 100 largest food manufacturers rose from 74 percent in 1958 to 78 percent in 1963. Size and diversity of large conglomerate food firms gives them great ability to spread risks, to survive their own mistakes, and to withstand intense competitive struggles in particular product lines. Opportunities to engage in reciprocal trading arrangements may give conglomerate firms advantages not available to conventional competitors. Also, where conglomerate firms face each other in several markets, they can be expected to seek out types of competitive behavior which will be in their mutual best interests and to avoid behavior which would invite vigorous retaliatory measures. It is not clear that the performance resulting from such behavior would be in the best public interest.

Pricing

The coordinating role of price is being modified in many significant ways. Vertical integration has eliminated buying and selling at some points in the marketing channel, central markets have declined, advance contracting has increased, and large numbers of transactions are tied by formula to specific market reports. Pricing at retail is a part of total store merchandising activity.

Efficiency

The food industry is progressive in many respects. New production and product innovations have appeared and spread. Efficiencies have enabled firms to render obsolete old plants and equipment. Changing channels and location advantages have left stranded plants which found themselves out of position. While severe hardships have come to a number of firms, particularly smaller ones, the food industry does not appear to have had more difficulties of this kind than would be expected in an industry serving a changing market, incorporating new technology, and undergoing constant reorganization.

Some specific inefficiencies which remain include costly distribution systems for bread and milk and rack service for some foods such as crackers and cookies. Involved in all these is the desire of the supplier to manage the display of his product in the retail store to increase sales of his product. Efficiency considerations would seem to diminish the amount of meat processing done in back rooms of retail stores and the shipping of bone and fat from packing plants to distributors' warehouses.

Profits

Profits in the food industry as a whole have run about in line with average profits in the total economy -- around 11-12 percent on net worth after taxes. In some areas, such as dry grocery lines, profits were substantially higher. By way of contrast, the largest meat packers have averaged around five or six percent, although many intermediate size firms, particularly in cattle slaughtering, have earned much higher rates.

The larger food manufacturers have generally realized higher profit rates than smaller ones. For example, the 50 largest food manufacturers received about 61 percent of total profits before taxes of food manufacturers in 1963. In that year, they held 48 percent of total assets and accounted for 37 percent of total value added.

The Consumer

Most consumers have access to attractive food stores that carry a wide variety of items for convenient meal preparation. The consumer pays for selling efforts that in some cases are substantial. Some advertising and promotion increases information to consumers and some compounds efforts to make accurate price-quality comparisons easily and quickly.

The Producer

The producer is being affected by sweeping changes in agricultural production and by structural changes among processors and retailers of farm foods. Technology in production is substituting machinery for labor, raising crop yields, and developing more productive livestock. These changes are reducing farm labor requirements and increasing the efficient size of farms. For some commodities production has moved essentially out of the family farm class.

Procurement methods growing out of mass merchandising and substantial concentration of distributors' purchases have brough increasing demands to tailor farm production to particular standards, to produce in large volume, and to maintain a steady flow of products. These demands add to other forces which tend to increase farm size. Vertical integration through both ownership and contract have helped bring about changes in the traditional pattern of agriculture.

Returns to farmers are influenced not only by productivity but increasingly by their bargaining strength. Food industry developments are causing farmers to think more earnestly about their bargaining ability to defend prices and other terms of sale. Group action is often needed if farmers are to make any substantial changes in sales arrangements. Ways of achieving such action will become an increasingly important issue in the future.

Conclusions of the Commission

Revolutionary and sweeping changes in agriculture and the food industry have given rise to serious questions about developing trends in industry organization and competition. The Commission gave much time and thorough study to needed changes in public policies, statutes and government services to assure and encourage a more competitive environment which would elicit the finest efforts of industry and reward those accomplishments which best serve society.

The Commission developed proposals to prevent the largest firms in an industry from dominating a field by acquiring their competitors and to provide for review of planned mergers in terms of competitive efforts before permitting them to occur. In this connection it was suggested that food firms should not be permitted to form buying groups representing a greater sales volume than a single firm would be permitted to gain by merger or acquisition. It was concluded that large firms with diverse activities in several areas should make public reports for each major field in which they operate. Also, because the food industry will continue to change in ways that cannot be fully anticipated, the Federal Trade Commission should be charged with making a continuous review of market structure and competition in the food industry and reporting theron to Congress.

Problems relating to perishable farm foods led the Commission to advise that an agency reporting directly to the Secretary should be established within the Department of Agriculture to Administer the Packers and Stockyards Act, the Perishable Agricultural Commodities Act, and other "laws regulating competition in the marketing of perishable farm foods."

In order to provide consumers with the choices and unbiased information they need to get the most for their money, and to reduce excessive sales promotion costs, consumer grades were proposed for all foods for which grades are feasible. It was suggested that standards of identity be established by the Food and Drug Administration for all goods recognized by the public as belonging to definite product categories and for which standards are practicable. Non-deceptive packaging was supported.

To coordinate and carry forward positive educational programs and to speak on legislative matters, the Commission concluded that a centralized consumer agency should be established in the executive branch of the Federal Government by statute.

The Commission found farmers much affected by fundamental changes in the food industry and having differing organizational needs. To provide increased flexibility and opportunity for group action, the Commission supported (1) greater use of cooperative "with all assistance government can reasonably give the producer cooperation"; (2) authorization for any locally or regionally produced farm product under Federal marketing orders; and (3) a new device which the Commission terms an "Agricultural Marketing Board."

Essentially an extension of a marketing order, such a board, as described by the Commission, could be voted into effect by producers and could regulate production or marketing, and negotiate prices. Besides an administrator representing the Secretary of Agriculture, each board would also include representatives of handlers and the public.

The Commission further believed specific legislation necessary "to protect the right of farmers to organize", that is, to prevent obstruction, boycott or intimidation in group activities of farmers to increase their bargaining power.

Other conclusions reached by the Commission relate to the need for more complete and accurate market information, the desirability of greater uniformity among state regulations affecting the food industry, studies of interstate barriers, transportation and advertising rates, improvement of price data compiled by the Bureau of Labor Statistics and the U.S. Department of Agriculture, and supervision of futures trading in livestock, meat, coffee, and sugar under the Commodity Exchange Authority.

Some of the Commission's proposals can be implemented by existing government agencies. Others will require changes in statutes.

Cattle and Beef

Many developing tendencies in the food industry as a whole have appeared in the production and marketing of livestock and meat. The cattle and beef sector is of interest to us because of its size and growth and also because it exhibits some rather significant developments.

Relative Growth

The average American has been consuming around 100 pounds of beef (carcass weight) in the past few years, up from about 66 pounds in 1947-49. Total red meat consumption was about 148 pounds per person annually in the late 1940's and 175 in 1964. Pork, lamb and veal consumption per person have gradually declined. Total cattle slaughter has about doubled in the past 15 years. Fed cattle slaughter has more than doubled, in that it rose from about 42 percent of the total in 1955 to 56 percent in 1964.

Cattle feeding is therefore a large industry, and it has expanded rapidly. Fed cattle will likely continue to make up a rising proportion of total beef production in the years ahead; consequently, the cattle feeding industry is expected to continue to grow more rapidly than total beef production.

Changing Organization of the Industry

As the production of fed beef has expanded, the size structure of cattle feeding enterprises has changed rather strikingly. The number of feedlots with 1,000 or more head capacity in 32 states rose from 1,440 in 1962 to 1635 in 1964. About two out of every five head of fed cattle marketed in 1964 came from feedlots with 1,000 or more head capacity. The 44 largest lots in the United States, all with capacities over 16,000 head, marketed about 10 percent of fed cattle in 1964. Five of these lots were in Texas, six in Arizona and twenty-five in California.

Growth of large feedlots has been particularly marked in the Western States. In California, for example, only 2.4 percent of the cattle marketed in 1964 came from lots with less than 1,000 head capacity. In Oklahoma, 48 feedlots had 1,000 or more head capacity each in 1964, up from 29 in 1962. The 48 feedlots marketed 175,000 head of cattle, about 65 percent of fed cattle marketed in Oklahoma in 1964. In 1962, the 29 lots with capacities of 1,000 or more head marketed about of Oklahoma's fed cattle. To illustrate the downward trend in small scale operations, the number of Oklahoma cattle feeders with capacities under 1,000 head dropped from 2,159 in 1962 to 1,708 in 1964.

Economies of scale help explain the trend toward large operations. Savings of about two cents per pound of gain, as the number on feed rose to 5,000 or more head per lot, have been estimated in studies relating cost to feedlot size. Additional advantages have accrued to the larger lots in procurement of feed and feeder cattle, in selling fat cattle and in being able to operate larger facilities more nearly at capacity the year round.

Vertical Integration

The trend in packer feeding of cattle, has risen gradually from an estimated five percent of fed cattle marketings in 1955. In 1965 an estimated 7.2 percent of fed cattle marketed were packer fed, either in the packer's own feedlot or on a custom basis for packers. Additionally several cattle were fed by interests associated with packers, such as directors, employees, subsidiaries and affiliates. Including these cattle brought the 1965 total to 11.5 percent of total fed marketings in 32 states. Packer feeding was greatest in the Western States, amounting to about 23 percent of fed cattle marketings in contrast with a little over three percent in the North Central States. In the South packer feeding accounted for about one-fifth of fed cattle marketed, but the total volume of feeding is relatively low in that area.

In a National Commission on Food Marketing Survey of cattle feedlots in 15 Western states it was found that 18.8 percent of 1964 marketings from feedlots with 1,000 or more head capacities were owned by packers for 30 days or longer. An additional 28.8 percent of cattle were owned by packers 8 to 30 days before shipment from the feedlots. Thus nearly half the fed cattle marketed from large feedlots in these states were owned by packers 8 days or more prior to shipment.

Three large retail food chains, Acme, Food Fair and National Tea, had substantial cattle slaughtering operations, accounting for 4.2 percent of fed cattle marketings in 1964. These chains also were in the cattle feeding business. In 1964 they fed 64,000 head, which was about 8.5 percent of their own slaughter.

Looking ahead, vertical arrangements of various kinds will probably be used more extensively as packers seek ways to assure themselves of steady supplies of slaughter animals for the meat volume and quality specifications of large scale merchandisers, to gain efficiencies through operating slaughtering plants more nearly at capacity the year round, and to reduce procurement costs.

The National Commission on Food Marketing did not propose that vertical integration, including the feeding of cattle by packers, be prevented. It did point out, however, that business practices of vertically integrated and conglomerate enterprises (which may be more complicated than those of simply structured firms) should be scrutinized to insure that competition is not restricted in particular lines, such as the possible use of packer fed cattle to manipulate market prices. It also proposed that large firms with diverse activities of significant importance report publicly their sales, expenses and profits in each field of operations in which the annual value of shipments is larger than a given minimum. Value of shipments referred both to sales by a firm and transfer from one field to another within a firm, so this proposal would apply to vertical as well as conglomerate integration. It was believed that greater public information about large diversified firms would put all competitors more nearly on an equal footing, so far as information about each other is concerned.

Pricing

The significant and sensitive market in the livestock-meat economy is for dressed meat at wholesale. It is on the basis of expected prices for dressed beef and on projected margins that packers usually determine the prices they can pay for live cattle and the quantity they will need. For the country as a whole, changes in live cattle prices are closely associated with changes in dressed beef prices. In a statistical analysis of weekly changes in farm and wholesale prices covering the period from January, 1962 to August, 1965, the National Commission on Food Marketing found farm and wholesale price changes moved fairly closely together within the same week. However, there appeared to be some lagged influence in that wholesale price changes were also statistically associated with farm price changes both one week preceding and two weeks preceding.

The level of wholesale prices influences the level of retail prices, but changes in wholesale and retail prices do not necessarily correspond in the same week. A statistical analysis of week to week changes in wholesale and retail prices showed that a change in the weekly wholesale price had an average effect on regular beef prices that was distributed over an 8 week period, with the influence in the first week after the wholesale price change being larger than in any other week. Often a change of three to five cents a pound in wholesale prices is necessary for retailers to consider it worthwhile to change their regular meat prices, although they may change the frequency and depth of price cuts for specials without altering regular prices.

In this connection, the National Commission on Food Marketing found that average retail beef margins computed by the USDA tended to be substantially overstated during periods when retailers were selling large quantities of beef on special. In 1964 for example, which was a year of frequent and deep price cuts for beef specials, the average retail margin was 17 cents per pound (retail cut basis), seven cents lower than the 24 cents average retail margin which was estimated using standard USDA procedures. The principal reason for the difference was that USDA estimates were based on retail prices, gathered by the Bureau of Labor Statistics on Tuesdays, Wednesdays, and Thursdays, that did not fully reflect the large volumes of beef moved on special prices to weekend shoppers.

Aside from the question of how prices at one point in the marketing channel are related to prices at another point is another basic question of how prices actually are established. Historically, the tradition has prevailed of an open competitive market at one or more points in the channel between producer and consumer. At this market the basic forces of demand and supply meet and price is determined. The process is assumed to work quite automatically and impartially. Prices generated at such markets, for example, terminal markets for livestock, not only establish exchange values on the commodities traded there, but they are widely reported and used as benchmarks in establishing prices at other locations, for other grades and qualities, and at later points in time.

Large cattle feeders rely heavily on benchmark prices in that most sell their cattle direct to packers rather than through terminal or auction markets. In the special survey of cattle feeders in 15 Western States it was found that 70 percent of the cattle from large feedlots were sold on a live basis in 1964 and shipped direct to packers. Around 13 percent were sold on some type of carcass basis. Only 10 to 11 percent were sold at terminals.

Terminal markets handled only 36.5 percent of all cattle purchased by packers in 1964, down from about 75 percent in 1950. As the proportion of cattle marketed from large feedlots increases, the terminal market share of cattle marketings is likely to decline further.

If terminal markets continue to handle a smaller share of cattle marketings, market knowledge about an increasing number of transactions will not be available unless reporting of direct sales is increased substantially. Terminal market prices may also become less representative of general supply and demand conditions. The variability among buyers and sellers in the quality and amount of market knowledge they have available

to make trading decisions, and consequently in their negotiating skill, may widen. Although advancing technology in communications has facilitated rapid dissemination of information which has become available, the information which is readily available may become increasingly inadequate, and the cost and effort required to become informed in order to buy or sell skillfully is likely to remain substantial.

In trading dressed meat at wholesale the single most important source of price information is the National Provisioner Daily Market and News Service commonly known as the "Yellow Sheet" a daily commercial market report issued Monday through Friday which quotes end-of-day carlot prices, f.o.b. Chicago. The National Commission on Food Marketing survey of meat packers showed that 41 percent of their fresh beef and veal transactions were tied directly by formula to the "Yellow Sheet" in 1964-65. Additionally, many packers reported heavy use of the "Yellow Sheet" as a guide in price negotiations. Some cattle feeders also reported considerable use of this price source both in formula sales and as a guide in negotiations.

From the standpoint of an effective and efficiently functioning exchange system, fundamental issues at stake in widespread formula pricing include: (1) the accuracy with which the pricing base (the "Yellow Sheet") reflects equilibrium supply and demand conditions for the many meat items for which prices are quoted, and whether it can be relied upon in the future (the more formula pricing, the fewer genuine negotiated prices to report); (2) whether quoted prices can be manipulated, or will become easier to manipulate, with further changes in the industrial organization of the livestock-meat economy; and (3) whether formula pricing helps perpetuate a geographic price pattern unrepresentative of changing supply and demand conditions in different areas, thus interfering with geographic resource adjustments toward overall efficient industry performance.

In order to improve price reporting generally, the Commission suggested that the U.S. Department of Agriculture be authorized to require submission of prices and related information in such forms as essential to the prompt publication of news about market prices and product movement, and that the USDA experiment with new approaches in price reporting.

The National Commission on Food Marketing made no study of futures markets for cattle and beef. However, initial activity in those markets is potentially promising. If futures markets attract broad participation and wide use, they could assume increasingly important roles as benchmark prices for trading in spot transactions.

Emerging Issues

It appears that the number of large scale feedlots will increase further. Large numbers of cattle will continue to be fed on diversified farms and ranches, but even these enterprises are expected to become more specialized, and cattle marketed from them will likely make up a declining share of total fed cattle marketings. Various forms of vertical coordination, packer feeding, custom feeding, contracting and the like, will probably increase. Such developments may diminish the cyclical and other sources of cattle supply variability and lead to general increases in industry efficiency.

The pricing process seems destined to change further, probably becoming more decentralized and diffused as open market exchange processes are supplanted by private treaty trading. Buyer-seller relationships are becoming more personalized, with special arrangements and unique features appearing in a rising number of transactions. As this occurs, each buyer and seller will increasingly need to have market information and trading skill as he participates more actively in the negotiating process. Neither a cattle feeder who sells nor a packer who buys can assume that a competitive equilibrium market price will emerge automatically. Issues in the cattle and beef sector, as in other sectors of the farm economy, are likely to involve increasingly the influences of market exchange processes and the effects of bargaining power on returns to resources -- capital, labor and management -- employed by various firms and individuals in the industry.

The cattle and beef industry will need to approach its problems in its own way, selecting those techniques which can be fashioned to the needs at hand. The organization and behavior of the industry is in transition and adjustment problems will continue to come. But long run demand prospects appear very favorable, and promise to be rewarding to those who can adapt advantageously to new developments. It will be especially important that the economic environment and developing industry structure be of a type which encourages fair competition and high level economic performance in all sectors. Cattle feeders, along with other industry leaders, can play a key role in helping to encourage and maintain such an environment.

NEW DEVELOPMENTS IN TRANSPORTATION

W. E. Harvey, General Manager
Transportation Department
Swift and Company, Chicago, Illinois

Gentlemen, I have looked forward with pleasure to this my first visit to Stillwater, Oklahoma. To be included on the panel with these authoritative men who have contributed so much to the livestock industry, reminds me of a story about the speech given by a forest conservationist who asked the audience -- "What have you done to help conserve our forests?" During a dramatic pause a man in the audience replied -- "I once killed a woodpecker." My particular contribution to the livestock industry has about the same significance. That is why I was so intrigued by Bob Daugherty's invitation and suggested topic, "New Development in Transportation."

To focus our attention on this subject, I would like for you to pay particular attention to the words in the following quotation: "It is an extraordinary era in which we live. It is altogether new. The world has seen nothing like it before. I will not pretend, no one can pretend, to discern the end; but everybody knows that the age is remarkable for scientific research into the heavens, the earth, what is beneath the earth; and perhaps even more remarkable still is the application of the scientific research to the pursuits of life. The ancients knew nothing like it. The moderns have seen nothing like it until the present generation. The progress of the age has almost outstripped human belief."

When do you suppose these words were spoken? These were the words of Daniel Webster in November, 1847 upon the opening of a new stretch of railroad track in Lebanon, New Hampshire.

As Webster said -- "No one can discern the end," but let's briefly trace developments since this dramatic achievement 120 years ago. As cities developed, it became necessary to move livestock longer distances. Cattle drives had developed from Kentucky and Ohio to the East and by 1840 were moving East on foot from as far West as Iowa. Of course, the highlight of all cattle drives were those from Texas to the Kansas railheads during a 30 year period after the Civil War.

The railroads were great pioneers in many parts of the country, opening extensive regions for various industries and finally in 1869 completed a line across the plains and mountains to the Pacific Coast. By this time large numbers of livestock were being transported to market by rail and in 1919 the rail movement of livestock reached its peak when the major markets received more than 1,500,000 carloads.

As the frontier moved West, livestock played an important part in providing the pioneers with food, clothing and even draft power. The meat packing industry likewise grew up with the country and along with the movement West began to follow the source of raw materials. The growth of the railroads during the last century provided the basis for a system of terminal markets and packing centers located primarily in the main livestock-producing states. It took men of great vision, ingenuity and dynamic leadership to develop this industry. One who certainly earned his place in this history of economic development was G. F. Swift. His development of the first satisfactory refrigerator car is considered by some to be the most important factor in the growth of the meat industry. This progressive step made it possible to slaughter beef near the source of supply and market fresh dressed beef successfully in distant markets.

Like many new developments, the transition into refrigerator car was not smooth sailing. The railroads wanted the livestock business with its additional tonnage. Rate making in those days was similar to the bargaining situation found in exempt truck rates today. The railroads had the direct routes from Chicago to the East and got the livestock business because of less shrink on the shorter haul. They would not bargain on the meat rates, and maintained them at a high rate level. These rate problems continued until the Interstate Commerce Act was passed. This provided provisions for rate-making and worked toward establishing reasonable rate levels. To expand the meat business, refrigerator cars were needed. Efforts were first directed to have the railroads build the cars. But the carriers did not generally want dressed beef traffic and would do nothing to encourage the movement. Neither would they build the icing stations necessary to make the refrigerator car practical. Icing stations required ice harvesting arrangements and ice storage houses. This did not stop Mr. Swift and he proceeded on his own. The financial strain very nearly broke him before his incredible perserverance and courage prevailed. Later the Interstate Commerce Commission ruled on complaint of other packers that Swift could no longer hold icing stations since these stations provided Swift a profit on other packers' shipments. The stations were sold to the railroads who were by then glad to take them over.

During the growth in the meat packing industry, concern was developing over humane handling in shipping livestock and in 1906 the 28 hour law came into being. With the faster service now being performed by the railroads, proposals have been made from time to time to change this law, with provisions for extension of time. However, there seems to be very little support for this and it has never passed.

In 1911 the first truck shipment of livestock moved to the Indianapolis market. Trucks provided much improved scheduling, flexibility and lower charges. As the railroads became aware of their losses in livestock shipments, they endeavored to improve their service and make various concessions. However, it was too little, too late and today trucks dominate all livestock shipping. From a limited beginning, truck transportation grew to such a scope that Federal regulation was inevitable. The legislation in 1887 known as the Act to Regulate Commerce did not include motor trucks. By 1930 this mode had expanded to such an extent that after numerous studies the Motor Carrier Act was passed in 1935. This act did

provide regulation of truck transportation but contained the interesting feature that motor vehicles used in carrying ordinary livestock were exempt from economic regulations. As you know, the exemptions make it possible to negotiate livestock rates via motor carrier moving interstate. Intrastate movements are not covered by the Motor Carrier Act. Such movements are under the control of the various State Legislatures who may, or may not, provide exemption from economic regulation.

The pricing of transportation has always been a complicated matter. The primary factor, of course, is distance, but other considerations include cost, value, demand of service, weight, space and handling requirements. The Interstate Commerce Commission does not necessarily prescribe or approve all interstate rail rates, but has regulatory power over the rates. Therefore, carriers may prescribe rates but they are subject to the requirements of being just and reasonable.

Let's briefly review the historical significance rates have had on livestock and fresh meat. There has always been a contention by the various interests that there should be a relationship between the rates on livestock and dressed beef. In 1884 the various meat packers, railroads and livestock interests met to discuss and resolve the question of rate relationship. The conclusions were that the relative rates on livestock and dressed beef, Chicago to New York, should be 40 to 70. This relationship continued until 1915 when the Interestate Commerce Commission approved increases in the rates on both livestock and fresh meat. This resulted in the fresh meat rate being 144 percent instead of the previously described relationship of 175 percent. In interim years this rate relationship fluctuated to as low as 140 percent. Over the years this rate relationship theory has been under constant attack and the subject of various proceedings before the Commission. One complaint resulted in a five-year Commission proceeding which finally was resolved in August 30, 1963. This resulted in a uniform method of measuring rail distances between all major points in the United States, which resulted in lower fresh meat rates from points West of Des Moines, Iowa to the East Coast. Therefore, all of the meat processors who were located closer to the source of cattle were placed in a more competitive position than those that were located closer to the main areas of population which are along the Eastern Seaboard. This is why we have seen the movement of meat packing plants to the West. Swift & Company is constructing numerous new plants among which is a new plant in Guymon, Oklahoma, opening this year.

Our transportation system, as you know, has had a major role in this country's industrial growth. The importance of transportation in the development of the meat packing industry can hardly be overstated either in its early history or in its future.

The progress made since Daniel Webster's statement -- "The progress of the age has almost outstripped human belief" would certainly stagger even his imagination. What then are new developments in transportation? The first thing new which comes to my mind is your apparent interest and all of top management's new emphasis on transportation. If, as history would indicate, we have again reached progress beyond human belief, what more can be accomplished in transportation? You are hauling livestock shorter distances at remarkable speeds. New possum belly livestock trucks appear to be the ultimate in livestock carriage vehicles. Mortality rates on livestock shipments have been reduced substantially. New mechanical refrigerator cars can maintain constant temperatures for the transportation of meat. Rail and truck schedules have been drastically reduced due to improved equipment, improved rail tracks and beds, improved highways and so on. Freight costs have been declining and will continue to do so with improved efficiency. Remember, history shows us that we cannot wait for the carriers to come up with all of the ideas. Neither can we let the carriers' possible disinterest, if so, deter us from exploring to the fullest any idea which we may have that could improve our marketing position.

Thanks to our universities, their undergraduate courses and graduate courses, American businessmen are approaching marketing with an entirely new concept. This is known by several names but the most commonly used are -- business logistics, which is the management of physical supply and distribution. Now I said -- this is an entirely new concept which is not altogether true. Recognition of the different areas of distribution was made by A. W. Shaw in a Harvard University Press published in 1916. He concluded that distribution was composed of two types of effort -- demand creation and physical supply. Little attention was paid to logistics until the armed forces employed logistics techniques in World War II.

In today's marketing concept, transportation is only one segment of the total physical distribution system. The other elements are -- plant location, raw material and supply procurement, production scheduling, inventory control, warehousing, and material handling. The business logistic technique is to analyze each of these elements by their alternative methods and through quantitative and method analysis make tradeoffs to arrive at the lowest delivered cost for your product in the market place. To make these studies requires quantification and mathematical analysis that was not practical until the advent of the computer; even though it is now practical it will be a slow revolutionary process for many long established firms with large investments in numerous plants and who are marketing their products in every conceivable market place.

Containerization is a favorite subject today in transportation circles. It offers great possibilities for improving our ability to market beef in foreign markets. These containers can be moved inland by truck or rail flat car, stored on ship and delivered to the customer without rehandling the contents and during this period of time be kept under constant controlled refrigeration. They also will be a major factor in domestic distribution.

Swift & Company is doing much research work in controlled atmosphere in an airtight container with nitrogen, other gasses or combination of gasses. This offers great possibility for increasing the shelf life and improving the bloom of the meat through the control of bacteria growth and can be effective throughout the distribution cycle.

Even though present mechanical refrigeration systems used in transporting meat appear to have reached the ultimate, there are many new methods of refrigeration -- such as liquid nitrogen, which are showing great promise.

A tremendous evolution is taking place in design and construction of railroad cars. They are becoming longer, taller, and wider...designed to make best possible use of the cubic capacity, taking into consideration the lading which it will carry. These cars will further reduce rail rates and improve service schedules due to the ability to haul heavier loads in fewer cars. An example of this is the tank car which has grown in a few short years from an 8,000 gallon capacity to a 20,000 gallon capacity with larger cars in testing stages and in actual use.

The airlines have made some inroads in freight hauling. Much of this was due to a simple thing, like removable seats which can convert a plane almost instantly from passenger to freight hauling. The advent of a new supersonic jet with its tremendously increased load capacity will have great impact on freight traffic.

The computer, of course, has had enormous effect on transportation. Railroads and industry are employing the computer for car and service control. Many efforts are being made to program freight rates into the computer whereby we can instantaneously search out the lowest possible rate and combination. One of the major airlines disseminates information instantaneously, such data as weather conditions in all flight lanes, the number of airplanes in the air at terminals and in repair shops, the number of passengers holding tickets at each location. It computes the expected number of empty seats and/or standbys at each air terminal.

Tests are being made on railroads of a jet propelled train. This will improve service and reduce transportation time.

Recently at a conference in Washington I was privileged to hear Mr. Long, Deputy Under Secretary for transportation, Research Department of Commerce, make a few comments regarding the activities of the new department of Transportation. Their principle efforts will be to coordinate the 37 separate transportation agencies. Much of the effort in this new department will be spent on research and development of facts that will devise systems and compatability to enable the ICC to speed up decisions, recommend compatable standards of rate measurement that will speed up computerization of rates and intermodel system of transportation.

One can expect more compatible state regulations which will follow uniform use of longer trucks and expanded use of double bottom trailers.

With a little ingenuity there is no end to our accomplishments. An example of one method of hauling livestock which you may find interesting though somewhat impractical, is the method I observed a year ago in Korea. Farmers take their pigs to market strapped on a two-wheel bicycle. In order to keep the pig from squirming, they get them dead drunk on saki wine. It's the first time I have ever seen pigs going to market happy and with a silly grin on their faces.

I am sure all of you have read the December 1966 issue of "The Cattleman." The article entitled "The Oklahoma Cattle Industry Yesterday, Today and Tomorrow" included some interesting statistics including studies made by OSU. Some of the statistics indicated cattle feeding had increased since 1958 by 13 percent. That Oklahoma and Texas had a strong advantage for marketing beef in the states with the most rapid increases in per capita income. It concluded that Oklahoma is on the threshold of gigantic potential economic growth.

We at Swift are proud that we are joining you in contributing to this economic growth.

Our industries have always been dependent one on the other. You need us to buy your livestock, we need the producer to supply the kind of beef our customers want. It follows then that we have common goals to --

1. Increase the demand for and per capita consumption of beef.
2. Sell our products at a price which will return a reasonable profit on our investment.

To achieve these goals we should work together in the common objectives and improved production handling, and transporting of livestock that will meet consumer demands, further decrease the mortality rate and eliminate costly bruises and improve our methods of transporting dressed beef to the market place. We think that the business logistics approach will help us accomplish these objectives.

Peter Drucker in Fortune Magazine some time ago called distribution the "economy's dark continent ripe for exploration and development which would enhance profits."

History has proven we are limited only to the extent of our imaginations and our perserverance. New methods in transportation can lead the way in achieving these goals.

Thank you again for inviting me to Stillwater. It was a pleasure being included on your program.

SWINE NUTRITION AND MANAGEMENT SYSTEMS

J. C. Hillier, Director
Institute Animal Sciences and Industry
Oklahoma State University

The finishing of cattle and the growing and finishing of swine are operations in which large quantities of grain and other concentrates are converted to meat. The bulk of the ration for the two species are alike for milo, soybean meal, minerals, vitamins A and D and antibiotic supplements. Only the B complex vitamin supplementation and the possible sources of protein are different. The steer can use Urea as a source of nitrogen and makes his own B complex vitamins. However, the cost of the B complex vitamins is a very small part of the swine ration. In some management schemes even the energy levels used for the two species are quite similar.

Feed purchase, storage, handling and ration preparation for the two species can be handled about the same way. Similar livestock "know-how" can be utilized with either species. The mechanization of feed handling can be quite similar in both cases. The marketing of the two species has some common elements. Both live animals and meat products are open to futures trading.

In short, the finishing of cattle and the growing and finishing of pigs seem to be compatable in most regards and may even be complementary under some conditions. Certainly they have been found to be so in the Cornbelt.

Since most of you are especially knowledgeable in the case of cattle feeding and probably not as well grounded about modern swine production, I will describe a modern Oklahoma swine production unit to you. Details have been worked out on what is considered to be a minimum sized economical confinement or semi-confinement unit. Properly mechanized it will require about forty hours of labor per week or less. It is termed a 72 litter unit and is designed to provide for a minimum of 144 litters per year or a possible maximum of 1440 pigs. With reasonable operating efficiency about 1200 pigs could be marketed on a two litter per year schedule. Where management is good enough to obtain up to 2.3 litters per sow per year even greater volumes can be handled. Multiples of these units may be combined to give annual productions of 1200, 1800, 2400, 3000, etc., pigs per year.

The plans call for 15 sows to be placed in the breeding pens with 12 expected to farrow. The total breeding herd consists of three sets of 15 sows each and 4 boars. Initial purchases would include both the gilts and boars but no further female purchases are required. Cross-breeding of selected breeds is the common thing with meat type boars being the only animals purchased after the initial purchases. The hybrid vigor developed in the crossbred female is utilized fully.

In terms of building such a unit would consist of two-farrowing houses with twelve stalls each, and six nursery-growing-finishing buildings each containing accommodations for twelve litters. Preferably these would consist of four larger pens each designed to hold three litters. Maximum isolation is maintained between the sow groups at all times.

The sows remain in outdoor dry-lots with shelters during pre-breeding and for about 15 weeks of gestation. During this time the sows are hand fed once daily in individual stalls. They are brought in as a group and placed in the individual farrowing stalls in one of the two farrowing houses after about 15 weeks of gestation. Under the plan all sows placed in a house should farrow in two weeks or less. Sows and pigs are moved to the nursery-growing-finishing building 14 to 21 days past farrowing. Sows are moved from their litters at weekly intervals following a nursing period of 35 to 42 days. The pigs are carried to market weights in the same pens. In this way maximum isolation is obtained and fighting is held to a minimum. They should reach market weight at 20 to 22 weeks of age. On such a time schedule each pen can house slightly more than two litters per year.

The degree of automation depends on the managers desires. Feed handling can be almost completely automated. Likewise, waste disposal can be automated to a large degree. Various arrangements of slatted and solid floors have been used. It will always be necessary to clean and disinfect the farrowing houses between farrowing. This is largely a "hand job". With good planning Sunday work can be cut to a minimum although some attention to farrowing and breeding will always be required.

Production figures are estimated in detail in the attached tables. Likewise an estimated financial statement on a swine production unit of this size has been prepared by J. L. Tomlinson of the Agricultural Economics Department.

A swine production unit of this size could constitute a one man operation as a major farm enterprise. Some saving could be brought about with increased size. It could be made to combine well with grain farming. It would seem to fit especially well with a feed mill or a cattle finishing operation. The talents and personal preferences of the manager or operator of such a combined enterprise would be a very important factor. The successful rearing of baby pigs requires attention to details on a daily basis. The schedule of events in a swine operation must be followed closely if the program is to be successful.

Table 1. Oklahoma Swine Production Program Expected Production From One Size Unit.

Buildings (Plan A)	
Farrowing	2 - 12 Stall
N.G.F.	6 - 4 Pen (3 litters each)
Sow Shelters	3 - 30 Sows (2 x 15)
Boar Shelters	4 - 1 Boar each

Sow Group	Number Sows To Breed	Litters Expected	Pigs Expected
A_1	30	24	200
B_1	30	24	200
C_1	30	24	200
A_2	30	24	200
B_2	30	24	200
C_2	30	24	200
Total Annual		144	1200

Multiples of these units may be combined to make up a desired size operation such as below:

Plan A 1/2 A = 600; A = 1200; 2A = 2400 pigs annually

Table 2. Example of a Calendar of Swine Production

Sow Group	Date Bred Monday	Date To Farrow 114 Days	Farrowing House, Tues. 14 Days	N.G.F. Wednesday	Date Weaned Thursday	Date Marketed
A_1	Jan. 4	Apr. 27	Apr. 20	May 12	June 10	Oct. 4
	Jan. 30	May 23	June 8	June 9	July 8	Nov. 19
B_1	Mar. 1	June 23	June 15	July 7	Aug. 4	Nov. 30
	Mar. 27	July 19	Aug. 3	Aug. 4	Aug. 30	Jan. 16
C_1	May 3	Aug. 25	Aug. 17	Sept. 8	Oct. 6	Feb. 2
	May 29	Sept. 20	Oct. 5	Oct. 6	Nov. 1	Mar. 19
A_2	July 5	Oct. 27	Oct. 19	Nov. 10	Dec. 9	Apr. 5
	July 31	Nov. 22	Dec. 7	Dec. 8	Jan. 7	May 21
B_2	Sept. 6	Dec. 29	Dec. 21	Jan. 12	Feb. 10	June 7
	Oct. 2	Jan. 25	Feb. 8	Feb. 8	Mar. 3	July 23
C_2	Nov. 1	Feb. 24	Feb. 15	Mar. 9	Mar. 31	Aug. 2
	Nov. 27	Mar. 21	Apr. 5	Apr. 6	May 5	Sept. 17

Conditions of this schedule.

1. Three sets of sows each farrowing twice annually with farrowing about the same time each year. Farrowings equally spaced over the year.

2. Breeding period - 27 days starting on Monday ending on Saturday. Breeding on three Sundays required.

3. Gestation 114 days, weaning 42 days, after farrowing age to market 160 to 180 days.

4. Breeding started on Mondays, sows taken to farrowing house on Tuesdays, sows and pigs moved to nursery on Wednesdays. Pigs weaned on Thursdays. Feed mixing and delivery on Fridays. Marketing Mondays, Tuesdays, or Wednesdays as desirable. Farrowing - as nature dictates.

Table 3. Feed Budget - Basic Considerations Feed Allowances and Weight Changes (Estimated)

	Age in Days		Days	Weight Changes			Complete Confinement	
	Start	Finish	Period	Start	Finish	Gain or Loss	F/D	T. Feed
	Days	Days	Days	Pounds	Pounds	Pounds	Pounds	Pounds
Pre-breeding	165	240	75	200	290	90	5.5	412
Gestation No. 1	240	360	120[1]	290	410	120	6.0	720
Lactation No. 1	360	402	42	410	360	-50	11.0	462
Recovery Period No. 1	402	427	25	360	390	30	7.0	175
Gestation No. 2	427	547	120[1]	390	510	120	6.0	720
Lactation No. 2	547	589	42	510	470	-40	11.5	483
Recovery Period No. 2	589	614	25	470	520[2]	+60	10.0	250
Summary	165	614	449	200	520	320		3222

[1] Allows for a second breeding on 30 percent of the sows.

[2] Sows smoothed up ready for market.
Boars 7.0 pounds per day. Boar feed estimated at 7 pounds per pig weaned.
Creep feed - for pigs up to 45 pounds - 50 pounds per pig.

Table 4. Estimated Annual Feed Budget, One Unit-Plan A, 144 Litters - 1200 Pigs Annually

Ration Weight of Pig	Creep to 45	Grower to 120	Finisher to 215	Herd Sows-Boars	Total Weight	Price/ Cwt. $	Total Cost $
Feeds (lbs)							
Milo (Western Yellow)	36,942	199,691	324,257	186,366	747,256	2.00	14,945.12
Soy Meal 50%	13,890	49,869	56,594	21,198	144,550	4.50	6,504.75
Dehydrated Alfalfa Meal	-	13,500	20,520	11,600	45,620	2.25	1,026.45
Dry B. Milk	1,800	-	-	-	1,800	9.00	162.00
Tankage	-	-	-	5,800	5,800	4.25	246.50
Whey (Dry)	3,000	-	-	-	3,000	6.00	180.00
Molasses(Dry)	3,000	-	-	-	3,000	4.50	135.00
Dicalcium Phos.	660	3,915	3,919	1,438	9,932	4.25	422.11
Calcium Carbo.	192	986	2,011	847	4,036	0.75	30.27
T.M. Salt	300	1,350	2,052	1,160	4,862	2.25	109.40
Vitamin-Mineral Antibiotic Sup.	216	689	1,047	592	2,544	40.00	1,017.60
Per Market Pig	50	225	342	194	811		
Total Pounds	60,000	270,000	410,400	232,000	972,400	.25[1]	2,431.00
Total Tons	30	135	204.2	116	486.2		
Percentage of Total	6.2	27.8	42.2	23.8	100.0		
TOTAL COST							$27,210.20

[1] Grinding and mixing charge

Table 5. Estimated Feed Requirements Per Head and Per Hundred Pounds of Market Hog with Varying Sow Productivity and Feed Efficiency

Pigs[1] Per Sow Annually	Per Pig[2] Feed Charge To Cover Breeding Herd	Feed Consumed Per Head At Efficiencies of 3.2	3.4	3.6	Total Feed Required[3] Per Cwt of Market Hog at Efficiency of 3.2	3.4	3.6
		Pounds					
10	329	923	957	991	429	445	461
11	300	894	928	962	416	432	447
12	276	870	904	938	405	420	436
13	255	849	883	917	395	412	427
14	237	831	865	899	387	402	418
15	222	816	850	884	380	395	411
16	208	802	836	870	373	389	405
17	198	791	825	859	368	384	400
18	186	770	804	848	358	374	394

[1] Number of pigs raised annually per sow in the breeding herd, including breedings, infertile sows, death losses, etc.

[2] Per pig feed charge to supply the breeding herd. This figure is calculated by dividing the 3222 pounds of feed estimated to carry a sow through two farrowings and finish her to a market weight of 520 pounds. Feed for the boars is also figured in at the rate of 7.0 pounds per pig raised.

Example: $\frac{3222}{16} + 7 = 208$ lbs. of feed per pig raised where 16 pigs are raised annually per sow kept in the herd.

[3] These figures represent the total feed input per hundred weight of butcher hogs marketed. Example: $\frac{\frac{3222}{16} + 7 + 50 + 544}{215} = 373$

This is the feed input in a situation where the sow raising 16 pigs annually, consumes 3222 pounds of feed. Seven pounds per pig is allowed to feed the boars; each pig consumes 50 pounds of creep ration plus 544 pounds from weaning to a market weight of 215 pounds. This is an efficiency of 3.2 pounds of feed per pound of gain from weaning to market (from a weaning weight of 45 pounds to a market weight of 215 pounds - 170 pounds gain).

Table 6. Estimated Annual Production Requirements, Cost and Returns for Swine Production and Feeding; 72 Sows Farrowing Twice a Year (Three 24 Sow Units), A 12 Sow Unit Farrowing Every 60 Days

Plan A *

I. Production	No.	Average Weight	Cwt.	Price/Cwt.	Value
Market Hogs	1,115	215	2,397.25	$16.00	$38,356.00
Sows Non-Breeders	13	350	45.5	14.50	659.75
Sows After 2 Litters	71	520	369.2	14.00	5,168.80
Boars	4	600	24	9.00	216.00
Total	1,203		2,835.95		$44,400.55

II. Inputs	Unit	Quantity	Price	Value	Cost/Cwt. Live Weight Produced
Boars	Each	4	$150.00	$600.00	.2116
Feed	Cwt.	9724.00	2.80	$27,227.20	9.6007
Vet. & Medicine	Head	1200.00	1.50	1,800.00	.6347
Trucking	Cwt.	2835.95	.30	850.78	.3000
Selling Expense	Head	1203.00	.91	1,094.73	.3860
Utilities & Misc.				150.00	.0529
Total Specified Expenses				$31,722.71	11.1859
Returns to Labor, Capital, Mgmt. & Overhead				$12,677.84	
Labor	Hours	2200.00	1.25	2,750.00	.9697
Returns to Capital, Mgmt, & overhead				9,927.84	
Housing & Equipment				3,520.00	1.2412
Interest on Annual Capital	Dol.	14,524.00		941.92	.3321
Return to Mgmt.				5,465.92	
Total					13.7289

Cost per cwt. of market hogs sold 13.8199.

* Prepared by J. Tomlinson, Department of Agricultural Economics.

Table 7. Estimated Capital Requirements For Swine Production and Feeding: 72 Sows Farrowing Twice A Year (Three 24 Sow Units) One Unit Farrowing Every 60 Days - Plan A

Item	Quantity	New Cost	Years Life	Depreciation Straight Line	Repairs % New Cost	Repairs Annual Cost	Insurance and Taxes 1% New Cost	Total Annual Cost
Farrowing House	2	$ 6,000	10	$ 600	5	$ 300	$ 60.00	$ 960.00
Finishing Houses	6	12,000	10	1,200	5	600	120.00	1,920.00
Sow Shelters & Fencing	3	3,600	10	360	5	180	36.00	576.00
Boar Shelters & Fencing	4	400	10	40	5	20	4.00	64.00
Total Housing & Equipment		$22,000		$2,200		$1,100	$220.00	$3,520.00

Annual Capital

Item	Total Cost	Annual Investment	Interest Rate	Annual Cost
Housing and Equipment	$22,000	$11,000	$ .06	$660.00
Sows 85 x 34.40 =	3,924	2,924	.08	233.92
Boars 4 x 150 =	600	600	.08	48.00
Total	$25,524	$14,524		$941.92

ECONOMIC CONSIDERATIONS IN COMBINING CATTLE AND HOG FEEDING OPERATIONS

Vernon Eidman
Department of Agricultural Economics
Oklahoma State University

Whenever producers of one enterprise enjoy a period of unusually favorable prices and net returns, others become interested in the possibility of adding this enterprise to their business. I am confident that if hog prices had been one-half of what they were the past two years, we would not be idscussing cattle-hog combinations today. However, some feedlot operators have shifted from feeding only cattle to cattle and hogs. Others are interested in the economic consequences of adding a hog feeding program to an existing cattle feedlot. Consequently, I will take as my point of departure that you are in the cattle feeding business. You have the alternative of expanding the business by feeding more cattle or by adding swine production. Based on your experience, you have a definite idea of the resources needed, cost involved and additional expected returns from adding more cattle feeding facilities. The material in this paper is an attempt to provide similar estimates for the addition of a hog enterprise and to analyze some of the potential advantages and disadvantages of making such a change.

The first section of the paper presents estimates of the additional resources that would be required by the hob enterprise, their cost and the average returns. The second section discusses some of the potential advantages and disadvantages in light of the cost and return estimates.

Swine Cost and Return Estimates

Modern production technology enables the swine producer to attain higher efficiency of labor use and feed conversion than ever before. However, to attain these high efficiences, the producer must utilize the recommended types of facilities and management practices. Consequently, the cost and return budgets for swine production make three general assumptions:

1. The producer provides the recommended confinement hog facilities for farrowing and feeding. These facilities provide concrete and slotted floors, environmental control in the farrowing facilities and a lagoon for manure disposal. The hog feeding facilities are not suited for cattle and vice versa. Consequently, entirely separate facilities are used for cattle and hogs.

2. The feedlot operator has all of the feed storage, mixing and handling equipment needed except a hammer mill (to provide the finer grind necessary for hog feed), a storage bin for soybean meal and several augers to move the ground milo and soybean meal to the mixer.

3. The manager has the knowhow to handle the hog system at the assumed level of efficiency without reducing the efficiency of his cattle operation.

Table 1 lists the production and required inputs for a 72 sow swine farrowing and feeding enterprise. It is assumed that the sows are divided into three groups of 24 each and that one group farrows every other month. This size of enterprise was selected because it is reasonably efficient in its use of facilities and labor. It can, of course, be expanded by multiplying all inputs (except the hammer mill and related feed handling equipment) by some factor. For instance a 144 sow unit would require double the amount of housing facilities, feed, labor and other inputs shown for the 72 sow unit. A 36 sow unit would require one-half of the inputs of a 72 sow unit, etc. Market hogs are valued at the average of monthly prices received by Oklahoma producers for the period October 1955 through September 1963. Feed prices for grain sorghum and soybean meal are the average of monthly prices paid by Oklahoma farmers for the three-year period 1964 through 1966. It is assumed that eight pigs are raised per litter and hogs on feed require 3.2 pounds of feed per pound of gain.

Total annual sales for the 72 sow unit are estimated at $46,378.47. Total specified expenses for the boars, feed, the annual cost of housing and equipment and other cash costs are $32,660.92. The difference between these two is the return to labor, operating capital, overhead, management and risk ($13,717.55). This is the estimated increase in annual returns for an operator who has enough available labor and operating capital to handle this enterprise without hiring additional help or borrowing additional money. Subtracting the value of the labor gives the return to the operating capital, overhead, management and risk.[1] Removing the charge for interest on the operating capital leaves the return to overhead, management and risk. This $8777.30 is the increased average annual return an operator would receive if he must hire all labor, purchase all inputs needed, and borrow the capital required to finance the hog operation.

Table 2 provides estimates of the annual sales and inputs required for finishing 45 pound feeder pigs. It is assumed the feedlot operator purchases approximately 180 pigs every other month and feeds them to 215 pounds. This plan utilizes the same set of finishing facilities as Table 1. It assumes a two percent death loss (22 pigs) during the 106 day feeding period. The price paid per Cwt. for feeder pigs is assumed to be 160 percent of the market price for fat hogs. Other prices and input requirements are similar to those for Table 1. The three return estimates are interpreted in a similar manner to those in Table 1.

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[1] Estimates of the labor required for hog production with the type of confinement facilities assumed vary greatly. One Illinois study reports less than 20 hours per sow per year. Others report as much as 60 hours per sow per year. The majority of studies based on actual farm records give average labor requirements of about 20 hours per sow per year plus 1.3 hours per pig finished. However, the range in labor requirements suggests that after a grower gains some experience with hog production, he may be able to reduce the labor requirements a great deal.

Table 1. Estimated Annual Production Requirements, Cost and Returns For Swine Farrowing and Feeding; 72 Sows Farrowing Twice Each Year (Three 24 Sow Units), A 24 Sow Unit Farrowing Every 60 Days (Replacements Raised)

I. Annual Sales	No.	Average Weight	Cwts.	Price/ Cwt.	Value
				$	$
Finished Hogs	1068	215	2296.2	17.45[3]	40,068.69
Sows, Non-Breeders	12	350	42.0	15.45	648.90
Sows After 2 Litters	72	520	374.4	14.45	5,410.08
Boars	4	600	24.0	10.45	250.80
Total Sales	1156		2736.6		46,278.47

II. Inputs	Unit	Quantity	Price	Value
Boars	Each	4	$125.00	500.00
Feed	Cwt.	9,427.8384	See Table 3	24,110.71
Vet. and Medicine	Head	1,156.0	1.50	1,734.00
Trucking	Cwt.	2,736.6	.30	820.98
Selling Expense	Head	1,156.0	.70	809.20
Annual Housing & Equip.		See Table 4		4,435.00
Variable Cost of Grinding Grain Sorghum[1]	Ton	362.41	.1368	49.58
Variable Cost of Mixing & Distributing Ration[1]	Ton	471.3	.1410	66.45
Taxes on Swine		72.0	1.875	135.00
Total Specified Expense	Sow			32,660.92
Returns to Labor, Oper. Capital Overhead, Mgmt. and Risk				13,717.55
Labor[2]	Hours	2,828.00	1.50	4,242.00
Returns to Oper. Capital, Overhead, Mgmt. and Risk				9,475.55
Interest on Annual Operating Capital	Dol.	9,975.0	.07	698.25
Returns to Overhead, Mgmt. and Risk				8,777.30

[1] Variable feed processing costs are composed of two parts; (1) the variable costs of operating the added equipment and (2) the variable costs of mixing and handling the hog feed using existing feed processing facilities. The variable costs to operate the hammermill and other added equipment are assumed to be $.0534 and $.0834 per ton for repairs and electricity respectively. The combined fuel, electricity and repair cost is assumed to be $.10 per ton for mixing the ration and $.041 per ton for the truck to place it in the feeder. These costs are based on a study by T.F. Webb, Improved Methods and Facilities for Commercial Cattle Feedlots, Marketing Research Report No. 517, USDA, Washington, D.C., May 1962, pp. 36-7.

[2] Labor required is assumed to be 20 hours per sow farrowing two litters and 1.3 hours per pig fattened.

[3] Prices used are the average for U.S. #1 and 2's, 200-240 pounds for October 1955 through September 1963 period.

Table 2. Estimated Annual Production Requirements, Cost and Returns for Fattening Feeder Pigs - Buy Forty-Five Pound Feeder Pigs Six Times Per Year and Sell 215 Pound Market Hogs

I. Annual Sales	No.	Average Weight	Cwt.	Price Per Cwt.	Dollar Value
Finished Hogs	1068	215	2296.20	$17.45[3]	40,068.69

II. Inputs	Unit	Quantity	Price	Value
45 Pound Feeder Pigs	Each	1,090.0	12.56[4]	13,690.40
Feed	Cwt.	6,055.561		15,367.04
Veterinarian & Medicine	Head	1,068.0	.50	534.00
Trucking	Cwt.	2,296.2	.30	688.86
Selling Expense	Head	1,068.0	.70	747.60
Annual Housing & Equipment		See Table 5		2,485.00
Variable Cost of Grinding Grain Sorghum[1]	Ton	233.15	.1368	31.90
Variable Cost of Mixing & Feed Distribution[1]	Ton	327.78	.1410	46.22
Taxes on Swine	Head	1,068.0	.068	72.62
Total Specified Expenses				33,663.64
Returns to Labor, Operating Capital, Overhead, Mgmt. and Risk				6,405.05
Labor[2]	Hours	1,388.0	1.50	2,082.00
Returns to Operating Capital, Overhead, Management and Risk				4,323.05
Interest on Annual Capital	Dol.	6,549.0	.07	458.43
Returns to Overhead, Mgmt. and Risk				3,864.62

[1] Variable feed processing costs are composed of two parts; (1) the variable costs of operating the added equipment and (2) the variable costs of mixing and handling the hog feed using existing feed processing facilities. The variable costs to operate the hammermill and other added equipment are assumed to be $.0534 and $.0834 per ton for repairs and electricity respectively. The combined fuel, electricity and repair cost is assumed to be $.10 per ton for mixing the ration and $.041 per ton for the truck to place it in the feeder. These costs are based on a study by T.F. Webb, Improved Methods and Facilities for Commercial Cattle Feedlots.

[2] Labor required is assumed to be 1.3 hours per pig fattened.

[3] Prices used are the average for U.S. #1 and 2's, 200-240 pounds for the October 1955 through September 1963 period.

[4] The price paid per hundredweight for feeder pigs is assumed to be 160 percent of the finished hog price. Some growers report paying 150 percent of the market price per hundredweight of pig purchased. This would reduce the cost per pig to $11.78 and the cost of 1090 pigs to $12,840.20. The $850.20 cost reduction would increase all return figures by an equal amount. For instance, returns to overhead, management and risk would be $4714.82.

Table 3. Assumed Feed Requirements For Hog Production[1]

Feed Ingredient	Price Per Cwt.[2]	Feed Requirements and Cost Per Sow of a Farrow and Finish Unit: Feed/Sow for Breeding Herd	Feed Required - 16 Pigs: Creep	Grower	Finisher	Total Feed Per Sow for Breeding Herd and Finishing	Cost of Feed	Quantity for a 72 Sow Unit	Feed Cost for a 72 Sow Unit	Feed Requirements For a Finishing Operation: Total Feed/Feeder Pig	Cost of Feed	Quantity per 1068 Pig Unit	Cost Feed per 1068 Pig Unit
Western Yellow Milo	1.89	2588.416	492.56	2662.54	4323.42	10,066.94	190.27	7248.1968	13,699.09	436.623	8.2522	4663.134	8,813.32
50 percent Soybean Meal	5.14	336.069	185.20	664.94	754.59	1,940.90	99.76	1397.3760	7,182.51	88.720	4.5602	947.530	4,870.30
Dehy. Alfalfa Meal	2.25	161.111	-	180.00	273.60	614.71	13.83	442.5912	995.83	28.350	.6379	302.778	681.25
Dry. B. Milk	9.00	-	24.00	-	-	24.00	2.16	17.2800	155.52	-	-	-	-
Tankage	4.25	80.555	-	-	-	80.56	3.42	58.0032	246.51	-	-	-	-
Dry Whey	6.00	-	40.00	-	-	40.00	2.40	28.8000	172.80	-	-	-	-
Dry Molasses	4.50	-	40.00	-	-	40.00	1.80	28.8000	129.60	-	-	-	-
Dicalcium Phosphate	4.25	19.972	8.80	52.19	52.26	133.22	5.66	95.9184	407.65	6.528	.2774	69.719	296.31
Calcium Carbonate	.75	11.764	2.56	13.15	26.82	54.29	.41	39.0888	29.32	2.498	.0187	26.679	20.01
T. M. Salt	2.25	16.111	4.00	18.00	27.36	65.47	1.47	47.1384	106.06	2.835	.0638	30.278	68.13
Vitamin - Mineral Antibiotic Supplement	40.00	8.222	2.28	9.18	13.95	34.23	13.69	24.6456	985.82	1.446	.5784	15.443	617.72
Total Lbs. or Cost per Pig										567.000	14.3886		
Total Lbs. or Cost per Sow		3222.220	800.00	3600.00	5472.00	13,094.22	334.87						
" " Cost/1068 Pigs												6055.561	$15,367.04
" " Cost/72 Sow Unit								9427.8384	24,110.71				

[1] The feed requirements are based on feed consumption estimates provided by the Department of Animal Science at Oklahoma State University

[2] Grain Sorghum and soybean meal prices are averages paid by Oklahoma farmers for the years 1964 through 1966. Other prices are those currently reported by local suppliers.

TABLE 4: ESTIMATED INVESTMENT AND OWNERSHIP COSTS FOR SWINE FARROWING AND FEEDING: 72 SOWS FARROWING TWICE EACH YEAR (THREE 24 SOW UNITS) ONE UNIT FARROWING EVERY 60 DAYS

Item	Quantity	New Cost	Years Life	Depreciation	Repairs % New Cost	Repairs Annual Cost	Insurance and Taxes 1% New Cost	Interest on Ave. Investment At 7%	Total Annual Cost
Farrowing Houses	2	$ 6000	10	$ 600	5	$ 300	$ 60	$210	$1170
Finishing Houses	6	12000	10	1200	5	600	120	420	2340
Sow Shelters & Fencing	3	3600	10	360	5	180	36	126	702
Boar Shelters & Fencing	4	400	10	40	5	20	4	14	78
Hammer mill (2 Ton/Hr. Capacity)& Electric Motor	1	400	10	40	-	1/	4	14	58
5 Ton Storage Bin	1	300	10	30	-	1/	3	10.5	43.5
Augers	3	300	10	30	-	1/	3	10.5	43.5
Total		$23000		$2300		$1100	$230	$805.0	$4435.0

TABLE 5: ESTIMATED INVESTMENT AND OWNERSHIP COSTS FOR SWINE FEEDING: BUY 45 POUND FEEDER PIGS SIX TIMES PER YEAR AND SELL 215 POUND MARKET HOGS IN 106 DAYS

Item	Quantity	New Cost	Years Life	Depreciation	Repairs % New Cost	Repairs Annual Cost	Insurance and Taxes 1% New Cost	Interest on Ave. Investment at 7%	Total Annual Cost
Finishing Houses	6	$12000	10	$1200	5	$600.00	$120	$420	$2340
Hammer mill (2 Ton/Hr. Capacity) & Elec. Motor	1	400	10	40	-	1/	4	14	58
5 Ton Storage Bin	1	300	10	30	-	1/	3	10.5	43.5
Augers	3	300	10	30	-	1/	3	10.5	43.5
		$13000		$1300		$600.00	$130	$455.0	$2485.0

1/ Repairs on the hammer mill, motor, augers and additional bin were estimated at $.0534 per ton of feed processed and are included as part of the variable cost of grinding grain sorghum in Tables 1 and 2.

Some operators are interested in a farrow and finish unit. The majority would probably prefer to buy 45 pound feeder pigs and finish them. Relatively few feeder pigs are available in Oklahoma each year. Consequently, the operator who does not plan to farrow his own pigs may want to contract with one or more producers to insure himself a relatively constant supply. Finding the man who will raise the feeder pigs may be a major problem.

Potential Benefits of Cattle-Hog Combinations

The first potential benefit resulting from a cattle-hog combination is better utilization of labor, buildings and feed handling equipment. The feedlot operator may have a man which operates the feed mill and others the feed trucks. In some cases these men could process and deliver feed to hogs without greatly increasing the total number of hours they work. Self-fed rations for hogs increase the flexibility of the day and time that the hog rations must be prepared. Consequently, they can be fit into the schedule of preparing cattle rations somewhat easier than the feed preparation for additional pens of cattle. This consideration may reduce the amount of additional labor required by the hog enterprise. The amount of reduction depends on the specific situation.

In addition to increased labor efficiency, the increased use for the feed mill, scales and other feed handling equipment would also spread the fixed costs of these facilities over more tons of feed. Each sow unit in the farrow and finish budget requires 6.5 tons of processed feed. Each 100 pigs in the finishing operation requires 28.3 tons of feed. If a steer requires 2.5 tons of feed, then a sow is equivalent to about 2.5 steers, while 100 feeder pigs are equivalent to 11 steers in terms of the milling capacity utilized.

The importance of the complementary effects of labor and machine use will depend on the individual situation. In general, I doubt that a well organized feedlot will increase either the efficiency of labor or machine use much more by feeding both cattle and hogs than by feeding additional cattle.

A second possible advantage is that the manager has more flexibility in the use of his resources. If feeder cattle prices and feed costs are high relative to the expected fat cattle prices, the manager with hog facilities could make use of the additional labor and mill capacity by feeding more hogs. In periods when cattle feeding is more profitable, hog production could be cut back.

There are a number of ways the operator may want to use the flexibility provided by the hog enterprise. He may want to vary the number of sows farrowing per unit, but maintain six farrowings and marketing periods per year. On the other hand, the operator could maintain only one or two groups of sows and let the facilities stand idle the remainder of the year. The latter method might be particularly appealing to those operators who usually have their feedlot filled to only partial capacity during certain seasons of the year.

Table 6 provides the monthly average prices and seasonal index for the October 1955 through September 1963 periods for U.S. #1 and #2, 200-240 pound market hogs. A grower finishing six equal size pens of hogs per year could arrange his operation to follow either plan A or plan B shown in Table 7. There is very little difference in the seasonal average prices if both plans are operated at full capacity. However, the data in Table 7 does indicate that eliminating pigs farrowed by sow groups number 3 in plan A or group 2 in plan B would reduce gross returns less than if one of the other groups were omitted.

The net returns to overhead, management and risk for alternative utilization rates of the 72-sow farrow and finish unit are shown in Chart 1. The upper line indicates the level of returns assuming the unit is used for three 24 sow units with either marketing plan A or plan B. By moving along the "full capacity" line, one can determine the level of returns for a range in the average annual hog price. Notice that the operator would obtain a zero return if hog prices average $14.24 per hundredweight and (of course) $8777.30 when the annual price averages $17.45. If the operator utilizes the facilities at one-half capacity (with three 12 sow units) the breakeven price is $15.86 per hundredweight and the return at an average annual price of $17.45 decreases to only $2171.15. If the operator uses the facilities for the two groups of sows in plan A which will give the highest average prices (groups 1 and 2), the return for the average annual price of $17.45 is $4870.39. The breakeven price in this case is $14.78. Operating the facilities with only one group of sows for Plan A (group 1) would result in returns of only $463.99 per year when the average annual price is $17.45. The breakeven price for the 1/3 capacity situation is $16.94 per hundredweight. If the relationship for 2/3 and 1/3 capacity utilization rates was drawn for other alternatives, the breakeven cost would be higher and the returns lower for any given annual average price of finished hogs than for those shown.

Chart 2 provides a similar analysis for the operator buying feeder pigs. The returns line for each capacity level assumes that the price paid per hundredweight for the feeder pigs is 160 percent of the price received for market hogs. As one would expect based on the information in Table 2, the breakeven price is higher and returns (for any given annual average price) are lower for the feeder pig operation than for the farrow and finish unit producing the same number of market hogs. The breakeven price at full capacity is $14.89 and at one-half capacity is $16.54. Feeding only four bunches of hogs per year and selling them on the most favorable seasonal markets has a breakeven cost of $15.23. Feeding at 1/3 capacity requires an annual average price of $17.63 for the operator to cover both fixed and variable costs.

Charts 1 and 2 are also useful in indicating the amount of net hog returns a grower sacrifices by operating at partial capacity. For instance, with an annual average price of $17.45 per hundredweight the return to overhead, management and risk is reduced ($8777.30-2171.15) $6606.15 by cutting from full to one-half capacity. At the same price level the operator finishing feeder pigs would reduce returns ($3864.62-689.82) $3174.80. Hence, the operator that utilizes hog facilities at partial capacity on a regular basis must determine if the same labor, capital and mill capacity devoted to cattle feeding will yield enough returns to more than offset this reduced hog return. In general, it appears this will only be true in exceptional cases, such as years of very low hog prices and/or periods of very favorable cattle feeding margins.

Table 6. Monthly average Prices and Seasonal Index for the October 1965 - September 1963 Period For U.S. #1 and #2, 200-240 Pound Barrows and Gilts on the Oklahoma City Market

Month	Average Price	Seasonal Index
January	$17.03	97.6
February	17.05	97.7
March	17.01	97.5
April	17.17	98.4
May	17.49	100.2
June	18.43	105.6
July	18.98	108.8
August	18.76	107.5
September	17.89	102.5
October	16.86	96.6
November	16.24	93.1
December	16.50	94.5

Table 7. Average Seasonal Index of Hog Prices for Two Alternative Marketing Plans

	Plan A		Plan B	
Sow Group Number	Months of Hog Sales	Average Price Index	Months of Hog Sales	Average Price Index
1	Jan. & July	103.2	Feb. & Aug.	102.6
2	Mar. & Sept.	100.0	Apr. & Oct.	97.5
3	May & Nov.	96.6	June & Dec.	100.0

Feedlot operators are always interested in reducing the risk of cattle feeding. The relative profitability of cattle and hogs is not always the same. Consequently, one should consider the effect of diversification with a cattle-hog combination on the year-to-year income variability of the total operation. This is a third point to be considered.

One method of evaluating this effect is to examine the price movements for slaughter hogs and cattle over a period of time. The cattle cycle has been averaging about 10 years and the hog cycle 4 years in length. Consequently the ten-year cattle cycle contains about 2 1/2 hog cycles. Examining data for recent years, one finds the number of cattle and calves on farms in the U.S. reached a peak in 1955 and again in 1965. The number of pigs saved reached a peak in 1955, 1959 and again in 1963. The average monthly prices for slaughter hogs and choice slaughter steers at the Oklahoma City Market have been plotted for that period on Chart 3. (The first peak year, 1955, is omitted to give a true 10 year cycle.) In looking at these data, one must keep in mind that the highest seasonal hog prices occur in June through August and the lowest in November and December. The seasonal variation in choice slaughter steers is less pronounced. However, the highs tend to occur in April and September.

In examining Chart 3, one should keep in mind that cattle sold during periods of declining prices tend to be less profitable than those sold during periods of constant or increasing prices. We concluded above that net returns from hog production would be small or negative when hog prices dropped below $15.00. Notice that each period having hog prices below $15.00 is accompanied by declining cattle prices. The difference in phase of the cycles does suggest that there would have been some periods during which high returns from hogs would have offset low returns from cattle and vice versa. But it does not appear that returns from cattle will be great in the years of lowest returns from hogs. This is, of course, to be expected for two commodities that substitute in the consumer's diet as readily as do beef and pork. Looking at historic data only suggests what has or could have happened and not necessarily what will happen in the future. However, I see no reason to expect future cattle and hog prices to move together with less regularity than the have in the past.

Conclusions

Assuming the operator can gain enough experience to do a good job of converting labor, feed and other inputs into pork, I see no reason an Oklahoma feedlot operator could not increase net returns by adding a swine enterprise to his business. However, cattle feedling and swine production are basically competitive enterprises. They compete for the manager's time, for labor, and the capital available to the business. Some increased efficiency in the use of labor, feed milling and distribution equipment can probably be obtained by adding a hog enterprise to most feedlot operations. However, the operator should consider if the same increase in efficiency could be obtained by feeding more cattle.

It was suggested that adding hog production might increase the operator's flexibility in the type of livestock he feeds. The cost and return figures used in this paper suggest that operating at 1/3 to 2/3 capacity greatly reduces the operator's net returns - unless hog prices are quite low. During the last ten years, periods of low hog prices have also been periods of declining cattle prices. Consequently, it may be difficult to use this increased flexibility to increase the net returns of the operation.

CHART 1: RETURNS TO OVERHEAD MANAGEMENT AND RISK AT FOUR ALTERNATIVE UTILIZATION RATES FOR THE FARROW AND FINISH UNIT HAVING A 72 SOW CAPACITY

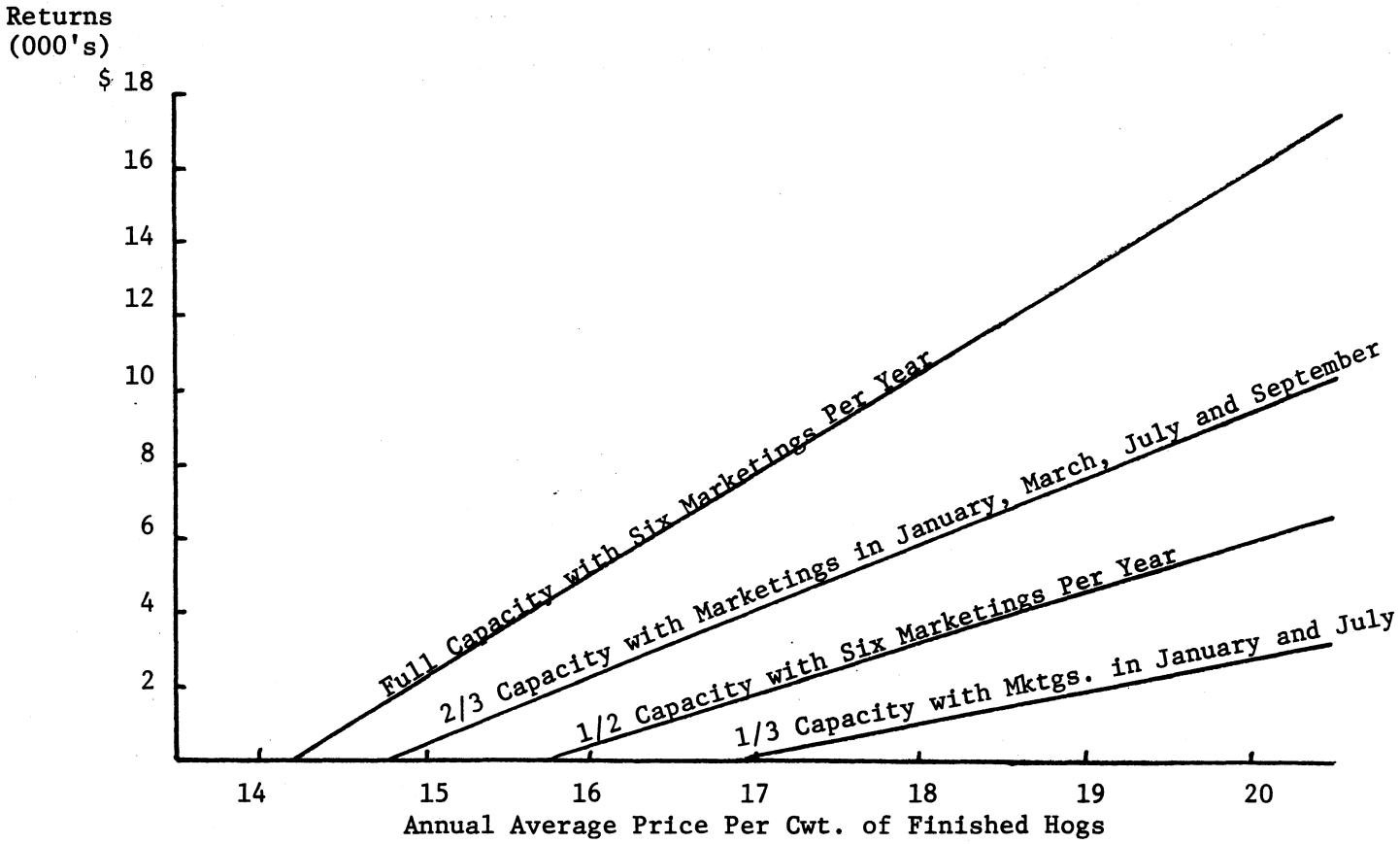
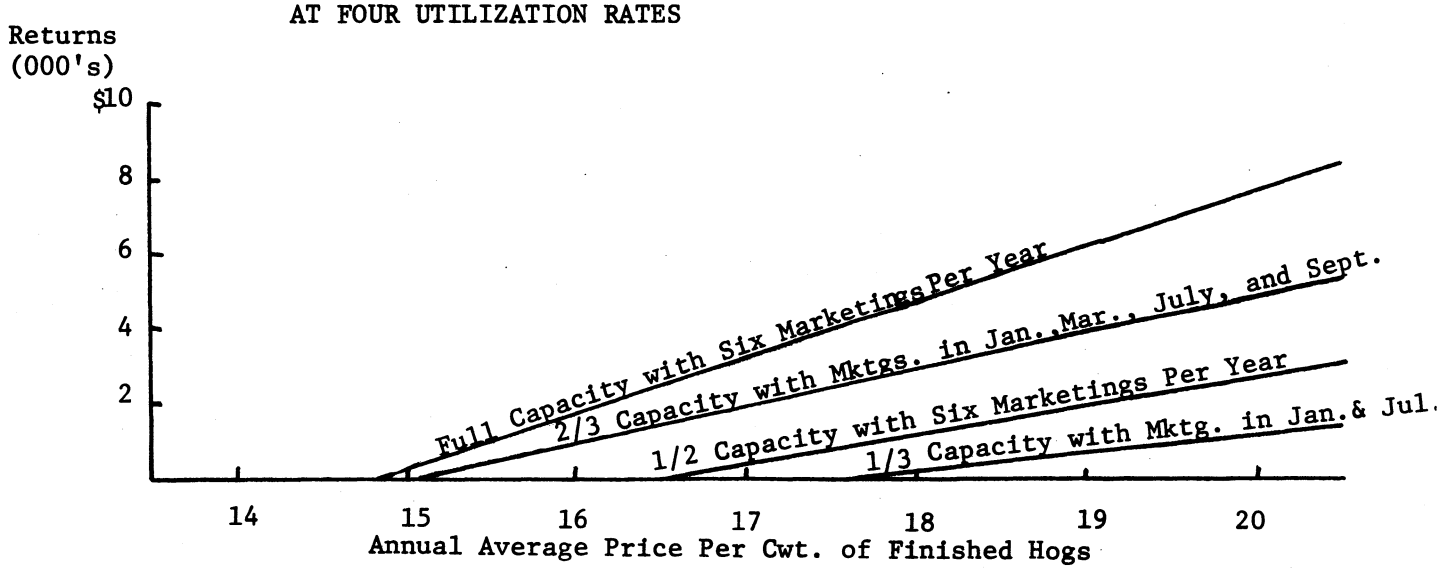
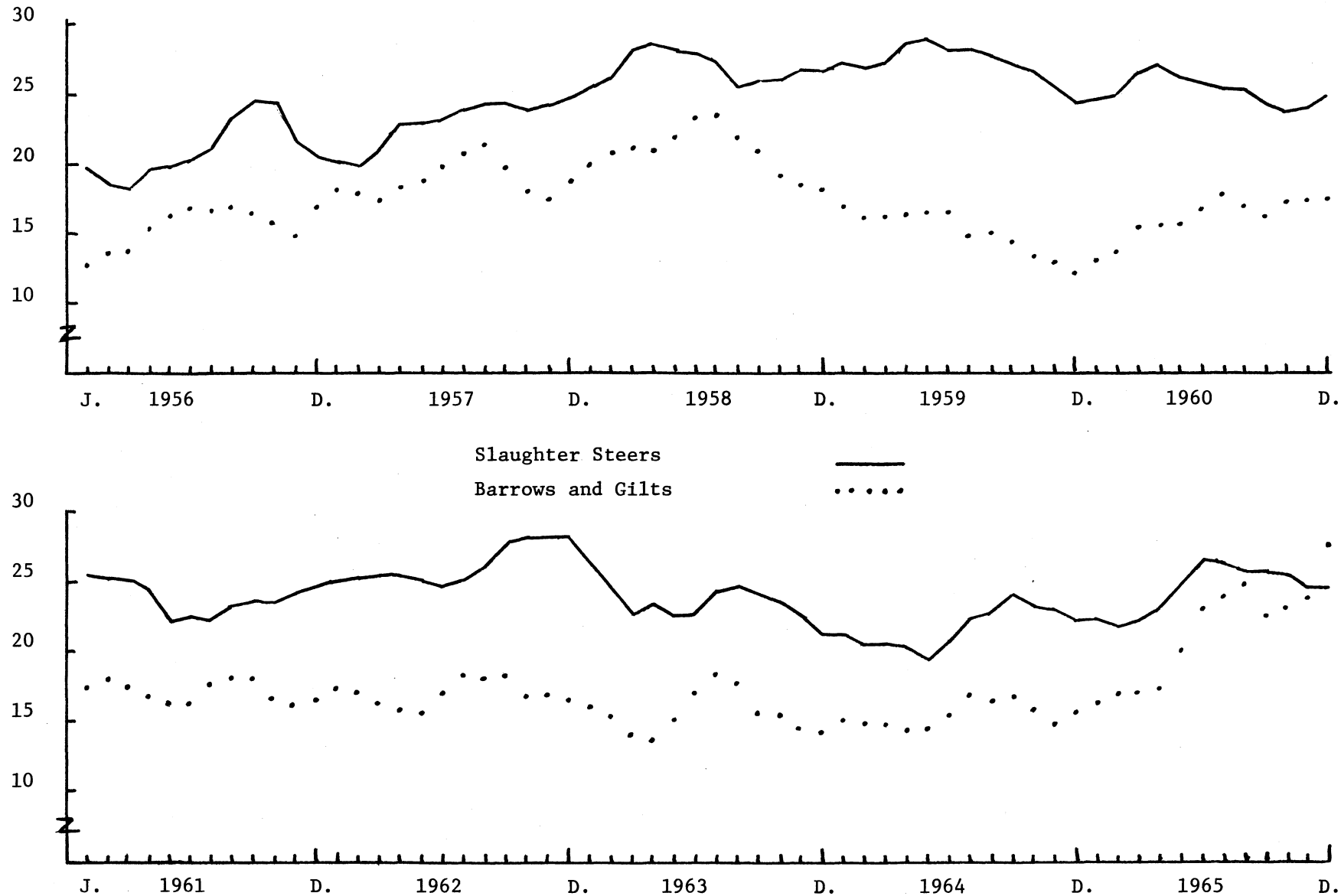


CHART 2: RETURNS TO OVERHEAD, MANAGEMENT AND RISK FOR THE FINISHING UNIT AT FOUR UTILIZATION RATES



OKLAHOMA CITY MARKET MONTHLY PRICES FOR U.S. 1-3 (200-270#)
MARKET HOGS AND CHOICE SLAUGHTER STEERS



CATTLE FEEDING AND THE FUTURES MARKET

Roy V. Edwards, Executive Vice-President
Wilson and Company, Inc.
Oklahoma City, Oklahoma

It is always a pleasure for me to return to these familiar surroundings to visit with old friends, and to have the opportunity to make new ones. On this visit I regard it a real privilege to participate in a program concerned with cattle feeding -- surely one of Oklahoma's most dynamic growth industries.

To my knowledge, many industries regard a four or five percent average annual growth rate as one that represents real progress; something as high as 20 percent per year would be considered almost too good to be true. Yet, the average annual increase over the past five years in Oklahoma fed-cattle marketings has actually been over 20 percent. Put perhaps even more impressively, fed marketings have more than doubled in this state in only five short years.

To touch just briefly on the reasons for this growth, I am personally inclined to think first of people. For cattle feeding to move ahead, there has to be both talented teachers and apt pupils. I am privileged to know a number of the men in Oklahoma whose job it is to provide advice and counsel to the cattle industry on economic, financial, and technical matters, and these contacts lead me to one conclusion: the Oklahoma cattleman is extremely fortunate in having access to the large reservoir of talent and expertise possessed by these men. Beginning here with the educational leadership provided by O.S.U., and extending across the agribusiness community of the state, the cattle feeder has an opportunity to obtain all the help necessary to keep him fully competitive with other regions in the all-important area of operating know-how.

But any profitably expanding industry must also have the right kind of economic climate. This is an area, based upon all the studies I have seen, where Oklahoma cattle feeding ranks right among the leaders. On the raw material side, we have both a large local supply of feeder cattle and a surplus of feed grains in nearby Kansas and Texas. In terms of product outlets, there are not only the large beef consuming markets here in Oklahoma and the Southwest, but within fair proximity are major population centers in both the southeastern and far western regions of the U.S.

In this connection, we might note the unusually strong demand for beef in southwestern markets that prevailed this past year, at least as we saw it from the vantage point of Wilson's Oklahoma City plant. Some of us had thought that the big increase in Texas fed-cattle marketings during much of 1966 would cause fed-beef prices in the Southwest to become relatively depressed, leading to major diversion of product to either southeast or west-coast markets. But this did not happen; the demand for beef by Texas, Oklahoma and Louisiana consumers apparently strengthened and expanded relative to other regions, and we continued to sell most of our Oklahoma City plant output in the Southwest, notwithstanding the big increase in marketings in this area.

So, by way of capsule appraisal of the overall cattle feeding business in Oklahoma, we basically see an industry with an exceptionally strong and rising consumer demand for its products, and a superior location for its production facilities. These are factors, I might add, that are ordinarily regarded as key ingredients for success in American industry generally, and I know of no reason why Oklahoma cattle feeding should be an exception to the pattern. Quite probably, much of our recent growth in feeding in the state has been motivated by the profit potentials of the future and, for the well-managed operation, I am confident that those potentials exist.

Turning now more directly to some of the alternatives of the individual cattle feeder as he tries to capitalize upon this industry outlook, we immediately recognize that, in some degree, each and every one of the some 1,750 cattle feeders in Oklahoma has his own unique set of circumstances. An important case in point concerns the extent to which any particular feeder should expand his feeding operations. Nationwide, we know that large, commercial feedlots are becoming more important, with some 40 percent of all fed-cattle marketings reported to be coming out of feedlots with a capacity of over 1,000 head.

Yet, at the same time, we have important feeding states like Iowa and Minnesota, with very few large-scale feedlots; here the conventional farmer-feeder dominates the scene, typically turning out just a few truckloads a year. He realizes that certain of his feedlot costs might be lower if he had a large, specialized operation with feedlots filled to capacity throughout the year. But he is also convinced that he can neither afford to neglect his cash-grain crops during the critical growing season, nor can he afford to just sit in his rocking-chair during the nongrowing season.

In short, we suggest that expansion from forty up to eighty head per year may be just as correct a decision for one particular feeder as it is for another who increases his lot capacity from 500 to 1,000 head. Differences in costs associated with different capacities may not be as important an influence on total earnings as such factors as the degree of conflict with alternative enterprises, the interests and abilities of the cattle feeder, and last but not least -- the state of the feeder's financial resources. Decision-making in this area must largely be dealt with on a case-by-case basis, fully utilizing the talents available in this state that we mentioned earlier.

Now, while no two situations are precisely alike, a significant expansion program for small and large cattle feeders alike means an increased need for outside sources of capital, with the exception of those fortunate few who have an abundance of liquid assets. Other things equal, the financing of cattle feeding expansion has historically been on a more restrictive basis than has been the case for most other agricultural enterprises, and for understandable reasons. As we must readily concede, the history of cattle feeding has clearly shown it to be a relatively high-risk enterprise. While profits have been good on the average, short-term periods of badly depressed fat-cattle prices have figuratively wiped out numerous operations before they could get solidly established. And unfair as it may seem, this has happened to both relatively efficient and higher-cost feeders alike. This came about, of course, because the feeder could be a master in the management of a feedlot, yet have no meaningful control over his results because he had no means of fixing his selling price.

For a number of years we have known that at least some livestock producers were much concerned about this vulnerability to adverse market price changes. They have talked to packers about working out some means of contracting ahead, so that they could have more assurance concerning the price their livestock would bring at marketing time. But the packing industry never came forth with any such contracting program for the simple reason that the price risk was much greater than it could incur, in the absence of any means to transfer the risk elsewhere.

Theoretically, there has always been one possible way for the packer to transfer such price risk, and that would be to sign forward contracts for the sale of meat at the same time that the packer signed forward contracts for the purchase of livestock. But retailers have generally had little or no interest in contracting very far ahead for their meat supplies, and therefore the packer could not transfer price risk in this manner in any significant degree. Typically, a chain wants to buy fresh meat this week for delivery next week. Occasionally, efforts are made by retailers to contract several weeks in advance, as in the case of smoked or canned hams for Christmas or Easter.

With this brief bit of background on some of the difficulties in finding feasible ways of transferring price risk from our cattle marketing system, it is perhaps easier to understand why many -- including myself -- have strongly felt that a cattle futures market deserved a solid trial in accomplishing this end. Some years ago, I had the opportunity to handle Wilson & Co.'s futures trading and hedging operations in lard and other fats and oils, and I became a confirmed believer at that time in the essential functions that can be performed by a viable futures market, especially for the processor who wants to transfer some of his price risk to other parties.

In a very real sense, the cattle feeder can, of course, be considered a processor. He has much more in common with other types of processors making heavy use of the futures market for hedging purposes than he may at first realize. Just like the cattle feeder, both the soybean crusher and the flour miller buy raw materials, change their form, carry sizeable inventories, and have an operating margin that is small in relation to product price variations. In the presence of a hedging opportunity, the crusher and miller can compute their margins closely, concentrate on technical efficiency in processing, reduce their financing costs, and operate on narrower margins than would otherwise be possible. The cattle feeder should be able to do precisely the same thing.

I know that Mr. Waldner was on your program this morning and explained many of the technical and mechanical aspects of futures trading. He and his colleagues from the marketing agencies are making a major contribution in bringing about a better understanding of these somewhat new and complex concepts. I call them complex because many people find them difficult to absorb immediately, even though they may later seem simple. In a sense, futures trading has a language all its own.

Perhaps only partly in jest, A. G. Osgood, Vice President of the Harris Trust & Savings Bank of Chicago, defined futures trading in these terms: "It's buying something you can't get with money you haven't got, and then selling what you never had and did not pay for, at more than it cost."

While we can easily joke about futures, the fact nevertheless remains that solid understanding of it must be achieved by hedgers -- by the people who have risks to shift, and who would like to have price insurance -- because history has clearly shown that a futures market can never be successful without them. As Tom Hieronymus of the University of Illinois has aptly put it, "Futures trading develops in the presence of risk shifting. All else -- the speculation, the contract terms, the place of trading -- falls in place around this central consideration. Futures markets are sometimes started where major risk shifting does not occur. In the past, these have faded and disappeared."

As we in Wilson saw the problem, the futures market needed hedging activity, but there could be a number of cattle feeders, especially smaller operators, who might feel that they could not really justify the time required to learn how to use this new market successfully, and to follow it on a continuing basis. So we proceeded to develop a program, just as simple and straight-forward as we could conceivably make it, whereby a cattle feeder can eliminate his price risk without having to get involved in the hedging operation.

From the feeder's standpoint, the program can be described in just a sentence or two. Here in Oklahoma, Wilson will sign a contract at a specific price for fed cattle to be delivered at its Oklahoma City plant at some agreed-upon future date. The contract price is based upon cattle grading 80 percent choice and 20 percent top-good, and with the average dressing yield of 61 $\frac{1}{2}$ percent. All variations up or down in the actual grade or yield means that the base price will be adjusted up or down, depending upon the market price differentials prevailing at time of delivery.

While the feeder does not get involved in any way, Wilson proceeds to sell a futures contract at the same time that it is buying the cattle from the producer, with the hedge placed in the option month corresponding most closely to the time of expected delivery of the cattle. Wilson has thereby transferred its price risk to an outside party.

As you know, the futures price varies from one delivery month to another, so the cash price we offer for contracted cattle will show such variations with time of delivery, and it will discount the futures market level by only that amount which will enable us to simply break even in providing this service to cattle feeders. In other words, we want to end up with cattle delivered to our Oklahoma City plant at a cost in line with those bought on the open market, after considering the combined cash and futures market transactions.

Perhaps I should also point out here that we have not yet learned of any way to handle this program whereby we can just break even on each individual transaction. Rather, this is our objective over an average of several weeks, and we will necessarily narrow or widen our differential between our contract price and the futures market, depending upon the actual experience we encounter, compared with our original forecasts of price differences between locations and between futures and cash markets.

I well remember a situation a few weeks ago when we had cattle delivered to our plants at a time when the futures market was something like $1.50 a hundredweight over the Chicago cash market. We had no recourse but to buy our contracts at that time, since deliveries of cattle can be made against Chicago Mercantile Exchange contracts only during essentially the last week of every other month of the year. In this case, our forecast of the futures-cash price difference was off the mark, and we paid the penalty. Put another way, a hege can eliminate much price risk, but seldom 100 percent of it.

In passing, I might point out that this example also serves to indicate how futures trading rules are still considerably short of perfection. When improvement comes about, some of the risk still remaining in the hedging operation will be removed, the hedging process will be less expensive, and futures trading volume will reach higher levels than will otherwise be the case.

To summarize briefly the key advantages of this contracting program for each party, the packer can assure part of his future slaughter requirements, thereby realizing a more efficient slaughter operation. He becomes somewhat less vulnerable to those provisions of his labor contract that guarantee 36 hours of work each week to plant production employees, regardless of the daily and weekly availability of cattle.

From the feeder's standpoint, this contracting program above all else provides a means of eliminating price risk. Secondly, to whatever extent the feeder's costs are below the contract selling price, he will be able to fix, or "lock-in", a profit margin. Third, this greater certainty of a profit makes it possible to do more solid advance planning and budgeting of future operations. Fourth, elimination of price risk makes the feeder a better credit risk, and enables his lending agency to safely make more capital available for expansion purposes than could otherwise be done. The fact that a $25 per head advance payment is made to the feeder, at the time our Wilson contract is signed, also obviously helps financial flexibility. A firm contract, plus this advance payment, should make it easier for the feeder to buy more cattle and expand his operation.

And last, but not least among the program's advantages, the feeder need not be involved himself with any of the problems of carrying out an effective hedge in the futures market. He does not, for instance, have to worry about being overhedged or underhedged; with each futures market contract equal to about 24 head, and since fractions of contracts cannot be traded, a problem arises every time you must hedge a number other than a multiple of 24 head. There really is no alternative in such cases but to be either overhedged or underhedged, which keeps you exposed in this degree to the very price risk you are trying to avoid.

In addition, price differences between the local market and Chicago do not always remain constant, the futures and cash markets do not always come together precisely as the textbooks say they should, and hedges can turn out to be placed in the wrong month when cattle in the feedlot gain much faster or slower than you expected. We are saying two things here: first, the relatively large hedger is willing to take on these types of risks because they are far smaller than those involved in being completely unhedged; second, since he is handling cattle week-in and week-out, these types of hedging costs have a chance to average out over quite short periods of time.

However, for the small feeder doing his own hedging and selling only once or twice a year, there is no equal opportunity to average out very quickly on these kinds of costs. His hedge, of course, protects him from catastrophic loss associated with a sharply breaking market.

Now, above all else, we want to underscore the one thing the feeder gives up by hedging his operation, whether done directly or through our contracting program. It is simply this: he gives up his chance for a windfall, or an unexpected, profit. Let us take an illustration where the appropriate futures market is $26 when reflected to a local basis, and neither a given feeder nor his banker have any particular evidence or reason to expect the market to be higher than $26 at delivery time. So they hedge at this level, but then comes marketing time and the price has moved up to $28. The feeder is perhaps disappointed at this apparent loss of $2, but he recalls that he not only had the price insurance and other benefits of hedging, but he also received a price in line with the level he originally expected. He lost only what he did not originally expect to get anyway, so what he really lost was the windfall, or unexpected profit.

With this illustration we also implied that the cattle feeder and his banker at least looked at the possibility that the futures price was too low in light of expected supply and demand conditions, and that the speculators operating in the futures market were unduly bearish. I think that, as a matter of course, a cattle feeder might look for this possibility, especially if he has definite analytical talents of his own, but he should remember at all times that active speculators in the market are backing up their judgment with hard cash, and that there are many potential speculators ready to come into the market when they think the price level is below what it will be in any given delivery month. Incidentally, studies made in other commodities have indicated that speculators, as a group, surprisingly did not show any significant profits over a several-year period; since they are traditionally buyers, or on the "long" side of the market, this suggests that prices in the futures markets included in these studies could not have been considered unduly depressed. In passing, we might note how the cattle futures market during much of the past year turned out to be too high in relation to the cash market, and we can surmise that the unjustified bullishness of speculators was quite costly for them.

Returning to the hedger, we would go a step further and maintain that, in a real sense, the forecasting accuracy of the futures market is not of primary concern to him. He wants a satisfactory margin between his estimated fat cost and the futures market price as brought to a local basis. Once this goal is achieved, he is in business. As said earlier, he has locked in his profit, and it then becomes somewhat academic as to how right or wrong the futures price turns out to be.

Perhaps one of the most frustrating experiences, for the cattle feeder wishing to hedge, is when he cannot get feeder cattle bought and fed out at a price that is enough below the futures price to give him any kind of an operating margin. One alternative for him, of course, is to go ahead and feed without hedging, thereby betting that the futures market price is wrong, and that it will be higher at marketing time. To the feeder following this practice, we would offer one suggestion: If he is really in a financial position to take the risk, and really convinced that the futures market is too low, then he ought to consider buying a futures contract instead of feeder cattle in order to maximize his results. This action should either minimize losses or increase profits for him, depending upon the ultimate cash market movement.

But we should always take a moment, I believe, to take note of what the futures market is trying to tell us, either when its price level is quite high or low in relation to the current cash market or feeding costs. For instance, the price in futures market options for next fall is considerably above the current cash market, and it is, in effect saying this to the cattle feeder: "Look, don't curtail your feeding operation just because your costs may be higher than the current fat cattle market; if you are an efficient enough feeder to have a good profit margin when placing a hedge in the futures market, you should be expanding your feeding operation."

Conversely, a low futures-market price is trying to tell the feeder that the supply and demand outlook is not good, and that he ought to hold back on expansion for the time being. We see, therefore, that the futures market is acting as a barometer; it is giving signals to the cattle industry, encouraging it to expand when the price outlook is bright, and likewise pushing it toward curtailed operations when the price outlook is poor. For these reasons we suggest that the futures market brings a price-stabilizing action to the cattle business, helping it to make more rapid adjustments to changing supply and demand conditions, and keeping prices from getting as high or low as they would otherwise go.

Parenthetically, we might add that some folks have questioned this price stabilizing hypothesis by saying that the process of achieving price stability is self-defeating, since it in turn eliminates the need for a futures market and, when this takes place, our past periods of violent price fluctuations will return. We personally question the likelihood of this kind of cycle, since the futures market can hardly single-handedly bring about such complete price stability. The whole matter is one of degree. We simply contend that the futures market can reduce the violence of past price fluctuations, and this is a worthwhile contribution, without expecting it to eliminate all variation.

By way of a few concluding and summarizing comments, we have seen that price risk has always been a major problem for the cattle feeding industry, and that it can be especially serious for feeders that want to grow and become more specialized. A new marketing tool has now come along, known as the cattle futures market, that can enable the cattle feeder to substantially eliminate this traditional headache of adverse price changes. Among other things, it enables him to "spin off" the main speculative element of his operation, and permits him to concentrate all of his energy and talent on the processing or feedlot function, which is the job that he is best equipped to do. Going a step further, the cattle feeder even has a choice of alternatives as to how he hedges his operation; he can either carry out his own hedging program directly in the futures market, or he can consider a simple forward contract of the type that Wilson has available. Basically, the latter route enables the feeder to divest himself of just a little more of those activities not directly related to feedlot efficiency and performance. So again, his choice depends much upon where he wants to concentrate his time and attention.

In addition to its risk-shifting function, the futures market provides a set of continuing prices that can be used by the cattle feeder as a barometer in planning his program on a more informed and intelligent basis. We believe that the utility of these price guides will become increasingly recognized; anything that improves our ability to plan our business on a more meaningful basis is certain to have far-reaching value.

I thank you sincerely for the opportunity to participate in this seminar.

CONFINEMENT FEEDING

S. A. Ewing
Professor of Animal Science
Oklahoma State University

Providing confined or high density feeding facilities for commercial cattle feeding is receiving considerable interest in certain areas of the country. This interest is based largely on two things: (1) The desire to locate feedlots in or near areas of high population density where space can be very expensive. Thus, feeders in these areas may be interested in feeding facilities that minimize space requirements. (2) In certain areas, interest stems from the possibility of providing an environment for the animals that can hopefully give better performance and efficiency than is possible by merely providing a pen to hold the animals. Providing a more completely controlled environment receives most interest presently in the colder climates. There seems to be very limited interest at present in power controlled environment in areas where heat stress is likely to be a problem, however, power assisted air movement may be an important consideration even in open-confinement facilities.

In any case however, space costs money and in some instances the cost of space stimulates interest in attaining maximum animal density in order to spread space costs among more production units. Then secondly if a confinement facility is built, whether it be an open or closed facility, whether it has slotted or solid floors, the producer must be concerned with space requirements and other problems that may be associated with confinement or high animal density.

Research in the area of confinement feeding is limited at present but it is possible to assemble some data to show the areas being explored.

The Michigan station has published work recently concerning space allowances for cattle as well as limited work which deals with closed, insulated power-ventilated housing. Table 1 summarizes one test to study space allowance in a covered facility open to the south.

Table 1. Effect of Space Allowance on Feedlot Performance of Steers (Michigan, 1965)

	Square Feet Per Head			
	55	45	35	25
Initial Wt., lbs.	704	705	704	704
Final Wt., lbs.	981	1003	973	981
Daily Gain, lbs. (115 days, February-June)	2.41	2.59	2.34	2.41
Feed/100 lbs. gain, lbs. D.M.	818	857	829	871

In this test there appears to be no relationship between space allowance (from 25 up to 55 square feet per head) and rate or efficiency of gain. These same workers conducted a second study with space allowance from 20 to 35 square feet per head. This data reported in 1966 is summarized in Table 2. Again the housing was a covered structure open to the south.

Table 2. Effect of Space Allowance on Feedlot Performance of Steers (Michigan, 1966)

	Square Feet Per Head			
	35	30	25	20
Initial Wt., lbs.	429	429	430	430
Final Wt., lbs.	1000	986	958	946
Daily Gain, lbs. (213 Days, January-July)	2.68	2.62	2.48	2.43
Feed/100 lbs. gain, lbs. D.M.	659	685	710	734
Dressing Percent	61	60	61	62
Carcass Grade*[1]	10.6	10.8	10.2	10.4
Carcass Cutability	49.0	48.8	49.5	49.1

*1 10 = Low Choice, 11 = Average Choice

In this study rate of gain and feed efficiency were directly related to space allowance up to 30 square feet per head with only small differences between 30 and 35 square feet. From this data it would appear that a space allowance of 30 to 35 square feet may be approaching a minimum for maximum performance. The greatest difference in performance occurred among space allowance groups during the last 46 days of the test, during which time the steers had reached 900 pounds. At weights below this even the lowest space allowance (20 square feet) appeared to be adequate. Cost of gain was, of course, directly related to feed efficiency. Only small differences in carcass grade or cutability scores were noted.

For the past two years the O.S.U. Agricultural Engineering and Animal Science Departments have had a cooperative research program concerning confinement feeding facility design and space allowance. This design involves a covered facility with slotted floors. Windbreak protection on the north is provided in winter and all sides are open in summer. The pens are located above pits in which the manure has remained during the entire feeding period and removed then by pumping for field distribution. The cattle have been provided either 25 or 15 square feet per head. The latter allowance is considered maximum density. In addition a group of cattle has been fed outside in a dirt lot without protection. In the outside lot a space allowance of 100 square feet per steer has been standard. A circular self feeder is located in the center of the pens with cattle have access from all sides.

The results of these studies with yearling steers are summarized in Tables 3 and 4.

It is readily apparent when both trials are considered that about equal performance and efficiency was obtained in the open lot (100 square feet) and the confined lot, providing 25 square feet per head. Maximum density (15 square feet) resulted in a severe depression in rate and efficiency of gain in both trials. The unusually poor feed efficiency for all groups in the first lot is not explained but a part may have been due to feed wastage. Feeder design was changed for the second trial.

Table 3. Influence of Feedlot Facility and Space Allowance on Feedlot Performance of Steers (Oklahoma, 1965)

Feeding Facility	Open Pen	Elevated Slotted Floor	
Space Allowance, sq.ft.	100	25	15
Number of steers	10	10	10
Initial Wt., lbs.	683	685	684
Final Wt., lbs.	971	923	860
Daily Gain (120 days, Aug.-Dec.)	2.40	2.00	1.62
Feed/100 lbs. gain *[1]	1102	1170	1299
Carcass Grade *[2]	9.3	9.0	8.6

*[1] The ration used for all groups was a Milo-Cottonseed Hull base ration with a ratio of concentrate to roughage of 80:20.

*[2] 8 = Average Good, 9 = High Good, 10 = Low Choice.

Table 4. Influence of Feedlot Facility and Space Allowance on Feedlot Performance of Steers (Oklahoma, 1966)

Feeding Facility	Open Pen	Elevated Slotted Floor	
Space Allowance, sq.ft.	100	25	15
Number of steers	10	10	10
Initial wt., lbs.	627	630	630
Final wt., lbs.	949	948	835
Daily Gain (118 days, Feb.-June)	2.72	2.70	1.73
Feed/100 lbs., gain*[1]	871	875	1185
Carcass Grade *[2]	8.6	8.9	7.9

*[1] The ration used for all groups was a conventional Milo-Cottonseed Hull base ration with concentrate to roughage ratio of 80:20.

*[2] 8 = Average Good, 9 = High Good, 10 = Low Choice.

The Michigan station recently published data concerning confinement feeding in closed, insulated and power ventilated structures in comparison with a covered but open facility with a space allowance of 35 square feet per steer in all facilities compared. The results of this trial are shown in Table 5.

Table 5. Effect of Type of Housing on Feedlot Performance of Steers (Michigan, 1965)

Type of Housing	Open Shed*[1]	Insulated *[2] Enclosed Solid Concrete Floor	Insulated Enclosed Concrete Floor*[3]
Square footage allowance	35	35	35
Initial Wt., lbs.	704	704	704
Final Wt., lbs.	973	951	945
Daily gain, lbs.(115 days)	2.34	2.15	2.10
Feed/100 lbs. gain, lbs. D.M.	829	890	888

*[1] Open Shed with roof over the entire area.

*[2] The enclosed structures were insulated and equipped with exhaust fans to exchange air within the structure each five minutes.

*3 One half of the floor area was slotted and one half solid concrete. The pit was flushed into a liquid manure holding tank near the building. No bedding was used in either of the enclosed structures.

In this study rate of gain tended to be lower for cattle in the closed facility. Feed efficiency favored the cattle in open shelter by 60 pounds or about 7.0 percent. Feed cost was approximately $1.00 higher per 100 pounds in the closed facility. In this same test slotted floors were compared with solid concrete floors with basically no influence of floor type on performance. It was noted however, that some foot infection did develop after 45 days on the unbedded concrete floors and slotted floors. This was not however, reported as a serious problem during the 115 day trial.

The California station reported work with solid concrete, slotted and dirt floors in 1966. No important differences in steer performance or feed efficiency have been observed to date. Thus, it would appear, relative to type of floor in a confinement facility the choice will be dictated by ease and economy of manure handling.

Summary

Work is progressing at several stations concerning confinement feeding facilities, floor type and space requirements of cattle. To date only limited data is available. It would appear however, that space allowances above 20 square feet are appropriate with up to 35 square feet being required for cattle of 900 pounds or more. Maximum animal density (15 square feet) appears undesirable. Floor type selection among solid concrete, slotted floors and dirt appears to be based on manure handling considerations. High animal density may predispose certain health problems but in observing cattle in commercial feed lots crowding is common in the daily activity, therefore, space needs beyond the above suggested levels may depend largely on drainage and manure handling considerations.

EFFECT OF PROCESSING ON THE NET ENERGY CONTENT OF CEREAL GRAINS

Donald R. Gill, Extension Animal Nutritionist
Animal Science Department
Oklahoma State University

The net energy concept lends itself well to evaluate the effect of processing of feeds in cattle rations. Differences in rate and efficiency of gain due to feed processing may mislead the researcher or feeder in evaluating a process unless he looks at the efficiency of energy utilization.

The net energy concept is the most sophisticated tool available today to evaluate either the performance of feeds or cattle. To understand what net energy is, a comparison of net energy and TDN is useful. Total digestible nutrients (TDN) is defined as the sum of all the digestible organic nutrients with fat multiplied by 2.25. Thus TDN = digestible protein + digestible crude fiber + digestible nitrogen-free extract + (2.25 X digestible fat). TDN is determined in digestibility trials, where measurements are made on the amount of each of the above items in the feed on test and in the feces of the test animals. That excreted is deducted from that fed to determine the quantity digested.

Simply stated, net energy is the energy remaining after digestive losses, gas losses, urinary losses, and work of digestion are deducted; tus, net energy is that amount of energy left either for maintenance or production. There are three expressions of net energy (NE):

1. NE for maintenance alone (NE_m)
2. NE for production alone (NE_p)
3. NE for maintenance and production (NE_{m+p})

It is important that one know which measure is used, as their numerical values differ considerably.

The NE required for maintenance is equal to the basal heat production of an animal, or the heat produced by the animal when the animal is not consuming feed. Drs. Lofgreen and Garrett at the University of California developed a low cost, practical technique for determining the NE_m of feedlot cattle. They found that the energy requirement at maintenance was equal to 40 kCal. X $W^{3/4}$. The expression $W^{3/4}$ represents the metabolic size of cattle. Using these data it is possible to calculate that a 400 pound calf, for example, will require 40 kCal. X 89.4 or 3576 KCal. or 3.58 megcal. daily to meet its requirement for basal heat production (under feedlot conditions). In separate tests, a sample of alfalfa hay was found to have 60 megcal. NE_m per 100 pounds. Using these data, it is possible to calculate that a 400 pound calf would have to eat $\frac{3.58}{.60}$ or 5.93 pounds of the above hay to cover its maintenance energy requirement.

If cattle are fed two levels of feed above the maintenance level, it then becomes possible to determine the NE_p content of the feed by calculation of the energy gain in the carcass of the steers which resulted from the differences between the higher and lower level of feeding. Table 1 shows the net energy requirements of growing-finishing beef cattle and Table 2 shows the net energy content of a number of feeds.

In brief, net energy determinations have shown that cattle use energy for maintenance at a higher efficiency than they do for production, and roughages are used better for maintenance than for production compared to concentrate.

One the NE_m and NE_p of a feed is known, it is possible to calculate expected production from the tables and actual consumption.

The net energy concept can be used to evaluate the performance of cattle on various rations. For example, Dr. W. H. Hale presented data at last year's Oklahoma Cattle Feeders Seminar on the effect of dry rolling and steam processing milo. The data given in Table 3 on page 5 of last year's proceedings showed the following:

Average Performance

	Av. Daily Gain	Av. Daily Feed	Feed/100 Lbs. Gain
Dry Rolled Milo	2.83	22.7	800
Steam Processed Milo	3.10	23.7	764

If one applies the net energy calculation based on the ration given in Table 2 of Dr. Hale's paper (NE_m = 74.22 and NE_p = 42.29), it is possible to calculate that a 775 pound steer (approximate average weight during tests) must consume 22.64 pounds of feed daily to gain 2.83 pounds a day. Dr. Hale reported 22.7 pounds. Then for the same steer to gain 3.10 pounds daily or (3.10 - 2.83) or .27 pounds more, it should require .27 X 2.20 megcal. NE_p or .594 megcal. additional. The ration contained 42.29 megcal. NE_p per hundredweight. Thus, the steer should require 1.4 pounds more feed daily to achieve this gain. These calculations indicate that the steer, in theory at least, should have consumed 24.08 pounds of feed having the same energy level to attain a gain of 3.10 pounds daily. In the test, the cattle required 23.7 pounds. One might conclude, then, that the primary response to steam processing the milo in this test was to increase the amount of feed the cattle accepted.

Recalculations on a test on the effect of fine grinding and pelleting compared to course grinding of barley conducted by Dr. A. T. Ralston et al. at Oregon State University are shown in Table 4.

Table 1. Net Energy Requirements of Growing-Finishing Beef Cattle

Body Weight	NE required		Body Weight	NE required	
	For Maintenance	For Production/ Lb. Gain		For Maintenance	For Production/ Lb. Gain
lb.	megcal./day		lb.	megcal/day	
250	2.51	0.94	700	5.44	2.03
275	2.71	1.02	725	5.59	2.09
			750	5.73	2.14
300	2.88	1.08	775	5.88	2.20
325	3.06	1.15			
350	3.24	1.21	800	6.02	2.25
375	3.41	1.28	825	6.16	2.30
			850	6.30	2.35
400	3.58	1.34	875	6.43	2.41
425	3.74	1.40			
450	3.91	1.46	900	6.57	2.46
475	4.07	1.52	925	6.71	2.51
			950	6.84	2.56
500	4.23	1.58	975	6.98	2.61
525	4.39	1.64			
550	4.54	1.70	1000	7.11	2.67
575	4.70	1.76	1025	7.25	2.72
			1050	7.38	2.77
600	4.85	1.81	1075	7.51	2.81
625	5.00	1.87			
650	5.15	1.93	1100	7.64	2.86
675	5.30	1.98	1125	7.77	2.91
			1150	7.90	2.96
			1175	8.03	3.00

Table 2. Net Energy Content of Feeds as Fed to Beef Cattle

	For Maintenance (NE_m)	For weight Gain in addition to Maintenance (NE_p)
	megcal. per 100 pounds	
Dry Roughages		
Alfalfa hay, 25% fiber	60	27
Alfalfa hay, 28% fiber	54	24
Alfalfa hay, 34% fiber	45	20
Alfalfa meal, dehy., 20% protein	68	30
Barley hay	54	24
Barley straw	32	14
Bermuda grass hay	45	20
Cottonseed hulls	43	19
Prairie hay, good quality	50	22
Sudangrass hay	50	22
Silages		
Alfalfa, wilted (36% D.M.)	22	10
Corn, dent (29% D.M.)	24	11
Hegari (29% D.M.)	20	9
Sorghum, sweet (27% D.M.)	18	8
Sorghum, dual purpose(27% D.M.)	18	8
Concentrates		
Barley, 48 lb. per bu.	85	50
Barley, light weight	73	43
Beet pulp, molasses, dried	83	49
Corn, dent, No. 2	94	55
Corn and cob meal(ground earcorn)	85	50
Cottonseed, whole	94	55
Cottonseed meal, expeller 41% protein	85	50
Cottonseed meal, solvent, 41% protein	78	46
Fat	204	120
Hominy feed, 5% fat	102	60
Milo grain	85	50
Molasses, 10% of ration	65	38
Oats	77	45
Soybean meal, expeller, 43% protein	94	55
Wheat mixed feed(mill run)	73	43

Table 3 shows an example of how these calculations are made.

Table 3. Expected Performance of a 400 Pound Calf Eating 12 Pounds of a Barley-Alfalfa Ration

Ration	Percent Composition	NE_m	NE_p
Barley, 48 lb./bu.	70	59.5(a)	35.0(b)
Alfalfa hay, 25% fiber	30	18.0(c)	8.1(d)
	Total:	77.5	43.1

(a) .70 X 85* = 59.5 (* NE_m of barley on Table 2)

(b) .70 X 50** = 35.0 (**NE_p of barley on Table 2)

(c) .30 X 60 = 18.0

(d) .30 X 27 = 8.1

400 Pound Calf:

1. NE_m required for maintenance (from Table 1) = 3.58 megcal.
2. Feed needed to meet maintenance requirement:
   3.58 ÷ .775 = 4.6 pounds
3. Feed left after maintenance requirement is met:
   12 pounds (amount consumed) - 4.6 pounds (amount used to meet maintenance requirement) = 7.4 pounds
4. NE_p available for growth: 7.4 X .431 = 3.20 megcal. per day
5. NE_p required per pound of gain = 1.34 megcal. per day (from Table 1)
6. Expected daily gain (3.20 ÷ 1.34) = 2.39 pounds

Table 4. Effect of Fine Grinding and Pelleting of Grain

Item	Coarse Grind	Fine Grind and Pelleted
Data reported		
Mean body weight, lb	800	800
Daily feed consumption, lb.	22.09	20.18
Daily gain, lb.	3.17	2.76
Feed required per lb. gain, lb.	6.97	7.31
Analysis		
NEm required, megcal/day	6.02	6.02
NEm of feed, megcal/100 lb.	75.2	75.2
Feed required for mainten. lb/day	8.01	8.01
Feed left for gain, lb/day	14.08	12.17
NEp of feed, megcal/100 lb.	49.6	49.6
NEp left for gain, megcal/day	6.98	6.04
NEp required/lb. of gain, megcal.	2.25	2.25
Expected gain, lb/day	3.10	2.68
Observed gain, lb/day	3.17	2.76
Observed gain as percent of expected	102	103

The Oregon workers reported a .41 pound per day depression in gains when comparing the fine ground and pelleted ration to the coarse ground ration. Without going through the net energy calculations, it is difficult to rationalize a reason for the depression. There are two possibilities, the first being a reduction in the availability of energy (reduced net energy). The second possibility is related to feed intake. The calculations show that in this test the poor performance was due to reduced feed intake and not due to any change in the availability of energy due to processing.

If all the published reports on the effects of grain processing (steam) are evaluated, the picture becomes extremely confusing. The vast majority of the tests have had no effect on the net energy of the commodity being tested, a few have resulted in a lowering of the net energy, and a few have shown an increase in the net energy content of the ration.

Dr. L. S. Pope at Oklahoma State University has demonstrated the necessity of some processing for both barley and milo. He found that both rate of gain and feed efficiency were improved when milo was ground fine.

In an Oklahoma test conducted by Dr. Robert Totusek in 1963 comparing coarse and fine ground milo, he found feed efficiency was improved by fine grinding compared to the coarse grind. The data are presented in Table 5.

Table 5. Feedlot Performance of Steer Calves Fed Coarsely versus Finely Ground Milo (168 Days)

	Milo Grind*	
	Coarse	Fine
No. calves started	40	40
No. calves completed tests	38	36
Av. initial wt., lb.	475	475
Av. daily gain, lb.	2.70	2.65
Av. daily feed intake, lb.	25.1	23.3
Feed per cwt. gain, lb.	929	881

* The ration consisted of the following

Feed	Percent
Milo, ground	40.0
Cottonseed meal	12.5
Ground alfalfa hay	10.0
Molasses	7.5
Cottonseed hulls	30.0

Net energy calculations indicate that the lot which received the fine ground milo rations gained 97 percent of what was expected while the other lot gained only 87 percent of expectations using the data presented in Tables 1 and 2. Most feeders and researchers will agree that fine grinding increases surface area for digestion; but in some cases, fine grinding may lead to less feed intake and, subsequently, a reduced rate of gain and feed efficiency. The total ration needs to be considered in deciding what kind of processing is necessary. The typical California and Arizona feedlot ration, which consists of milo or barley (or both), cottonseed hulls, ground alfalfa hay, and possibly molasses, is apparently less palatable than the Panhandle type ration which includes corn silage. If the Southwest feeder (California, Arizona) dry rolls milo too fine, he expects and usually gets poor feed intake.

Thus, it appears extremely hazardous to try to apply the results attained in a steam processing test to a situation where the non-processed parts of the ration are different.

Little progress in the area of understanding the biological relationships involved in grain processing has been made since Dr. Hale's report last year. Since that time, however, Dr. Robert Totusek has completed a test on grain processing here at Oklahoma State University. The cattle were fed for 167 days. The rations consisted of milo processed as indicated in Table 6, plus a mixture of 35 percent chopped alfalfa hay, 23 percent cottonseed hulls, 40 percent cottonseed meal, 1 percent salt and 1 percent dicalcium phosphate, which was fed at a rate to meet the animals theoretical maintenance requirement (NE_m). The preliminary results are presented in Table 6.

Table 6. Preliminary Results on the Effect of Milo Processing on the Rate and Efficiency of Gain on Steers (Oklahoma)

	Coarse Grind	Fine Grind	Steamed
Initial Weight	501	490	498
Final Weight	916	911	948
Average Daily Gain	2.46	2.54	2.66
Feed/Cwt. Gain	796	736	765

The best feed conversions were obtained when fine ground milo was fed. Steam processing of the milo resulted in the highest rate of gain. While these tests have not been tested for significance, it appears that the net energy values as effected by treatment cannot differ greatly.

The actual net energy values of milo as effected by the various treatments will be reported at the 41st Annual Livestock Feeders' Day (Oklahoma).

The University of California at Davis completed its second series of grain processing experiments. The University of California steams its grain in a Food Machinery Corporation Cooker, which enables them to attain precise pressures and times in the steam chamber. In the latest test, process treatments were tested on wheat, corn, barley, and milo, which were fed at both the 64 percent and 84 percent concentrate level. The rations fed in Dr. Garrett's work are shown in Table 7. Table 8 shows the effect of method of processing on the feedlot response of steers. In Table 9, the effect of the two levels of concentrate on the feedlot performance and carcass characteristics can be seen.

Table 7. Ration Composition[1]

	Level of Grain	
Wheat, corn, barley or milo	64%	84%
Other ingredients		
Alfalfa hay	10.0	2.3
Oat hay	10.0	2.3
Beet pulp	6.0	1.4
Molasses	5.0	5.0
Fat	2.0	2.0
Urea	1.0	1.0
Trace mineral	1.0	1.0
Dicalcium phosphate	0.6	0.6
Oyster shell flour	0.4	0.4

[1] Rations were formulated to contain approximately 12 percent crude protein, at least 0.4 percent Calcium and 0.3 percent Phosphorus. Vitamin A was added to supply 1000 I.U. per pound of feed.

Table 8. The Effect of Method of Processing and Kind of Grain on the Feedlot Response of Fattening Steers[1]

Response Criteria	Grain	Processing Method[2] 8 ap	20 psi	60 psi	20 ap	Mean
Av. daily gain, lb.	Wheat	2.50	2.44	2.37	2.43	2.44[b, c]
	Corn	2.74	2.49	2.57	2.70	2.63[a]
	Barley	2.31	2.49	2.29	2.21	2.32[c]
	Milo	2.71	2.73	2.19	2.57	2.55[a, b]
	Mean	2.56[a]	2.54[a]	2.35[b]	2.48[a, b]	
Feed consumption[3,4] lb.	Wheat	12.98	12.92	12.93	13.01	12.96[a]
	Corn	13.77	12.89	13.15	12.93	13.19[a]
	Barley	12.74	13.24	13.59	12.17	12.93[a]
	Milo	15.18	14.47	11.26	15.27	14.04[a]
	Mean	13.66[a]	13.38[a]	12.73[a]	13.34[a]	
Feed[3] lb. of gain, lb.	Wheat	5.24	5.28	5.45	5.35	5.33[a, b]
	Corn	5.09	5.25	5.17	4.80	5.08[a]
	Barley	5.53	5.38	5.96	5.31	5.60[b]
	Milo	5.58	5.28	5.17	5.92	5.49[b]
	Mean	5.36[a]	5.30[a]	5.44[a]	5.40[a]	
Energy gain, megcal/day	Wheat	4.49	4.32	4.43	4.19	4.36[a, b]
	Corn	5.11	4.62	4.75	4.47	4.74[a]
	Barley	3.75	4.15	4.17	3.69	3.94[b]
	Milo	5.01	5.08	3.50	4.61	4.55[a, b]
	Mean	4.59[a]	4.54[a]	4.22[a]	4.24[a]	

[1] Each individual value is the mean of six observations (steers). The mean values are based on 24 steers.

[2] 8 ap is 8 minutes steaming at near atmospheric pressure; 20 psi is 1.5 minutes steaming 20 psi pressure; 60 psi is 1.5 minutes steaming at 60 psi; 20 ap is 20 minutes steaming at near atmospheric pressure.

[3] Dry basis.

[4] Significant interaction between kind of grain and processing method.

a, b, c Means having different superscripts are significantly different ($P < .05$).

Table 9. The Effect of Grain Level and Processing Method on Feedlot Response and Carcass Characteristics [1]

Response Criteria	Grain Level	Processing Method [2]				
		8 ap	20 psi	60 psi	20 ap	Mean
	%					
Av. daily gain, lb.	64	2.61	2.59	2.36	2.60	2.54[a]
	84	2.52	2.49	2.34	2.36	2.43[a]
Feed consumption, [3] lb./day	64	14.72	14.02	13.88	15.12	14.44[a]
	84	12.61	12.74	11.58	11.56	12.12[b]
Feed [3] lb. gain, lb.	64	5.64	5.45	5.90	5.82	5.70[a]
	84	5.08	5.14	4.98	4.98	5.05[b]
Energy gain, megcal./day	64	4.67	4.45	4.25	4.59	4.49[a]
	84	4.52	4.64	4.18	3.89	4.31[a]
Carcass yield, [4] %	64	63.1	62.4	62.4	63.0	62.7[a]
	84	63.0	61.9	61.2	61.5	61.9[b]
Carcass fat, %	64	24.4	23.5	24.0	24.4	24.0[a]
	84	24.8	25.7	24.4	22.6	24.4[a]
Rib eye area, sq. in.	64	11.2	10.9	11.3	11.2	11.1[a]
	84	10.6	10.8	10.2	11.0	10.7[b]
Final carcass grade [5]	64	8.3	7.9	8.0	7.8	8.0[a]
	84	7.9	8.0	7.7	7.5	7.8[a]

[1] Each individual value is the mean of 12 observations (steers).

[2] 8 ap is 8 minutes steaming at near atmospheric pressure; 20 psi is 1.5 minutes steaming at 20 psi pressure; 60 psi is 1.5 minutes steaming at 60 psi; 20 ap is 20 minutes steaming at near atmospheric pressure.

[3] Dry basis.

[4] (Warm carcass weight ÷ final shrunk weight) x 100.

[5] Carcass grade score key: 9 choice, 8 low choice, 7 high good.

a, b, c Comparable means having different superscripts are significantly different ($P < .05$).

Some people may wish to criticize the California work because there was no dry grain control lot. The California researchers have made a number of comparisons between dry rolling and steaming at atmospheric pressure. They have concluded that no difference exists in any of the measurable parameters between dry rolling and steaming at atmospheric pressure for eight minutes.

The California workers concluded:

"If steam pressure processing of grain (at least by the method used in these trials) has an influence on animal response, any beneficial effect is likely to be small and probably not consistent.

It is quite possible that feed grains do not all react in the same way to a similar processing treatment. For example, the 60 psi treatment of milo appeared to lower feed consumption, but this effect was not as apparent for the other grains." [1]

Not all reported work agrees with the California data conclusions. Dr. J. K. Matsushima at Colorado reported that when corn was steamed for 10 to 12 minutes at atmospheric pressure a sizable reduction in the amount of feed required to produce a pound of gain resulted. In this case cattle were fed 211 days and were fed ten pounds of corn silage plus ad-libitum amounts of corn, beet pulp pellets, and alfalfa hay. Average gains and feed efficiency were 2.18 and 858 and 2.17 and 792 for the cracked and steamed corn respectively. These results differ from the Arizona results in that the cattle consuming the steam processed corn ate less feed and gained less while attaining a better feed efficiency. These data suggest a true increase in the net energy value of the corn due to processing.

One of the most interesting reports reported to date was done at Arizona where they demonstrated that a "poor flake" actually resulted in poorer performance and an apparent reduction in net energy value of the milo. To produce the "poor flake," the grain was steamed as defined by the Arizona process; but it was rolled too fast, resulting in a poor flake. Any difference in processing thus had to be associated with the rolling.

The cattle on the "good flake" gained 3.05 pounds a day and had a feed conversion of 763, while the cattle consuming the "poor flake" gained 3.12 pounds and had a feed conversion of 844. Daily feed intake for the two respective groups were 23.21 and 26.32 pounds. Thus, it does appear that, in this comparison at least, grain processing can change the net energy content of a ration for better or worse depending on how you look at it.

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[1] Garrett, W. N., G. P. Lofgreen, and J. L. Hull, "Steam Pressure Processing of Wheat, Corn, Barley and Milo for Feedlot Cattle," California Feeders' Day 1966, University of California Department of Animal Husbandry (Davis, California, Oct. 28, 1966), p. 32-33.

As previously stated, the tests reported to date have shown inconsistent results in terms of improving the net energy value of cereal grains by steam processing. For each plus there appears to be a minus. The majority of the tests have had little effect on the measurable parameters of animal performance. The possibility exists that necessary conditions are as of yet too difficult to obtain to get widespread positive results due to grain processing.

It does seem clear that grain processing many times has resulted in higher energy intake and subsequent improvements in rate and efficiency of gain; but this cannot be interpreted to mean that all cattle feeders either need or could attain this benefit.

Today, nearly everyone agrees that some processing is necessary for milo or barley. In the case of milo, the Oklahoma workers led by Dr. Pope demonstrated that good gains and efficiency can be obtained with the ground product. They showed that finely ground milo was used about ten percent more efficiently than was dry rolled milo of a medium degree of fineness. As one reviews the literature on the value of steam processing grains, with the exception of the work done here at Oklahoma State, the lack of comparisons between dry ground versus dry rolled versus steam processed becomes apparent.

It is of significance to note that Henry, in the first edition of Feeds and Feeding copyrighted in 1898 said on grinding grain, "This subject is a difficult one to discuss owing to the great variety of conditions existing as to both grain and animals. In general, idle animals and those having ample time for mastication, rumenation, and digestion do not need their grain or roughage prepared as carefully as do those with only limited time for these essential operations. Experiments quite generally show increased gains from grinding grain, but in many cases they are not sufficient to pay the cost of grinding."

CATTLE FEEDLOT WASTE PROBLEMS[1]

R. I. Lipper, J. R. Miner and G. H. Larson[2]
Kansas State University, Manhattan

The trend toward specialized, large-scale factory farms inevitably introduces new problems and challenges. Closer contact between city dwellers who are pushing suburban city limits farther into rural areas and concentrated agriculture creates problems for both. Our growing population, which is stimulating efficient, commercialized agricultural production is also cluttering its own environment. The renewed emphasis on cleaning up our environment is being felt by livestock producers as well as industries already accustomed to controlling wastes generated by their operations.

Economical handling of feedlot wastes is important to cattle feeders across the country. The cost of getting manure onto the land at the time and place and rate conducive to beneficial use often is greater than its value as fertilizer. New developments in the next ten years should significantly alter our current solids-handling and manure-utilization techniques. Irrespective of the manure handling and disposal practices of the future, water that runs off manure covered feedlots after rainfall will remain an important consideration.

Nature of Problem

Cattle feedlot runoff became recognized as a problem in Kansas during the late 1950's. Incidents of septic streams and fishkills were noted immediately following rainfall in areas where no known municipal or industrial waste discharges existed, and where chances of insecticide and herbicide residues seemed remote.

In 1962 samples were collected below a feedlot complex before and immediately after a heavy rain. Following the rain, organic matter content of the river (biological oxygen demand), its ammonia concentration, and its bacterial population increased. Septic conditions soon developed and within a few days, a massive fishkill was in progress. Unlike most pollution sources that discharged wastes continuously, septic conditions moved downstream in a slug. The most severe conditions occurred after streams began to rise rather than at low flow. That incident and others are documented in a paper by Smith and Miner of the Kansas State Department of Health.

The Livestock Sanitary Commission, State Department of Health and the two state universities in Kansas developed a research program to arrive at a better understanding of the problem, its causes and implications. Active research projects were begun both in Manhattan and Lawrence during the fall of 1964.

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[1] Associate Professor, Instructor, and Head respectively, Department of Agricultural Engineering, Kansas State University, Manhattan, Kansas.

[2] Contribution No. 145, Department of Agricultural Engineering, Kansas State University, Kansas Agricultural Experiment Station, Manhattan, Kansas.

In addition to the financial support from the Livestock Sanitary Commission and the State Board of Health, the project at Kansas State University has been supported by the Kansas Water Resources Research Institute and the Agricultural Experiment Station. It was planned as a two phase study. The first phase was to determine the nature and amount of runoff under various situations. The first phase is nearing completion and results of it are the primary subject of this paper. Active work on the second phase which, is concerned with methods to dispose of feedlot runoff will, begin next spring.

Cattle feedlot wastes, particularly runoff waters, are difficult to characterize because of the many controlling parameters and because the material is in a constant state of change. The complexity of the problem and its possible solutions has brought several disciplines into the Kansas State Project. The Departments of Agricultural Engineering, Agronomy, Animal Husbandry, Bacteriology, Civil Engineering and Chemical Engineering have been involved to date.

Physical Facilities - KSU Project

Two experimental cattle feedlots were constructed near the campus. One was entirely surfaced with concrete; the other had concrete only around feed bunks. Each lot was 92 by 24 feet (0.05 acre) with a constant two percent slope. Curbs prevented entrance of runoff from other areas and restricted runoff to one outlet point in each lot. Normally 10 steers in each lot were fed a high grain ration, considered typical of commercial rations.

Rather than wait for natural storms, simulated rainfall was provided through six part-circle irrigation sprinklers spaced around the periphery of the lots. Municipal water was stored for use. The system produced rainfall intensities from 0.4 to 2.5 inches per hour. Storage capacity was sufficient to allow up to 4.5 inches of simulated rain in a single "storm". Amount of rainfall applied was measured by 12 rainfall collection cans uniformly placed in each lot.

From each discharge point, runoff dropped into a rectangular box that was an approach to an HS-type measuring flume. Water-level recorders gave a continuous record of the depth of flow through the flumes. Discharge from the HS flume was sampled by a specially constructed proportional sampler. Samples were delivered to a collection barrel. It was possible to collect samples directly from the edge of the lot and to composite them manually, based on flow at that time.

Methods

Both quality and quantity are important when one considers the treatment or disposal of feedlot runoff. Selected as variables to assess runoff quality were air temperature, moisture content of manure, rainfall intensity, and manure accumulation. Runoff quality parameters were (a) organic matter content, (b) nitrogen content and form, (c) suspended solids concentration, and (d) bacterial populations.

Nature of Feedlot Runoff

Cattle feedlot runoff was shown to be a high strength organic waste containing large concentrations of nitrogen. Based on organic matter, one gallon of feedlot runoff is equivalent to two to seven gallons of average municipal sewage. Runoff from the concrete surfaced feedlot was found to be approximately twice as heavily polluted as that from the nonsurfaced lot. Runoff from both lots was found to be more heavily polluted when (1) low intensity rainfall was being received, (2) the weather was warm, and (3) the lots were wet before rainfall began. Detailed descriptions of the feedlot studies summarized in this report are included in the appended reference list.

We did limited work to evaluate effects of various feedlot management schemes to minimize pollution. Cleaning lots, to be effective, needed to be done more frequently than every two weeks. Thus cleaning would be an expensive way of controlling runoff concentrations. Mounding manure on the lots helped reduce the amount of manure washed off, but again, to be effective mounding must be done frequently so the area not covered by the mound is kept relatively clean.

We also did a series of runoff experiments with samples collected every ten to twenty minutes for 3 to 4 hours. Runoff concentrations first increased then decreased to a relatively constant value. These data are being used to develop simplified mathematical models to represent the runoff process. Hopefully, our experimental data can be extended to actual feedlot conditions.

In north-central Kansas, average annual rainfall is roughly 30 inches. Approximately 11 inches of this would be expected to run off a feedlot due to rainfall distribution pattern and surface characteristics of feedlots. Runoff would be expected to occur about 30 times in an average year. The average amount of organic matter carried into a stream each of the 30 times (days), per acre of concrete feedlot surface populated at normal feedlot density, is equivalent to the untreated sewage discharge from 500 people. Thus the runoff from a nominal sized feedlot is a significant source of organic pollution. Runoff from the nonsurfaced lot was found to be about half the concentration of the concrete lot runoff, or equivalent to 250 people per acre per day of runoff.

In addition to organic matter and nitrogen in runoff, bacteriological content is of considerable interest and importance. Thirty-three diseases have been listed as transmitted by cattle to man through contaminated water. That aspect of runoff becomes increasingly important in areas where water recreation is rapidly developing. While isolation of specific disease-producing organisms was not the purpose of our study, information on the general sanitary quality of the water was determined. Coliform counts in the range of 50 million per 100 milliters were common. Coliforms are generally used as the index of sanitary quality of water.

The current interest in Salmonella organisms has centered primarily in foods, however, this disease producer is also found in natural waters.

Salmonella have been isolated in sewage treatment plant effluents and in receiving streams. In a brief study at Kansas State University salmonella were isolated from both feedlot litter and runoff. From all the samples, only a single strain, Salmonella infantis, was isolated, which indicated that all the cattle infected were infected by a single source. There is no way of knowing how many cattle in each lot were infected but one or more on each lot carried the organism. No salmonellosis sysptoms were exhibited by any animal in the test feedlots.

Isolation of salmonella from feedlot runoff should not be regarded as alarming but recognized as a possible problem. Where feedlot runoff enters streams used for recreation or downstream livestock watering, special precautions against salmonella may be necessary in the future.

Future Plans

Plans for our future research are to complete the work on determining how various factors influence the nature of runoff and to check the feasibility of a relatively simple control measure.

Current data describing the nature of runoff are to be extended by deriving mathematical models for the test feedlots. It is hoped that the technique employed will make it possible to predict total organic material carried in runoff from any feedlot under specified conditions.

The first method for control of runoff to be studied involves impounding the runoff water until it can infiltrate adjacent land without producing further runoff. Such impounded runoff could be emptied onto agricultural land using one or more of several techniques of distributing irrigation water. Design of such a system must take into account any effect that the runoff water may have on the natural water intake rate of soils. Laboratory and field methods will be employed to evaluate such effects and to develop means of predicting land area required for disposal. Solids that settle will be left in flowways and in the impoundment. Their physical nature and the quantities involved will have an important bearing on the practicability of using such a system. One aim of the project will be to determine how the deposits can be controlled and handled economically.

The research in progress at Kansas University is aimed mainly at impounding runoff water and subjecting it to biological treatment to reduce its pollution potential. It may be that such a system will be capable of treating solid manure in addition to runoff water. A unique opportunity for other work in this area was presented to Kansas State University by the June, 1966, tornado. Plans for the new animal research facilities to replace those destroyed have been developed and funds are being sought to incorporate research systems for processing total waste production from animals reared in several covered pens with concrete floors. Data from such systems and other sources would be used for systems analyses and for optimization calculations to forecast future economically promising waste management systems.

Again looking to the future, plans are being made to investigate the potential of a mobile fluidized oxidation bed to reduce solid manure to ash. In effect it would be a super efficient incinerator that could gather manure directly from feedlot surfaces. It would burn the manure and drop the remaining ash back on the feedlot. Such equipment probably would not relieve the need for runoff control but it might be an economical substitute for present conventional scraping, loading, hauling and spreading of solid manure.

Current Complication

Much public interest currently focuses on water pollution. The interest is both positive and negative. It has increased the availability of funds to study the perplexing problems of pollution and it has caused us to move forward at an accelerated pace.

A provision of the Federal Water Pollution Act of 1965 requires establishment of water quality standards in many U.S. streams previously unaffected by U.S. laws. States have the first opportunity to establish such standards. If they do not, the federal government will. In Kansas, stream standards are being set by Kansans. Included in the advisory committee are representatives of the various water use and water quality interests. The person representing cattle feeders has a particular responsibility to prevent standards set from unnecessarily restricting the livestock industry.

Specific regulations relating to water pollution from animal feeding operations are being adopted by the water pollution control agency in Kansas. The regulations, if approved by the legislature, will require any new animal feeding operation, with more than a specified minimum of animals, to get a permit indicating that specified provisions have been made to control water pollution. Existing feeding operations will be required to apply for such a permit by January, 1968. The proposed regulation acknowledges that certain locations present no water pollution threat. In such cases a permit will be issued without control facilities being constructed. Where pollution control facilities are necessary, the state water pollution control agency will evaluate the effectiveness of a proposal by a feeder and grant a permit if the proposal is judged satisfactory. Runoff detention ponds with capacity to hold three inches of runoff from lots is prescribed as one satisfactory means of pollution control.

The two developments, water quality standards and feedlot pollution regulations, indicate current concern over water pollution. The challenge is great but it can and will be met, just as the livestock industry has faced previous problems.

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THE FIRST THIRTY DAYS IN THE FEEDLOT

Charles S. Crane, DVM
Consulting Veterinarian
Porterville, California

Pure, unadulterated hell is what it is today to nearly all of you.

Why? Because here you sit with a load of cattle capable and ready to explode in every way but the right one and armed with about as much chance to stop things as a celluloid rabbit in a prairie fire.

Sure you have several kinds of antibiotics, assorted vitamins, good men and a choice of seven or more rations to throw at them.

Do you know what you are throwing all of them at? Very often cattle are beyond profitable help, and for two reasons: a) they have had from birth to the time they are started on their way to you to get in or out of good physical condition; b) they have had seven days or more in travel time and mismanagement from their origin (origin being defined as a home of more than thirty days duration).

So now you are trying to undo in thirty days or less what has taken a lifetime plus seven days or more to develop. You bet it is tough to do.

I honestly feel that the only reason a considerable percentage of feedlot cattle make any money is because of "compensatory gain" made by you people unwittingly getting cattle that luckily are relatively free from serious disease, but suffering from chronic malnutrition.

But you've got new cattle on your hands. Let's get on with what to do with them.

Have the table set and in clean, comfortable surroundings affording some protection from the elements.

I strongly urge that you feed them before watering them. Use good quality alfalfa hay in mangers with about two feet of space per steer. Give them three or four hours before allowing access to water.

When you turn on the water have plenty available. Good, clean, cool, fresh water with enough trough space for 50 percent of them to drink at one time. You've all had trouble getting cattle to drink sufficient water I imagine. I've had the least trouble in one feedlot where we designed a cement V shaped shallow trough that runs the entire length of the receiving pen, right in the middle of it. The water runs constantly out of a small spout that creates a noise. The other end is rigged with an overflow attached to an underground drain.

Hay before water because anything that fills a steer's belly will satisfy him temporarily. If it is hay he gets some groceries. If it is water he usually develops a reverse osmosis syndrome and washes pretty good the next day, and out goes what little feed he has in him.

Leave them alone for 24 hours. Then start to worry about what to do next.

When it is decided whether or not to worm them, and if they are fairly well rested we generally start them through the processing chute. But first try this---get them up and stir them around once or twice slowly, or take them down a lane. The weaker cattle nearly always fall back. Pull these tail enders out for an additional layup or examination and go on with the rest.

Processing means vaccinating for diseases endemic, or anticipated in a given feedlot, treating for grubs, implanting, injecting vitamin A, branding, and ear ticking. No dehorning---this is the worst single thing that can be done to a feedlot steer. If required, the cattle are horn tipped and generally at a later date and carefully.

I've got to get something in here about worming cattle, and I hope I can make it strong enough. If anything requires immediate attention this is it. A feedlot arrival harboring any sort of intestinal parasite population is a complete economic dead loss until the situation is corrected. It is, further, unable to effectively immunize itself following vaccination until parasite free.

So before anything else is done to new cattle worm them if necessary. My choice is thiabendazole by individual treatment rather than mass feeding. The reason is obvious. One hundred percent of the cattle are treated rather than the 80 percent or less via feeding.

If the parasite infestation is mild we then go on with the rest of the processing. If it is heavy the cattle should be withheld from further stress until a satisfactory response is seen.

One more bit of digression. I do not know of one commercial feedlot, that plans to be around very long, that is not pushing its feeders just as hard as they know how toward the earliest sale they can arrange at a profit. To do this they try to get all the feed possible into them as fast as they'll take it, and sometimes with disastrous results.

Cattle have to be conditioned to this sort of phony surrounding. The poor unsuspecting beast has not changed anatomically or physiologically in the past couple of thousand years or so to speak of, but boy have the things it has thrown at it on its way to the slaughter house. It is in essence expected to operate at about 110 percent capacity. Somebody once figured out that if all the claims were fulfilled for all of the extra pounds expected from all of the fancy additives and feeds now available a steer should gain at about 20 percent of it's body weight per day. See why I mean he had better be in pretty good shape and/or conditioned for this sort of thing.

You people are trying to run two distinctly different operations under one name, and are having one hell of a time of it, or at least we are in California. One is a feeding lot and the other is a mess called the first thirty days.

Now is the time to say something about the nutrition and/or feeding of new cattle. Have any of you seen the inside of the fourth stomach (abomasum) and the first part of the small intestine (duodenum) of recently arrived cattle? Scare the heck out of you doesn't it? You think you have an ulcer. These poor things have ulcers in the ulcers, produced by the fright, shock and stress of getting to your lot. They make a beautiful opening for disease, not to mention malcontent.

This sort of gastro-intestinal tract needs no further embarrassment. It needs a cool, easily digestible feed. Try about a 40 to 50 percent concentrate ration consisting of good quality alfalfa hay, molasses, and rolled grain highly fortified with vitamins and minerals. Or perhaps you should investigate alfalfa hay cubes. I have seen several excellent results using cubes versus complex formulas, and want to use more if possible.

I like to start cattle on long stem alfalfa hay for two to three days, then add a starting ration top dressed with more hay. When the cattle go down through the hay looking for the concentrates withdraw the hay.

I've been doing some work with phosphorus in starting rations with some very interesting reactions. It started by noticing several lots of new cattle eating dirt in their pens. In trying to figure out what they were after all sorts of things were offered to them in troughs including more dirt, sand, oyster shell, charcoal, and several kinds of calcium-phosphorous compounds. They were not suffering from "Pica" or phosphorus deficiency as historically known, because phosphorus was being added in what is supposed to be adequate amounts. The amount of dirt eating was greater in wormy cattle or in cattle being pushed hard on feed.

When offered in multiple choice the cattle always went most for the high phosphorus ingredients.

From these observations I suspect there is an unsuspected demand for phosphorus in the young animal that greatly exceeds its so-called normal requirements. I see less gastro-intestinal disturbance in cattle having access to high phosphorus feeds also.

I'd better get back to the first thirty days, and what to expect after the first 48 hours or so.

The diseases usually start with respiratory troubles. So many millions of dollars and man hours have been spent in trying to conquer or even comprehend the pneumonia-shipping fever syndrome that about all I can say is that they're still in there spending and trying.

I have very little faith in the use of mass medication via feed or water. My results with broad spectrum antibiotics other than by individual use have been pretty discouraging for treatment. Maybe you can slow down the course of an epidemic in a pen using them. I use them mainly to placate the owner---like sending him out for the hot water and towels when the old doctor arrived at the ranch to deliver the baby---it keeps him from peering over my shoulder while I'm trying to work my way out of a mess.

I feel that nearly all of the pathogens isolated from the diseases encountered during the first couple of weeks---the pneumonias, salmonellosis, etc. were present in the animal before it arrived in your feedlot; and that all of the stresses of subnormal nutrition, long haul, exhaustion, climate, and rough handling it is subjected to prevail to pull its resistance down to a level ideal for the propagation of these diseases. This is also why very often the antibiotics and other drugs used to combat disease have rather dismal results. The cattle are so pooped that they are incapable of assimilating these goodies and putting them to any satisfactory use.

It doesn't help a whole lot to have had the critter injected three or more times prior to arrival or your purchase with the drug you generally use either. Here you have an animal ready to relapse or resistant to treatment with the same drug. I'm not sure that you are always advised of the goings on with the animals on their way to you, are you?

I would stronly suggest that one man be assigned to a given number of new cattle with the specific instructions that they are his for better or worse. He then gets to know his charges quite closely, and can observe and go to work on any changes much faster than by rotating work crews and cowboys. A cowboy likes nothing better (during his work time) than a chance to discuss his troubles, horses, roping, women etc. with another cowboy, and when they are paired up this often results in several oversights during the course of riding pens.

Disease is treated as encountered, by hand, and the earlier the better. If an animal even looks suspicious get it out and into the sick pen. I'd a lot rather treat a few too many than have the cowboys wait an extra day and wind up with a chronic case.

Treating sick cattle is not the most pleasant job in a feed lot, but it still should be done slowly, carefully, and properly, regardless of the size of the operation. Attempt should be made to at least categorize the disease being treated by the cowboy. Thermometers are handy and useful. Speed is the least essential requirement in treating the sick pen. I encourage the use of intravenous treatment. Cattle should be automatically treated two and preferably three days in a row if there is any question of generalized infection. Then make a decision as to its disposition.

I hope, after listening to all of this, that you have the impression that I am not happy with the first thirty days in the feedlot. I am not, and I do not think that you and I have to live with this sort of thing.

I think you, as feeders, will have to force some changes on your colleagues, the cattlemen. The producer or supplier of cattle for the feedlot will have to become aware of his share of the burden and be made to assume some of the responsibility for presenting them in condition to go on feed on arrival. I envision the creation of facilities close to the point of origin where one or more producers will bring their cattle to be indoctrinated into the life to come. I'm talking about a lot more than just a so-called conditioning lot. There are some of those going now---and doing a start of a job. The cattle should be examined and tested for disease, examined and treated for parasites, screened for soundness, immunized for diseases requested by the feeder, and culled heavily for anything else that might keep this animal from performing at its maximum efficiency.

I do not think you can continue to hide the ten percent that I can cull out of any one of your feedlots. It puts too much burden on the narrow margin of profit. Maybe this is why I often hear, "I don't make any money in the feeding of cattle. I get by by being in the finance business, or in the hauling business, or in speculating on hay and grain contracts."