ECONOMIC, SOCIAL AND LEGAL PROBLEMS OF THE ARIZONA CATTLE FEEDING INDUSTRY AS RELATED TO BY-PRODUCT DISPOSAL

by

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ABSTRACT OF THESIS

ECONOMIC, SOCIAL AND LEGAL PROBLEMS OF THE ARIZONA CATTLE FEEDING INDUSTRY AS RELATED TO BY-PRODUCT DISPOSAL

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Industrial plants producing wastes with nuisance characteristics are faced with the problem of minimizing the costs of waste production and disposal. If the plant is located in an urban area, social and legal considerations are an additional aspect of cost to be minimized. The development of by-product markets is a means by which waste disposal costs can be lessened. The "discontinuance and/or relocation margin" is crossed when the economic considerations associated with waste favor the cessation of operations at present locations. The plant owners must then decide to enter other enterprises or relocate the plants at new sites.

This study attempts to relate the waste problems of the Arizona cattle feeding industry to those of industrial-waste problems in general. The emphasis is placed on problems which cattle feeders in the Phoenix area of Maricopa County are presently undergoing. The problem

areas are classified under the headings: (1) economic, (2) social, and (3) legal. While these commercial feed lot operators have tried to minimize the costs of pen feeding and waste disposal at Phoenix area locations, it appears that economic considerations will favor the relocation of these feed lots where more desirable conditions prevail.

The Maricopa-Stanfield area of Western Pinal County is shown to be a favorable area for relocation of these feed lots. The Arizona Cattle Feeders' Association is currently negotiating with the Pinal County Planning and Zoning Commission to create a cattle feeding and heavy industrial zone in this area. If Phoenix area feed lots were to relocate in this "Cow Town" zone, they would receive the benefits of a potentially vast by-product market area, as well as being free from present Phoenix area nuisance complaints. It may be possible to minimize waste-disposal costs through the formation of an integrated manure handling joint subsidiary.

CHAPTER I

INTRODUCTION

The Problem Situation

Industrial Wastes

Industrial plants produce a variety of waste products--solids, liquids, and gases. Since a waste product is a cost to the plant, the question to the plant operator is how to minimize this cost. Engineering feasibility and development of by-product markets, in terms of costs and returns, are important factors.[1]

Social and legal considerations are an additional aspect of cost to be minimized. These considerations are to locate the plant, and to produce and dispose of wastes in a manner that does not adversely affect the health and comfort of the community. Zoning and health regulations structure and enforce this social imperative. However, if a complaint is lodged against the plant operator, it is possible that he will be concerned. This is a "cost"

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[1]For information of the engineering and chemical aspects of waste disposal systems and by-product recovery see Sewerage and Industrial Wastes, Journal of the Federation of Sewerage and Industrial Wastes Associations, volumes 1-31.

in the sense that it causes him to worry about his status in the community. This "social and psychological cost" is also to be minimized. This cost cannot be assessed in dollars as are the engineering and economic ones.

In terms of the relationship of the plant to the community, the two categories of undesirable characteristics of waste are:

(1) general nuisance and

(2) effect on man's health.

When meeting its public responsibility, the objective of the plant would be to eliminate or abate the production of an offensive product. Public and private recourse insures that this responsibility is met. The alternative to providing safeguards to the public's health and welfare from waste is relocating that plant or industry. If a plant has troubles with waste production and disposal at its present location, relocation may be the most advantageous way of minimizing costs.

Implicit in the nature of the problems associated with wastes is the institutional milieu within which the plant must necessarily operate. W. B. Back (1) suggests that the nature and scope of institutional forces are not easy to delineate:

> Institutional forces are more difficult to describe than the economic. The subject of

> institutions is vast, complex, and vague. What are institutions? First, institutions are formal and informal rules prescribing our individual rights and conduct in groups or society. By this definition, institutions would encompass laws, administrative regulations and procedures, rights and obligations by common assent, customs and traditions adhered to, etc. How economic opportunities were distributed among individuals would be determined by institutions. A second meaning of institutions in social science usage is that they are organizational attributes of groups or society.

As American society becomes increasingly decentralized, yet more complex, institutional forces in various communities are coming to bear upon operators of plants producing offensive wastes. Spaeth (2) says that "The broad aim of the public is to integrate the plant or industry into the community so as to contribute the best over-all development of the community." Seemingly, then, there are means whereby a community can either attract or displace industrial location in time and space dimensions. Tax concessions and public services are examples of the former; and severe industrial performance standards and municipal statutes examples of the latter. It would be unrealistic to ignore the fact that these waste problems are present. Nemerow (3) found that public action is limited not only to individual communities; public influence

can be more far-reaching in its attempts to elicit protection from industrial wastes.[1]

Social: Land Utilization and Urbanization

Population growth and movement appear *prima facie* to be the immediate precursors for public pressure on plants emitting offensive wastes. Nevertheless, one individual can bring action to enjoin a public nuisance, if he alleges and proves special injury, different in degree and kind from those of the general public. Population growth and urbanization increase the incidence of public and private action towards offending plants. Kelso (4) states in a discussion of land use conflicts:

> An increasing population means simply that an increasing weight of people puts more pressure on the resource base, more pressure on space, more crowding, more jostling, more stepping on toes, Interpersonal, private versus public, present versus future conflicts relative to land use will increase. Public versus private conflicts will grow as the public groups become more aware of their collective needs and more vigorous in curbing individual land uses that run counter to the public's welfare; the greater pressure of population

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[1] Nemerow cited an editorial printed in The New York Times on June 13, 1962, asking: "How many more bitter and losing battles will they have to fight before corporation managers learn to look for industrial sites that will not invade or endanger areas that have been dedicated to wildlife conservation? The Shell Oil Company should have foreseen the buzz-saw it ran into by trying to establish a refinery in the midst of the famous waterfowl marshes of the upper Delaware Bay . . . Shell would be wise to look elsewhere for a site."

> on resources will increase the concern that many have for the future resource base, space for future men to live in, and will lead to more vigorous action to curb present uses in favor of the future.

Certainly those plants that have disposed of wastes into streams and rivers, and allowed fumes to pollute the air have been subject to increasing public action.

Smith (5) noted that "The continuing growth of urbanization means that the pressure to transfer land to uses of increasing intensity will continue." The encroachment of residential, recreational, and other consumption uses on areas used for production purposes has been cited by Barlowe (6). Consequently, public pressures are often found to desire the plant to relocate in another area, rather than to take measures to safeguard the public health and welfare at the existing location. The process of urbanization fosters residential housing development at differential values for land and densities depending upon the locational relationships to other human activities. Hoover (7) found that "Direct public control of private land use is usually negative in character. That is, certain uses are proscribed in specified places, without any other uses being specifically prescribed." Higher-valued land uses appear to produce greater satisfactions and social utilities.

Most often, conflicts involving the general public and private persons cannot be resolved by simple economic considerations. In the case of odorous industrial wastes, no one has established when this odor can be called offensive; presently, there are no standards. However, these conflicts can be resolved by bargaining and adjudicating in the institutional spheres. In some cases the institutional framework of a community would provide opportunities for stalling possible courses of action regarding the production of public nuisances by a private party. Kelso (4) has made use of the concepts--rationing transaction and bargaining transaction--in the institutional processes of resolving land use conflicts:

> Within organized society, collective power prescribes working rules under which interpersonal conflicts, in the interest of attaining mutality, may or must be resolved. The establishment and enforcement of such working rules by the collective superior against the citizen inferiors are rationing transactions. Conflicts resolved between citizens as equals within prescriptions laid down by these "superior" working rules are bargaining transactions. In either case, conflicts are resolved through collective action in control, liberation, and expansion of individual action.

The significance of these concepts[1] to a discussion of industrial waste problems occurs when describing the

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[1]See John R. Commons, The Economics of Collective Action (New York: The MacMillan Company, 1950).

meeting of public and private parties to reach workable solutions to their problems. For example, in the formulation of zoning regulations, bargaining is carried out in the legislature and emanates as rationing policies for land utilization. This allows the zoning officials (collective superior) to follow working-rules when decreeing within which area of the community an industrial plant (citizen inferiors) may locate.

An example of a bargaining transaction, where the parties involved are legal equals, is where buyer and seller are negotiating the price for a product. On the other hand, in the case where public officials and industrial plant operators are bargaining the effective date for the plant being relocated, the outcome is not price. Instead the result is the "cost" that the community and plant operator will each bear in the interim. However, the process is strictly in keeping with that of market bargaining.

Legal: Nuisances and Zoning

Green (8) states that "The term nuisance means literally annoyance; anything which works hurt, inconvenience, or damage, or which essentially interferes with the enjoyment of life or property." Some things have been held by the courts to be nuisances under all circumstances (nuisance per se); other uses are found to be nuisances

in particular fact situations. In the latter situations it must be shown to the court that some injury to the health or property of the plaintiff is affirmable. Both public official and private citizen have the power to bring court action.

"In its original and primary sense, 'zoning' is simply the division of a municipality into districts and the prescription and application of different regulations in each district," according to American Jurisprudence (9). It is generally understood that zoning regulations express a comprehensive land use plan and, secondly, promote the public welfare, meaning that they must be within the police power. In recent years most large communities or cities have established planning and zoning departments to draw up comprehensive plans to serve as guides to municipal land uses and development.

The object of the zoning ordinances is to create zones of uniform character. However, this has been virtually impossible because most cities existed prior to the effective date of their zoning laws. This has meant that the zones were not of uniform character, but rather contained non-conforming uses. Green (8) continues this discussion of non-conforming uses by stating:

> The city is thus confronted with the problem of how to deal with these scattered exceptions to the general character of the neighborhood. Because

> the businesses or other nonconforming uses are already established, there is some feeling that their removal should not be forced without compensation. Furthermore, as a practical matter, even compensated removal may not be possible in the light of political considerations. It would be a costly process for the city to buy off every owner who has such an establishment, so the general practice has been to follow a different course: the city lets the passage of time take care of destroying the exceptional uses. It permits them to continue as they are at the time of passage of the ordinance but places limitations on their extension or re-establishment after the ravages of time have taken their toll.

One of the supplementary functions of the law of nuisances to zoning ordinances is to present a means whereby public or private action may be initiated against non-conforming uses.

Yokley (10) found that zoning, through exercise of the police power of the state, has given the greatest amount of freedom and protection to the greatest number of people.

Economic: Costs of Waste Disposal and By-Product Markets

Studies of industrial waste-disposal practices have concentrated on the engineering and chemical aspects to the virtual exclusion of information on associated costs. The technical discussions for nearly every industry producing wastes have been in terms of systems design and alternative systems. The few writers who have tried to incorporate economic analysis into their presentations have done so

by stating by-product possibilities. Yet waste disposal seems to be a fruitful area where cost studies can be carried out. This need is implied in Wilder and Hirzel's paper (11) on food wastes:

> Waste disposal costs money. Whether it is dumped in a river, carried away by truck, dumped in a city sewerage system, or re-manufactured--it costs money. And very few of the known by-products that can be manufactured from food wastes can be sold at a profit. One very notable exception is the manufacture of vodka by the Hood River Distilleries, Hood River, Oregon. This is understood to be a successful operation using waste pears. . . . Waste disposal (and utilizing waste in the manufacture of some by-product is a method of disposal) should be handled by management as an integral part of operations and given every necessary consideration as a part of the processing schedule. Waste should be re-manufactured into an innocuous material before it leaves the processing plant--whether at a profit, break-even, or a loss.

While not all industrial wastes have been found to have profitable recoverable by-products, many wastes do have potential value as market commodities. In a discussion of the re-use of waste and recovery of values, Besselievre (12) suggested:

> It is also true that any by-product can be recovered from a waste or waste effluent, but no plant should be designed on the premise that this recovery can be made a profitable operation, or even pay part of the cost of the plant required to make the recovery. . . . If the recoverable element is in such form that it does not require a complex installation to separate it from the wastes and there is a market or use for it, then it may be possible to install such a plant and credit the prices received for the product recovered or reused against the operating cost of the plant.

However, most industries are located in municipalities where the institutional pressures confer upon the plant the additional costs of providing safeguards to the general health and welfare of the public. These responsibilities of the plant to the community become costs when waste-control devices become necessary. This could be called the social cost of being located at that particular site. Even where profitable by-products can be produced, the plant may have additional costs of preventing pollution from the production and disposal of their industrial waste. The question is how to minimize the social cost of doing business. If the social cost of being located at present sites should become prohibitive to the plants, the plant owners would either have to cease and desist operations at that location, or hope that means could be found in the near future whereby operations at that location are still feasible. In the former case the plant owners would be faced with the decision to go out of business entirely or relocate the plant in more favorable surroundings elsewhere.

Objectives and Methodology

This study is intended to relate the waste problems of commercial feed lot operators in Arizona to industrial waste problems in general. Manure is the inevitable waste

produced in cattle feeding. As an industrial waste, manure is the potential source of a profitable by-product. While manure has been long regarded as valuable for use as fertilizer, the question has been raised whether it is still as profitable to use in light of today's plentiful supply of commercial fertilizers. Given that manure is a valuable fertilizer to farmers, the profitability to the feed lot operator of selling to this market depends upon the distance measured in terms of transportation costs from the feeding pens to the farmers' fields in relation to the value of manure.

Location of the feed lot is the decisive factor in determining the extent of sales to the by-product market. Too, in the institutional framework of industrial-waste problems, the location of the feed lot in relationship to the surrounding community stipulates the magnitude of conflicts that may occur. Manure is generally acknowledged to have general nuisance characteristics. If a feed lot is located in a sparsely populated rural area, it is likely that few grievances will be expressed by the public. However, if a feed lot is located in an urban area or rural area that is becoming urbanized, it is probable that many pressures will come to bear upon the feed lot operator to cease operating a cattle feeding business at that site.

These problems are classified under the chapter headings: social, legal, and economic. The present locations of commercial feed lots in Arizona will be related to these categories of problems. Emphasis is placed upon the nature of problems besetting the feed lot operators with pens in the Phoenix area.[1] Implications of the problems of operating a feed lot in this area will be drawn. If the data suggest a relocation of the plants, recommendations will be made as to new locations in Arizona.

The extent of social and legal problems will be determined from the interpretation of secondary sources of information. The nature of the economic problems of waste production and disposal will be presented from primary data collected from county agents, the Arizona cattle feeders, manure haulers, and University of Arizona personnel. Results of fertilization experiments at Agricultural Experiment Stations will be examined for the feasibility of increasing manure usage on Arizona soils.

In the course of discussing the economic problems of the Arizona cattle feeding industry, a valuation of manure for use as fertilizer on acreage used for cotton production will be presented.

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[1]The term "Phoenix area" means all points and places within 20 miles (air miles) of the capital buildings located in the City of Phoenix.

Limitations

It should be recognized that in the decision-problem facing feed lot operators there are limitations to the extent that a researcher can fully gather and interpret evidence. If a decision is made by a purely economic analysis, the price system is a proven standard by which costs and benefits can be measured. However, when the complex of institutional forces is taken into account, the measurability of variables is lost. The likely outcome of a conflict can be predicted if it can be determined which side wields more economic power and institutional redress. However, until public officials and private parties act upon their interests, the researcher can only make inferences as to their future behavior. On the other hand, the feed lot operators in the Phoenix area may make the decision to cease operations at present locations prior to positive institutional actions. Evaluations are limited to evidence compiled from population numbers and densities, nuisance and zoing regulations, the general impact and nature of urbanization, and by-product market possibilities; yet recommendations proceed without the benefit of particular fact situations.

These same considerations and limitations pertain to the "Cow Town" analysis in Chapter VI where actions of cattle feeders, farmers, public officials, and private parties are discussed.

CHAPTER II

LOCATION OF FEED LOTS

The Arizona Cattle Feeding Industry

Cattle feeding through commercial feed lots is a growing industry in Arizona. Its rate of growth in terms of head capacity has been rapid. This expansion can be attributed to the climate amenity. Wright (13) found that cattle in feed lots in the two western states having mild winters (California and Arizona) consume less feed per pound of gain in fewer days on feed than those of the United States average. Table 1 gives, by county, the number of feed lots and head capacity for 1963.

Of the 238 feed lots, 222 are located in the southern portion of the state. These feed lots have access to water, highways, and railroad lines. Maricopa, Yuma, and Pinal counties have a combined total of over 70% of the total number of feed lots and nearly 90% of the total head capacity. Maricopa County has by itself 41.2% of the total number of feed lots and 62.5% of the total head capacity of the state. Maricopa County has the largest feed lots in terms of head capacities.

TABLE 1.--Number of Feed Lots and Head Capacity by Counties, 1963.

County	Number of Feed Lots	% of Total	Head Capacity	% of Total
Maricopa	98	41.2	328,000	62.5
Yuma	43	18.1	88,000	16.8
Graham	32	13.4	23,000	4.4
Pinal	26	10.9	47,000	8.9
Pima	8	3.4	17,000	3.2
Yavapai	7	2.9	4,000	0.8
Cochise	6	2.5	7,000	1.3
Greenlee	6	2.5	2,000	0.4
Navajo	4	1.7	2,000	0.4
Santa Cruz	3	1.3	6,000	1.1
Apache	3	1.3	1,000	0.2
Gila	1	0.4	a	0.0
Mohave	1	0.4	a	0.0
Coconino	0	0.0	0	0.0
TOTAL	238	100.0	525,000	100.0

[a]Less than 1,000 head capacity.

Source: Arizona Crop and Livestock Reporting Service, supplemented by data from county agricultural agents concerning capacity of certain small feed lots that "warm up" cattle.

Table 2 gives the number and size of feed lots for March, 1963.

The location center for feed lot operations in Arizona is the Phoenix area of Maricopa County. This area encompasses 20 miles (air miles) in all directions from the capital buildings located in the City of Phoenix. This circle includes the municipalities of Tempe, Scottsdale, Mesa, Chandler, Gilbert, and Higley to the east and south; Laveen, Avondale, Cashion, Goodyear, Litchfield

TABLE 2.--Number and Size of Feed Lots in Arizona, March 1963.

Size of Feed Lot (Feed Lot Capacity)	No. of Feed Lots	Average Capacity per Feed Lot	Total Feed Lot Capacity	% of Feed Lots	% of Feed Lot Capacity
	No.	Head	Head	%	%
Less than 300 head	47	168	7,900	19.7	1.5
300 - 999 head	94	541	50,900	39.5	9.7
1,000 - 2,499 head	47	1,447	68,000	19.7	12.9
2,500 - 4,999 head	21	3,310	69,500	8.8	13.2
5,000 - 7,999 head	13	5,900	76,700	5.5	14.6
8,000 -14,999 head	9	10,722	96,500	3.8	18.4
15,000 or more head	7	22,286	156,000	3.0	29.7
TOTAL	238	2,208	525,000	100.0	100.0

Source: Data compiled by Walter W. Pawson, Farm Production Economics Division, Economic Research Service, U. S. Department of Agriculture, who is working in cooperation with the Arizona Agricultural Experiment Station.

Park, Litchfield, Tolleson, Fowler, Glendale, Youngtown, Peoria, El Mirage, and Surprise to the west and north. Approximately 30 feed lots are located within this Phoenix area.

The three concentrations of feed lots in the Phoenix area can be summarized according to location in relation to the capital buildings. These concentrations, referred to as such hereafter, are:

(1) Phoenix-Tempe (6)

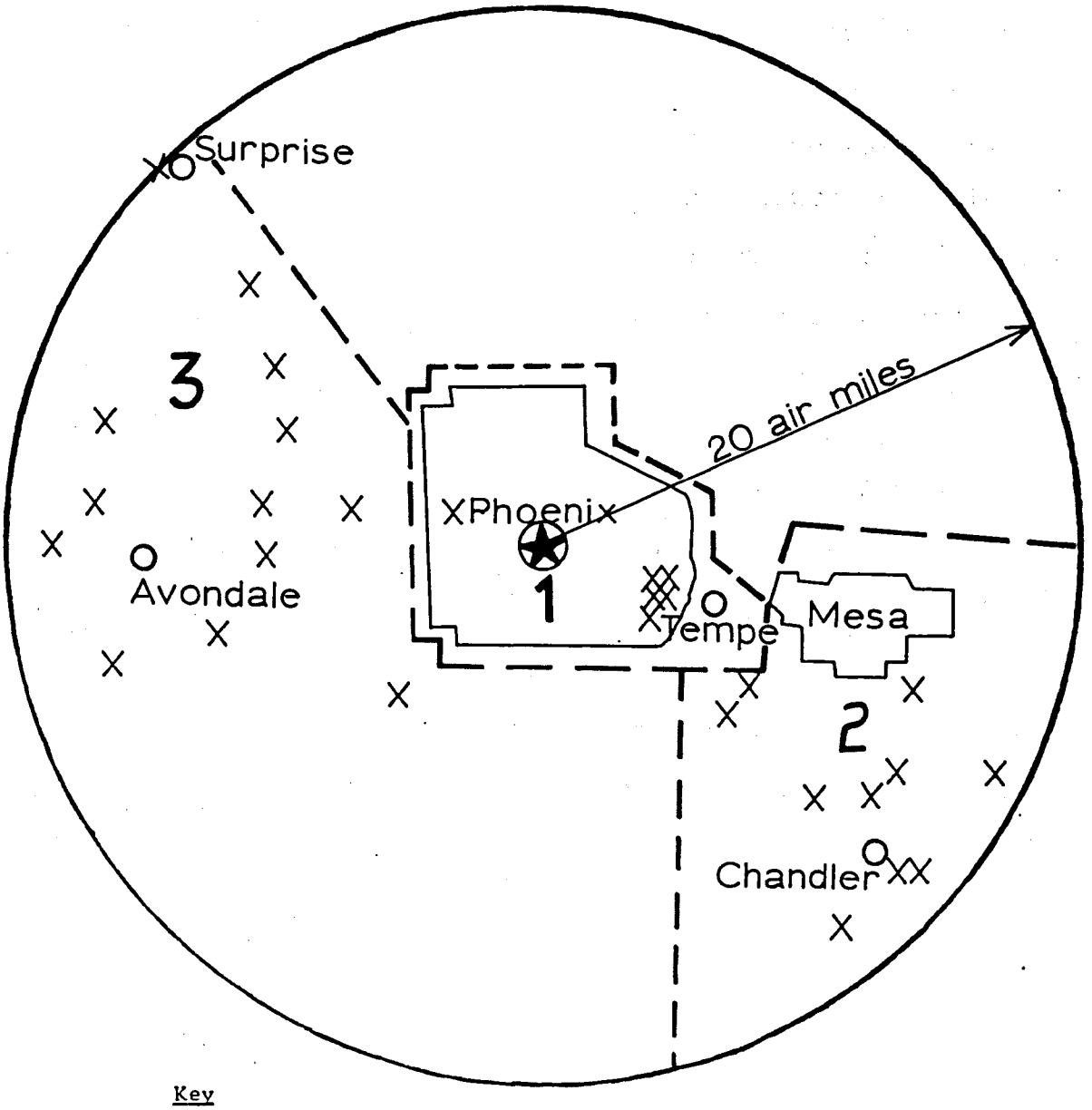
(2) Mesa-Chandler (10)

(3) Avondale-Surprise (14)

The numbers in parentheses refer to the number of feed lots in each concentration area. Figure 1 is a sketch map of the Phoenix area showing the three concentrations of feed lots and the approximate location of the individual feed lot in each sector.

Nature of the Problems

The nature of current problems of commercial feed lot operators regarding waste production and disposal is due to the location of the feeding pens. Once a feed lot has been located, its geographic position is fixed. Location of the feed lot can create conflicts between the community at large and the private operator, as well as for the operator in profitably servicing the by-product markets. Those feed lots that are situated in other than the Phoenix area of Arizona have virtually no conflicts or problems at present. However, feed lots in the Phoenix area are currently the focus of public objections to cattle feeding. Furthermore, these feed lots are located a great distance from by-product markets in terms of the interrelationship of the value of manure for fertilizer and transportation rates.



Key

- Capital
- 1 Phoenix-Tempe area
- 2 Mesa-Chandler area
- 3 Avondale-Surprise area
- X Feed lot

Figure 1.--Sketch Map of Phoenix Area Showing Individual Locations of Feed Lots.

This study will deal with the Phoenix area in delineating the social, legal, and economic problems currently facing those feed lot operators. These problem areas are relevant to the decision cattle feeders in the Phoenix-Tempe, Mesa-Chandler, and Avondale-Surprise areas are making or will have to make in the future regarding possible relocation of the plants. If the costs of operating at these locations call for cessation of operations, owners must decide when, and under what circumstances, they will close down the feed lot. Some feeders may decide to get out of the business altogether; others will wish to relocate elsewhere. If the latter is the case, a feeder may wish to relocate either in some other area of Arizona, or out of the state entirely. If a favorable location can be found in Arizona, it should be analyzed in terms of foreseeable problems and benefits in both the short and long run.

CHAPTER III

SOCIAL PROBLEMS

Population Growth and Urbanization

As a result of national trends and its locational advantages, the Phoenix section of Maricopa County is the largest population center of Arizona. The City of Phoenix had nearly two-thirds of the population of Maricopa County (Table 3).

TABLE 3.--Trends in Population Growth, City of Phoenix, 1920-1960.

Year	Population (000)	Increase (000)	% Increase	% of Maricopa County Population
1920	29	-	-	32.2
1930	48	19	65.5	31.8
1940	65	17	35.4	35.0
1950	107	42	64.6	32.2
1960	439[a]	332	310.3	66.1

[a]Source: United States Census of Population 1960: Arizona, p. 4-9.

Source: Population Growth of the Phoenix Urban Area, 1959, p. 4.

Census figures (14) for 1960 show that Maricopa County has a total population of 663,510 persons. The

Phoenix area, which harbors approximately 30 feed lots in the three major sections of concentration, contains over 95% of this figure. Of the 9,226 square miles of land area in Maricopa County, the Phoenix area contains 1,257 square miles or slightly over 1/8 of the total. The remaining areas of Maricopa County are largely rural and devoted to agricultural uses. Western Business Consultants, Inc. (15) expect that 50,000 to 60,000 acres of agricultural land in the Phoenix area will be put to other uses by 1980.

Population growth and the concomitant forces of urbanization intensify the complex of institutional forces acting upon the specific site of the commercial feed lot. Raup (16) found that the process of urbanization causes "(1) an expanded demand for surface area for urban expansion, industrial decentralization, and the transport network, and (2) an increased investment and residential demand for rural land on the part of urban and nonfarm users." Western Business Consultants, Inc., (15) prefaced the discussion of the economic base of Maricopa County by stating:

> Maricopa County is in the process of shifting from an agricultural-commercial to an industrial-commercial economy. Twenty years ago agriculture was the leading source of employment in the county. By 1958 average monthly employment in manufacturing was moving ahead of that in agriculture despite the doubling of farm employment. Meanwhile the number

> of jobs in retail trade, service, and government had reached even higher figures than in either manufacturing or farming. By 1980, however, the prospect is that manufacture will provide more employment than any other economic activity in the County.

Feed lots in the Phoenix area that were once situated in sparsely populated fringe areas or virtually rural areas of Eastern Maricopa County have become surrounded. According to the Advance Planning Task Force (17) of Phoenix in an analysis of residential land use in the Phoenix area:

> Increasing home ownership, enforcement of zoning, initiation of platting controls, public education and other factors have induced a growing cognizance of the importance of livability and stable value as standards of residential construction. Residences influenced by adjacent business, industry and heavy traffice are no longer marketable at par with those which are unaffected by such non-residential uses. The homeowner is growing more sensitive to land use conflicts, and looks with increasing dependence to the public agency for better guidance, protection and services.

Nuisance Complaints

Manure is generally conceded to be a nuisance in particular fact situations. Noble (18) mentions eleven areas of common objection to industrial activities which have adverse effects, either physical or psychological; these categories were originally cited for industrial performance standards by the National Industrial Zoning Commission:

1. Noise
2. Smoke
3. Odor
4. Noxious Gases
5. Dust and Dirt
6. Glare and Heat
7. Fire Hazards
8. Industrial Wastes
9. Transportation and Traffic
10. Aesthetics
11. Psychological Effects

Although "Health Menaces" is implicit in the above list, perhaps it should be explicitly added as a separate item.

In this context the generally mentioned undesirable characteristics of cattle feeding and manure would be:

1. Noise
2. Odor
3. Dust and Dirt
4. Industrial Wastes
5. Aesthetics
6. Psychological Effects
7. Health Menaces

Perhaps the one most persistent complaint of tourists, businesses who cater to the tourists, and residents, is that regarding odor. Garrabrant (19) notes that "The problem here is more psychological than physiological. . . . Only when the 'threshold of smell' is reached does it become a nuisance and the threshold of smell varies with different individuals." Even if the odor of manure can be camouflaged, the source of the odor remains. Since manure and cattle feeding have other characteristics deemed undesirable, the camouflaging of the odor may be a costly long run

proposition.[1] The general way of ridding a community of offensive odors is to take original preventive action through zoning regulations. However, most of the feed lots in the Phoenix area preceded the effective date of the zoning ordinances and were classified as non-conforming uses.

The extent to which odor is a source of grievance in the Phoenix area can depend upon wind and precipitation conditions. One could envision that motels and hotels could allege and prove that incidence of manure odor detracted financially from their operations; in this case they would be acting with special injury from public nuisance, different in degree and kind from complaints of the general public.

As a health menace, manure has not been shown to have induced disease that may not have been otherwise contracted in the Phoenix area. Certain diseases, such as valley fever, are contractable from the intake of dust; normally dust remains only a source of irritation. Western Business Consultants, Inc. (15) found in their study of Maricopa County and Phoenix that in general:

> Dust has been a major source of irritation to some winter visitors. This deterrent should be

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[1] A cost of $100 per week for liquid deodorant in a spray system presently used on a feed lot in Blythe, California, was reported by Arizona Farmer-Ranchman, August 10, 1963, p. 18.

> much less of a problem as agriculture in the metropolitan area gives way to urbanization. However, urbanization, itself, creates new irritations for the tourist, . . . that could offset the alleviation of the dust problem.

As of December 1963, no special injury claim had been tried in court. It seems likely that if one case is considered in court, and goes against the commercial feed lot involved, a rash of claims will be initiated shortly. The public pressures on feed lot operators should continue to mount as population increases and the Phoenix area becomes increasingly urbanized.

Public opinion and threat of lawsuits are institutional forces wielding influence on the feed lot operator's possible relocation decision.[1] In the Phoenix area, and specifically the Phoenix-Tempe sector, prospective private actions against feed lots appear to be increasing. A news item in the November 30, 1963, Phoenix Gazette (20) titled "Lawsuits Plague Industry" reads:

> Nuisance lawsuits could drive a multimillion dollar business from Maricopa County, an industry leader warned. . . . Companies operating cattle feed lots have been invited to set up operations in other parts of the country and state. Feed lot operators have been plagued by litigation claiming that the feed lots are a public nuisance because of objectionable odors and dust.

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[1]With the threat of lawsuit in Spring 1963, one feed lot in Tempe was closed down and the business relocated in Yuma County.

> He pointed out that steps have been taken to abate these nuisances through the use of deodorants and sprinkers to lay the dust. . . .
>
> The industry's own investment amounts to $30 million, of which $20 million worth of plant and equipment is in Maricopa County alone.
>
> Ganz declared the industry's position would be protected by a state licensing measure that would protect against nuisance suits.

While Mesa-Chandler feed lots have not had the immediate threat of lawsuit, these operators share the concern of Phoenix-Tempe feeders about the future of feed lot sites in urban areas. At least one feeder in Mesa-Chandler has expressed interest in relocation in lieu of future contingencies from present situations and trends.[1] The Avondale-Surprise sector is witnessing the growth of residential housing and retirement communities. At least one feed lot in this sector of the Phoenix area plans to phase out of the feeding business; the likely incidence of public conflict might be given for this decision. Some feed lots in this Avondale-Surprise sector have tried to minimize the nuisance conflicts by using deodorants and sprinklers to lay the dust.

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[1]See Appendix Table 1 for projected population of Mesa-Chandler.

CHAPTER IV

LEGAL PROBLEMS

Zoning Regulations

Zoning ordinances always contain some mention of the public health, safety, morals, or general welfare. Secondly, zoning regulations are expressive of a comprehensive plan. The Zoning Ordinance for Unincorporated Areas of Maricopa County Arizona (21) states in Article 1:

> For the promotion and protection of the public health, peace, safety, comfort, convenience and general welfare and in order to secure for the citizens of Maricopa County, Arizona, the social and economic advantages of an orderly efficient use of land, and as a part of the master plan for said county, there is hereby adopted and established an official land use plan and zoning ordinance for Maricopa County, Arizona, and rules, regulations and plans by which the future growth and development of said county may be directed in accordance with said plan and ordinance, as provided in the County Planning and Zoning Act of 1949.

Most feed lots in the Phoenix area existed prior to the effective date of the zoning ordinance.[1] This placed them in the category of non-conforming uses. Since a feed lot is not a nuisance per se, but a nuisance under

[1]The reasons why zoning officials allowed feed lots to locate in the Phoenix area after the effective date of the zoning ordinance has not been ascertained.

special fact situations, zoning officials would most likely exercise caution in issuing permits to locate new feed lots once the effective date of the zoning ordinance was enacted. Yokley (10) suggests:

> The exercise of care and caution by the authorities responsible for the issuance of building permits and certificates of occupancy can have much to do with the correct and proper functioning of a zoning system in any city. Indiscriminate issuance of such permits without a systematic method or plan for determining before such issuance the question of compliance with the law can cause frequent troubles both to citizens and to those in office responsible for the correct and proper administration of the law.

In protecting adjacent uses from nuisance and promoting the general welfare of the communities, as well as the feed lot operators, present conditions warrant that zoning not be permissive in allowing nuisance-producing industries to locate within the Phoenix area. Appendix Table 2 gives the estimated future population for Maricopa County and the City of Phoenix.

Since zoning ordinances are designed to create zones of uniform character, the eventual elimination of non-conforming uses is another goal of planning and zoning officials. The Zoning Ordiance for Unincorporated Areas of Maricopa County, Arizona (21) states that "if such non-conforming use is discontinued for a period of twelve (12) months, any future use of said land shall be in conformity with the provisions of this ordinance"; furthermore, a non-conforming use may not be enlarged, extended,

reconstructed, or structurally altered exceeding 100% of the original floor plan.

If stringent measures must be taken to force removal, perhaps the best suggestion, from the standpoint of meeting constitutional requirements, is the so-called amortization provision. Green (8) suggests:

> Under this method of attack, instead of requiring immediate removal of all nonconforming uses, the ordinance states various periods within which different uses must be removed. For instance, junk yards, with virtually no investment in real property other than land, may be required to leave within a year, whereas expensive store buildings or manufacturing establishments may be given as much as sixty years or more from the time of passage of the ordinance. When properly computed,[1] such periods would enable the owner to minimize any loss from the change-over and to plan ahead for the most advantageous use of his property. They could serve the public interest by forcing removal of the nonconforming use but would not place a crushing burden on the individual land-owner, as might be the case if he were required to leave immediately.

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[1]On this point Green states in a footnote:

> They would take into account such factors as the anticipated time when the difference between the cost of changing to a conforming use and the cost of repairing the old building to meet safety requirements would be at a minimum; the amount of fixed investment involved in various businesses and the feasible rate of amortization; the difference in the value of the property when utilized for a conforming use and for a nonconforming use, etc. The City of Boston avoided these complications with the enactment of a 1941 statute which required that all nonconforming property uses change to conforming uses by 1961.

In light of the current concern over Phoenix area feed lots and non-conforming uses in general, inclusion of an amortization provision into the zoning ordinance, with judicial support, would facilitate positive means whereby these variances could be publicly eliminated.

Arizona Statutes

Appendix 3 gives the public nuisance and health menace statutes and notes of decision that are relevant to feed lots and manure production and disposal. The definition of a public nuisance in Arizona law (22) reads:

> Anything which is injurious to health, or is indecent, or offensive to the senses, or an obstruction to the free use of property, so as to interfere with the comfortable enjoyment of life or property, by an entire community or neighborhood, or by a considerable number of persons, . . . is a public nuisance, and is no less a nuisance because the extent of the annoyance or damage is unequal.

Perhaps the most reasonable way to make an inference for nuisance lawsuits with cattle feeders as defendants would be to cite Engle v. State (23):

> The term "nuisance" is incapable of precise definition because the controlling facts are seldom alike and each case stands on its own footing and the term is so comprehensive that it has been applied to almost all wrongs which have interfered with rights of citizens whether in person, property or enjoyment of property or comfort.

Simply stated, it appears that nuisance remedies are not automatic, but rather discretionary with trial

court. There is no Arizona precedent for feed lot nuisances; attorneys would be unlikely to venture guesses regarding the outcome of a jury decision. A public nuisance may not be enjoined at the suit of a private person unless he alleges and proves some special injury, different in degree and kind from the general public; as of December 1963 no private suit against cattle feeders had been tried.

In a discussion of the law of nuisance as a device for controlling community development, Green notes (8):

> Application of the law of nuisance has been described as a species of "judicial zoning." Those who use this description mean that when a court declares that a given land use is a nuisance under particular conditions, it is in effect stating its opinion that that use should not be made of land in that neighborhood. Such a declaration is as effective as (or more effective than) the declaration of a zoning ordinance that that use in question is barred from that district. . . .
>
> A list of the defects of the law of nuisance as a control device include:
>
> (1) At the outset of any nuisance case there is always a question as to whether plaintiff is entitled to sue.
>
> (2) The court in making its decision "balances the interests," setting the individual inconvenience which the alleged nuisance causes against the public interest it serves, if any.
>
> (3) The jury ordinarily has little basis for determining whether it is really in the public interest for this particular use to be located where it is.
>
> (4) As a device for guiding the development of a city, it is difficult to apply before the harm has actually been done.

(5) As a control, it is applied in a sporadic, unplanned manner.

While it appears that the law of nuisance has weaknesses as a control device, commercial feed lot[1] operators are fearful of having a nuisance suit come to court. To try to minimize the "social cost" of carrying out cattle feeding, the feeders have utilized deodorants and sprinklers to lay the dust. In spring 1963 a special injury lawsuit was threatened by property owners living adjacent to a feed lot in Tempe; in lieu of becoming a defendant in court, the feed lot operator closed the feed lot and relocated his business in Yuma County.

One cattle feeder (20) stated that "the industry's position would be protected by a state licensing measure that would protect against nuisance suits." This appears to be an attempt by feeders to establish a "nuisance board" to review nuisance suits prior to legal action. The rationale behind the nuisance board appears to be one of establishing a situation where a bargaining transaction can be carried out by both parties in the conflict. The

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[1] The Zoning Ordinance for Unincorporated Areas of Maricopa County, Arizona (21) defines a commercial feed lot as, "Livestock feeding and handling facilities operated for the purpose of accommodating the needs of others in whole or in part for a fee or fees paid to the operator or owner for the accommodations, materials and services received." This raises the question whether a operator who feeds cattle for himself entirely could circumvent the zoning regulations.

outcome could be either an out-of-court cash settlement or a "social cost" agreement that each party will have to bear prior to the feed lots relocation. The process is strictly in keeping with bargaining, whether or not "price" is the outcome.

Whether the cattle feeding industry can get legal sanction to make it mandatory for nuisance damage suits to be reviewed by such a nuisance board is uncertain; furthermore, whether the board would be composed entirely of cattle feeders, or cattle feeders, plaintiff, and some "neutral" party has not been specified. If the board was to have an arbitrator chosen by both parties to settle their differences, instead of by court action, the arbitrator functions in the sphere of the rationing transaction.

CHAPTER V

ECONOMIC PROBLEMS[1]

Introduction

The income from the sale of manure out of feed lots and dairies has been very important in the past in Arizona. Manure has sold for as high as $3.00 per ton. Vanvig (25) in 1956-57 found that short-fed steers and heifers were fed 116 to 127 days. The steers consumed approximately 27 pounds of feed (air dry) per day and heifers about 25 pounds. It is estimated that these animals produced 1,550 pounds of manure. With a turnover of two animals per year per unit of capacity, many feed lots had an average production of 3,100 pounds of manure per head capacity of feed lot. Moran (26) found that the average investment in feed lots in Arizona in 1957 was $47.38 per head capacity. Thus the production of manure from 240 days of feeding (two short-fed steers

[1]This chapter is based upon the unpublished manuscript compiled by Thomas M. Stubblefield and this author (24), agricultural economist and graduate student, respectively, A Survey of the Production and Marketing of Cattle Manure in Arizona, Dept. of Agricultural Economics, Agricultural Experiment Station, University of Arizona (Tucson: December 1963), 18 pp.

or heifers) would have produced a revenue of $4.65 per head of capacity if the manure was sold at $3.00 per ton, or $3.10 per head capacity if the manure was sold at $2.00 per ton--a return of 9.8 and 6.5 per cent on the average investment in the feed lots. Assuming the operators break-even on their cattle feeding, manure can carry 100 per cent of the interest on investment, leaving gain to carry operating costs and management return.

It is estimated that, on the average, a dairy cow will produce 2 tons (air dry) of manure per year. According to Hill (27) the total capital investment per cow (not including the cow) ranged from $440.00 for a 42-cow herd to $176.00 for a 195-cow herd in 1959. Thus if the price the dairy farmer received for dairy manure was $3.00 per ton, the return on the capital investment would range from 1.4 per cent to 3.4 per cent--at $2.00 per ton the return on the capital investment would be from 0.9 of one per cent to 2.3 per cent.

An organized and structured manure market would supplement the need for a high return on investment. Presently the marketing of manure is carried out by personal arrangements between the feeders, manure haulers, and farmers. Since the price for the fertilizer is determined at the farm on which it is to be applied, the

price of dairy and feed lot manure has never been the same throughout the irrigated valleys in the state. Feeders in Pinal County usually received a lower price for their fertilizer than did the feeders in the Salt River Valley. Different kinds of agricultural producers--that is, vegetables, cotton, etc.--have different demands. Thus the nature of the manure market tends to create a disorganized and unstructured arrangement for the feeders.

Production

The total weight of manure available to be moved out of feed lots and dairy lots will vary from year to year due to the amount of precipitation, wind, and humidity. During very dry, windy years a considerable amount of manure will be blown out of the feed and dairy lots. The weight of the manure will vary with the amount of moisture in the manure. Therefore, more tons of manure are available for spreading on fields during years of higher precipitation.

The number of dairy cows in the major milk-producing areas in the state has remained rather constant over the past 10 years. There are approximately 30,000 head of dairy cows in Maricopa County and 10,000 head in Pinal, Pima, Cochise, and Graham Counties. Production of manure from dairy cows and replacement heifers is estimated at 160,000 tons a year.

Cattle feeding in Arizona has increased very rapidly since 1950. Ten years ago feeders were able to sell the manure produced by the cattle and calves being fed with very little, if any, difficulty. Exceptions to this were where the feed lots were located too great a distance from the fields to make it economical for the manure to be used. Several of the feeders, as well as the dairy producers, used all or part of the manure on their own fields. However, the market for manure has not expanded as much as the production of manure in the last two or three years. Table 4 gives the estimated production of manure from Arizona feed lots.[1]

TABLE 4.--Estimated Production of Manure in Arizona Feed Lots.

Year	Number of Cattle and Calves Marketed Out of Feed Lots	Estimated Production of Manure (tons)
1955	313,000	221,000
1957	393,000	280,000
1962	568,000	345,000

The production of manure has not increased as rapidly as the number of fed cattle and calves because

[1]A schedule was drawn up and distributed to feeders to find individual feed lot production of manure for 1962. The replies were deemed incomplete for use in this study. See Appendix 4 for a copy of this schedule.

the feeders have been feeding a higher concentrate ration since 1959 and 1960. The rule of thumb for the production of manure in the feed lots up to 1959 was that the weight of manure produced (air dry) was 50 per cent of the weight of the air dry feed fed. Since 1959 it has dropped to approximately 40 per cent of the weight of the feed consumed.[1]

It is estimated that 505,000 tons of manure were produced in commercial feed lots and dairies in Arizona in 1962--345,000 tons in commercial feed lots and 160,000 tons in dairies. Most of the dairy manure was produced in the Phoenix area--120,000 tons. Approximately 240,000 tons of the feed lot manure was produced in the Phoenix area with the Gila Bend-Mohawak-Wellton-Yuma area producing 60,000 tons, the Casa Grande-Coolidge-Florence area producing 28,000 tons, and the Tucson-Willcox-Safford area producing 17,000 tons. Thus 360,000 tons, or 70 per cent of the total production in the state, was produced in the Phoenix area.

Market for Manure

Table 5 gives the estimated amounts of manure used on the citrus, grapes, and vegetables in Maricopa County in

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[1]Given the situation where the operator breaks even on feeding cattle and 100% of the return on investment stems from manure sales, it could be conceived that the manure is the product and fed cattle be called the by-product. Depending on all prices paid and prices received, it may be advantageous for a feeder to increase the roughage content of the ration so as to increase manure production.

TABLE 5.--Estimated Amount of Manure Used on Citrus, Grapes, and Vegetables in Maricopa County, 1962.

Type of Acreage	Amount of Manure Used (tons)
Citrus	25,000
Grapes	15,000
Vegetables	120,000
TOTAL	160,000

1962. There was probably another 45,000 tons of manure spread on citrus and vegetables in Yuma County.

The landscaping industry in Arizona used about 30,000 tons. Thus there were approximately 270,000 tons left to spread on the vegetable land in other counties and grain and cotton land. Part of this production was not used. Approximately 40,000 tons were stockpiled. This was not all surplus product. A few feed lots sold manure produced prior to 1962 during the marketing year of 1962. The usual marketing period for manure produced in any one year is the latter half of that year and the first half of the next year.

One of the reasons why this manure was not used is that farm land close to metropolitan Phoenix is being taken into one of the cities and/or new housing developments. The owners of the farm land do not know how soon the land adjacent to these developments will be taken out of agriculture. Thus they hesitate to invest in manure, since the advantage

of this fertilizer may not be fully realized for two to three years.

Another problem involved in the sale of manure is that a larger part of the vegetable production is to the west and north of the Phoenix metropolitan area. Those feed lots located in Phoenix-Tempe and Mesa-Chandler find that the hauling costs in relation to the value of manure as fertilizer in the vegetable production areas almost put them out of this market. The feeders located on the east and south of Phoenix that own farm land use most, if not all, of it on their own farms.

The fact that more manure was available than had been available previously created a situation that forced the price of manure down. Up to 3 years ago the price of manure was fairly stable. Another reason for the price decline is that feeders in the Phoenix area had to get manure out of their pens; correspondingly the price for manure was bid down. In a few instances, the feed lot operators paid more in 1962 for the removal of manure from their feed lots and its stockpiling than they received for the product in the stockpile. While seemingly uneconomical, this was necessary in order to prevent the feed lots from becoming boggy during periods of rain.

In general, most of the manure produced in 1962 sold for $1.00 to $1.50 per ton at the feed lot. Using

Vanvig's figures (25), the return on investment is 3.3 to 4.9 per cent. Feed lots located in the Phoenix-Tempe and Mesa-Chandler areas were the ones which had the greatest difficulty in selling the manure produced in their feed lots.

Structure of the Manure Market

There are four possible methods for marketing of manure: (1) the feeder or his representative contacting the farmer and selling directly to the farmer, with the feeder arranging for the spreading of the manure on the farmer's field; (2) the farmer contacting the feeder and buying the manure in the feed lot, with the farmer making arrangements for the hauling and spreading of the manure; (3) the manure haulers contacting the farmer to determine if the farmer is interested in purchasing manure and at what price. The hauler then will contact the feed lots or dairies to determine the price at which the feeder or dairyman will sell the manure. If the hauler can cover costs and make a profit he will make a contract (mostly verbal) to spread manure on the farmer's land; and (4) the feeder selling to an "outside" buyer.

Most of the time the hauler has borrowed to finance his operations including payment for the hauling equipment, i.e., dozers, loaders, trucks, etc. In such instances, the hauler must keep his equipment operating in order to meet

his obligations. During times of expanded production of manure, the hauler attempts to increase his volume of business in order to increase his profits. If he can offer the manure to the farmer at a lower price, it may be possible for him to increase the volume of his business. If the dairyman and feed lot operators are finding it more difficult to sell manure, the haulers may find it easier to purchase the manure at a lower price.

Haulers of manure are required by law to have a franchise to haul. They are required to file a tariff and these rates are to be charged if the haulers do not own the manure and haul on public roads. In order to be considered the owner of the manure, it is necessary for the hauler to stockpile it.

The rates (except for one carrier) for transporting and spreading manure in bulk spreader trucks start at three different levels--$1.00, $1.25, and $1.50--per ton for the first mile plus 5 cents a mile for every mile or fraction thereof thereafter.[1] Five carriers in the Phoenix area have the $1.00 rate while the $1.25 is to be charged by all other carriers when transporting manure in Phoenix and vicinity. The $1.50 rate applies to the same carrier

[1]The reasons for the differentiation in rates is not shown in M.F.-A.C.C. No. 102 or M.F.-A.C.C. No. 172 tariffs of the Arizona Corporation Commission.

transporting and spreading manure in Florence and vicinity, Casa Grande and vicinity, and Yuma and vicinity. The rate for the first mile includes piling, loading, and spreading manure.

The only carrier not under this tariff has a rate of 50 cents per ton for 0-10 miles inclusive and 25 cents per ton per each 5 miles (or fraction thereof) in addition to the base 10-mile rate. This carrier may charge 15 cents per ton (or fraction thereof) for loading fertilizer at points of origin. It should also be noted that this tariff does not cover charges for spreading whereas the tariffs for all other carriers do.

The latter manure hauler did an estimated 70% of the transporting and spreading of manure in 1962. Table 6 gives approximate distances in highway miles from the centers of each of the three areas of feed lot concentration in the Phoenix area to two of the vegetable-producing areas of

TABLE 6.--Total Cost of Hauling to Two Areas of Western Maricopa County from Feed Lots in the Phoenix Area.

Feed Lot Area	Road Miles to Harquahala	Transportation Cost to Harquahala	Road Miles to Aguila	Transportation Cost to Aguila
Avondale-Surprise	70	$4.50	75	$4.75
Phoenix-Tempe	85	5.25	85	5.25
Mesa-Chandler	90	5.50	95	5.75

Maricopa County. The rate of the hauler with 50 cents per ton for 0-10 miles inclusive and 25 cents per ton per each 5 miles has been used. While the 15 cent loading charge has not been included, the $1.00 spreading charge has been incorporated into the compilation.

Farmers in the Harquahala-Aguila area of Western Maricopa County have paid $5.00 per ton of manure spread on the field. Therefore, feeders in the Avondale-Surprise area can make 50 cents per ton; feeders in both other areas are priced out of this by-product market. Put in other terms, feeders in Avondale-Surprise possess up to a $1.00 advantage over Phoenix-Tempe and Mesa-Chandler feeders when selling to vegetable producers in Harquahala-Aguila due to advantage of geographic location in relationships to the by-product market. During times when it is necessary to move manure out of pens and stockpiles, the Avondale-Surprise feeders are in a more favorable competitive position in making personal arrangements with farmers and manure haulers on the price of manure.

If the 15-cent loading charge was included, feeders in Avondale-Surprise would make a maximum of 35 cents per ton--a return on investment of about 1.1 per cent. This has been the case in 1962. The feed lots to the east and south of Phoenix have had to spread manure on their own lands or stockpile. With the present range of returns on investment

being 1.1 per cent to 4.9 per cent on the average investment in the feed lots from the sale of manure, the question becomes how can the return on investment be increased through by-product market disposal of manure.

Chemical Analysis of Feed Lot and Dairy Manure

Table 7 gives the chemical analysis of eight manure samples taken from feed lots in the spring of 1963. Table 8 shows the analysis of four composite samples of manure taken in the summer of 1963--two from feed lots and two from dairies.[1]

These data indicate that feed lot and dairy manure vary a great deal in chemical content. The results show that dairy manure may be a little lower in nitrogen content than feed lot manure. Based on these analyses, a ton of feed lot manure contains about 24 to 47 pounds of nitrogen.

There has been some concern about the salt content of barnyard manure. The analysis indicates that the sodium content is moderate--0.27 to 0.87 per cent or 5.4 to 17.4 pounds per ton. Total soluble salts, a large part of which are calcium salts, range from 4.42 to 10.77 per cent or 88 to 215 pounds per ton. Assuming these manure samples were

[1]These composite samples were made of five samples which were taken at random from two stockpiles of feed lot manure and from one stockpile of dairy manure at least one year old and from a dairy feed lot that was in current use.

TABLE 7.--Chemical Composition (Air Dry) of Steer Manure of Eight Samples Taken From Four Feed Lots in the Phoenix Area.

	Moisture	Nitrogen	Ash	pH	Total Soluble Salts	Sodium
	%	%	%		%	%
Range	57.9-28.3	2.34-1.18	37.9-9.4	6.5-8.1	8.73-4.42	0.69-0.32
Average	40.2	1.68	20.4	7.3	6.06	0.52

TABLE 8.--Chemical Composition of Feed Lot and Dairy Manure Samples Taken From Two Feed Lots and Two Dairies Located in the Phoenix Area.[a]

Composite Sample	Moisture	Nitrogen	Potassium	Available Inorganic Phosphorus[b]	Ash	Total Soluble Salts	Sodium
	Per Cent						
1 (feed lot)	21.2	1.29	1.42	0.26	44.1	6.56	0.62
2 (feed lot)	24.2	2.25	2.43	0.96	28.7	10.77	0.87
3 (dairy)	35.8	0.82	1.72	0.28	39.5	5.76	0.32
4 (dairy)	37.2	1.36	2.48	0.37	22.3	6.91	0.27
Average feed lot	22.7	1.77	1.93	0.61	36.4	8.67	0.75
Average dairy	36.5	1.09	2.10	0.33	30.9	6.34	0.30

[a]Each composite sample was made up of 5 random samples.

[b]Soluble in $CO_2 + H_2O$.

representative, the average total soluble salts in feed lot manure with the moisture content of 40 per cent would be close to 120 pounds per ton, while dairy manure would be lower (an acre-foot of water which contains a thousand parts of total soluble salts per million parts of water contains 2,718 pounds of soluble salts). The average nitrogen content of feed lot manure with 40 per cent moisture would be approximately 34 pounds per ton. The amount of phosphorus in the manure samples (Table 8) is adequate to support bacterial action to break down the manure.

Manure as a Fertilizer and Soil Conditioner

A limited number of experiments have been conducted in Arizona to determine the value of manure as fertilizer and soil conditioners. The results (Tables 9 and 10) of experiments conducted on the Mesa Experiment Station, 1946-1949, on alfalfa were inconclusive.

W. D. Pew (28) found it advantageous to use high quality feed lot manure on lettuce. The results of the experiments conducted by him are given in Table 11. The following are the conclusions of these experiments:

> A summary of the data presented in Table 11 show that guar as a green manure crop is not as effective in improving head lettuce yields as is feed lot manure at 20 tons per acre during three years following the manure application. Yield increases from the manure treatment were the result of both a higher percentage of larger,

TABLE 9.--Alfalfa Fertilizer Test, Mesa Experiment Farm, 1946-1948: Summary of Effects of Treatments on Hay Yields and Money Gain.

Year	No. of Cuttings	525 lb. Liquid Phos. Acid[a]	600 lb. Tr. Super-Phos.[a]	200 lb. T.S. & 10 T. Manure	200 lb. Tr. Super	175 lb. Liquid Phos.	10 T. Manure
1946	3	8,788	9,397	8,564	8,699	8,272	7,673
1947	5	19,098	17,277	17,672	17,360	16,602	16,169
1948	5	18,753	17,137	17,015	16,103	15,655	15,480
Total	13	46,639	43,811	43,251	42,162	40,529	39,322
Untreated check		35,847	35,847	35,847	35,847	35,847	35,847
Lbs. gain over check		10,792	7,964	7,404	6,315	4,682	3,475
Value at $20 a ton		$107.92	$79.64	$74.04	$63.15	$46.82	$34.75
Est. cost of fert.		31.50	18.30	31.10	6.10	10.50	25.00
Gain over fert. cost		76.42	61.34	42.94	57.05	36.32	9.75
Return per fert. dollar		3.42	4.35	2.38	10.35	4.45	1.39

[a]Only 1 plot of each of these, results only indicative.

[b]Tr. superphosphate and manure applied to plowed land and disced in.

[c]Annual yields from check plots--7,333 lbs., 14,901 lbs., and 13,613 lbs.

[d]Seed broadcast and irrigated up. Liq. phosphoric acid applied in 1st after-seeding irrigation.

TABLE 10.--Alfalfa Fertilizer Test Yields, Mesa Farm, 1949, Started February 18, 1949, Field Cured Weights in Lbs. Per Acre.

Cutting	Check No. Fert.	10 T. Man. & 75 lb. P_2O_5	100 lb. P_2O_5 & 35 lb. K_2O	50 lb. N & 100 lb. P_2O_5 ("10-20")	100 lb. P_2O_5 harrowed in	100 lb. P_2O_5 in Liquid Phos.	100 lb. P_2O_5 plowed under
1	1,829	2,290	2,549	2,456	2,354	2,117	2,088
2	3,658	3,716	3,528	3,457	3,298	3,571	3,420
3	3,075	3,665	3,478	3,262	3,363	3,327	3,154
4	583	618	742	606	562	579	525
5	2,009	2,722	2,621	2,427	2,492	2,268	2,362
	11,154	13,011	12,918	12,208	12,069	11,862	11,549
	Check	11,154	11,154	11,154	11,154	11,154	11,154
	Increase over check	1,857	1,764	1,054	915	708	395

Cutting dates--May 26, June 29, August 1, September 17 and November 5.

Manure and Tr. Super. plowed under--Column 2.

Tr. Super. and Sulfate of Potash plowed under--Column 3.

"10-20" harrowed in after plowing--Column 4.

Tr. Super. harrowed in--Column 5.

Liquid Phos. acid applied in pre-seeding irrigation 2/8/49--Column 6.

Tr. Super. plowed under 1/19/49--Column 7.

TABLE 11.--Effects of Guar and Steer Manure on Production of Head Lettuce, Fall Crop, Experiment Station, Mesa.

Treatment	Harvests (2 Dozen Size - Cartons Per Acre)		
	1st	2nd	3rd
Guar	83.0	364.0	447.0
Steer Manure (20 T/A)	192.0	348.0	540.0
Check	32.0	212.0	244.0

Source: W. D. Pew, "Effects of Cover Crops and Manure on Lettuce Yields at Mesa," Lettuce Research in Arizona: Summary for 1958, Agricultural Experiment Station Report No. 182, Tucson: University of Arizona, February 1959, p. 13.

> more desirable sizes and a higher percentage of cut. Earliness was also markedly influenced by the manure application. Yields and quality of the lettuce grown on the guar plots was generally poorer than that grown on the manure treated plots. The yield on the check plots was significantly poorer than for the lettuce on both the guar and steer manure plots.
>
> Soil condition and water intake were better on the green manure and feed lot manure plots as compared with the check. These data are not presented in this paper.

D. R. Rodney and G. C. Sharples (29) found that in responses of Lisbon lemon trees to nitrogen, phosphate and manure in experiments conducted in 1957-59:

> Increasing N fertilization from 1 pound/tree/year to 2-1/2 or 4 pounds resulted in no increase in the number of fruit produced except where phosphate or steer manure were supplied in addition to the N.
>
> Fruit sizes were increased by application of steer manure, but not by other fertilizer treatments.

Abbott and Tucker (30) have found in experiments being conducted on the Cotton Experiment Station near Phoenix that manure is superior to fallow, sesbania as a green manure crop, and continuous cotton on land which had been cut down to subsalt during leveling in 1959. The results of these experiments up to date are given in Table 12. The following are the comments of Abbott and Tucker on their experiments:

> A steady decline in yield of continuous cotton, with improvement of manured plots is apparent. Continuous cotton failed to respond to increments of nitrogen above 100 lbs. per acre. All manured plots

TABLE 12.--Effect of Fallow, Manure, and Green Manure on Soil Productivity and Nitrogen Fertilizer Requirements of Cotton.

Main Treatment	Lbs. N/A Applied[a]	1960		1961		1962	
		Yield	% of Control	Yield	% of Control	Yield	% of Control
		bales/acre		bales/acre		bales/acre	
1 Continuous Cotton	0	1.95	100	1.37	100	1.10	100
	50	1.94	100	1.40	102	1.41	128
	100	2.01	108	1.85	135	1.63	152
	150	2.17	111	2.14	156	1.61	147
2 Fallow in 1960, 1962	0	-	-	1.53	112	-	-
	50	-	-	1.84	134	-	-
	100	-	-	1.96	143	-	-
	150	-	-	1.84	134	-	-
3 Continuous Cotton, Manure at T/A each year	0	2.09	107	1.78	130	2.35	213
	50	2.49	128	2.36	172	2.64	239
	100	-	-	2.65	193	2.36	214
	150	-	-	2.62	191	2.60	236
4 Sesbania in 1960, 1962	0	-	-	1.52	111	-	-
	50	-	-	2.11	153	-	-
	100	-	-	2.12	154	-	-
	150	-	-	2.01	147	-	-

[a]Side-dressed with urea June 1, 1961, June 5, 1962.

Source: J. L. Abbott and T. C. Tucker, "Effect of Fallow, Manure and Green Manure on Soil Productivity and Nitrogen Fertilizer Requirements of Cotton," Sixth Annual Report on Soil Fertility and Fertilizer Research, Agricultural Experiment Station Report No. 5 (Tucson: University of Arizona, 1963), p. 66.

> yielded above the highest continuous cotton treatment. Manured cotton responded to the first treatment of 50 lbs. N/A., but not to higher rates.

The manure must be completely broken down before all of the nitrogen is available for use by the plants. It is the general consensus that not until the third year is all of the nitrogen in the manure broken down.

Pew indicated that feed lot manure increased water penetration. This aspect of penetration of feed lot and dairy manure has not been extensively explored in the arid regions such as Arizona. However, the University of Nebraska has conducted such experiments over a period of 39 years. Mazurk, Casper, and Rhodes (31) studied the rate of water entry into soil as affected by manuring. They reported as follows:

> The intake of water was influenced by the application of manure and cropping history during a period of 39 years. . . . Rates of water entry after 2 hours of irrigation . . . in the continuous alfalfa plots were 31 and 37 cm. per hour respectively for the nonmanured and manured treatments. . . . Where potatoes were growing, following the plowing of a 3 year old stand of alfalfa in a 6 year rotation, the rates were 16 and 24 cm. per hour for the nonmanured and manured, respectively. A minimum rate, 0.5 cm. per hour was obtained for continuous corn (nonmanured). When manure was applied annually since 1942 to the continuous corn plot the rate of water entry was 7 cm. per hour.

The above comparisons show that manure was valuable in improving the soil's ability to absorb water rapidly.

Expansion of the Manure Market

Results of these experiments indicate that the lettuce and cotton crops in Arizona would show increased yields by using manure. It appears, however, that the market for manure on lettuce acreage is saturated. Arizona Agriculture 1963 (32) reported that 55,473 acres of lettuce were harvested in Arizona in 1962. Pew suggested that an application of 20 tons of manure spread on lettuce acreage over a three-year period would be advantageous. With an average of 6-2/3 tons per year, the lettuce acreage would need optimally 370,000 tons of manure per year. The present supply of feed lot and dairy manure can meet this use. Table 13 gives the breakdown for 485,000 tons of the 505,000 tons of feed lot and dairy manure produced in 1962 when this 370,000 ton figure is incorporated.

TABLE 13.--Markets for Feed Lot and Dairy Manure, 1962.

Market	Tons Used
Lettuce, all counties	370,000
Citrus, Maricopa County	25,000
Grapes, Maricopa County	15,000
Citrus and Vegetables, Yuma County	45,000[a]
Landscaping Industry	30,000
TOTAL	485,000

[a]Most likely includes manure used on lettuce acreage.

Thus 20,000 tons of manure would still be surplus even if all lettuce acreage were spread with manure.

While the manure for lettuce acreage appears to have reached a saturated market condition, the market for manure for cotton acreage is virtually untapped. The two principal cotton-producing counties in Arizona are Maricopa and Pinal. Arizona Agriculture 1963 (32) reported that the state total of acres harvested of upland cotton was 360,500; Maricopa County farmers harvested 132,500 acres and Pinal County farmers harvested 142,200 acres. These two counties produced 76.2 per cent of the upland cotton; furthermore, of the 40,500 acres of American-Egyptian cotton harvested in Arizona in 1962, Maricopa and Pinal County cotton farmers produced nearly two-thirds.

Using Abbott and Tucker's study of manure on cotton acreage, a per ton value of manure can be calculated for the 30-ton application on acreage devoted to cotton for those three years. A comparison can be made for continuous cotton, manured at 10 T/A. with 50 pounds of nitrogen applied per acre, with yields for continuous cotton without manure with 150 pounds of nitrogen applied per acre. The total yield for each of the treatments can be found by addition, and the total difference in yields would be attributable to manure. This added yield can be measured in added costs and returns using current prices paid and prices received;

the net remainder represents the money value of manure per ton. Table 14 shows this budgeting analysis.

The value of manure for use on cotton acreage calculated on an actual test basis will come out greater than a compilation made simply from applying current retail prices to the type and amount of plant nutrients in manure. This seems reasonable when considering organic matter's ability to increase the condition of the soil; as of yet this added value to the soil cannot be measured in dollar value. Furthermore, research is needed to discover how much manure can cut irrigation costs with varying soil conditions; also more studies are needed to design optimum manure-inorganic fertilizer programs for various crops grown in Arizona.

The object of the budgeting analysis used in Table 14 is to show that the best prospect for additional market outlets for manure is to cotton producers. Given the present manure situation where production exceeds use, if it can be shown that it is advantageous for a cotton farmer to invest in manure, it is probable that the manure situation for the feeders and dairymen would become reversed.[1]

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[1] If a study was carried out that showed manure's ability to cut irrigation costs on land producing cotton from pump irrigation, it may be valuable to use manure when the water costs are too high to be profitable for including alfalfa and grain crops in the crop rotation.

TABLE 14.--Value of Manure Per Ton When Spread on Cotton Acreage.

Continuous Cotton at 150 lbs. N/A Applied[a]

Year	Yield (bales)
1960	2.17
1961	2.14
1962	1.61
Total	5.92

Continuous Cotton, Manured at 10 T/A Each Year with 50 lbs. N/A Applied

Year	Yield (bales)
1960	2.49
1961	2.36
1962	2.64
Total	7.49

Total Difference in Yields: 1.57 bales

Added Returns:	1.57 bales (785 lbs.) at 31.7¢ lb.[b]	$248.85
	1214 lbs. seed[c] at $48 per top[d]	29.14
	300 lbs. savings of N at 6¢/lb.[e]	18.00
	Gross Added Revenue	$295.99

Added Costs: Per Bale

Picking and hauling[f]	$19.10
Contracting[g]	.55
Ginning[h]	18.38
Miscellaneous[i]	1.30
Total	$39.33

Added Cost for 1.57 Bales at $39.33 per bale	$ 61.75
Net Added Revenue	$234.24
Value Per Ton of Manure With 30 Ton Total as Base	$ 7.81

TABLE 14--Continued

[a]Both the non-manured and the manured treatments were side-dressed with urea June 1, 1961, and June 5, 1962. Since these treatments received equal side-dressings, the cost balances therefore have not been included.

[b]Based upon Arizona Agriculture 1963, p. 18, price received for a pound of lint; a bale is considered to be 500 lbs.

[c]Estimated that each bale of lint has an associated 773 lbs. of seed.

[d]Estimated price per ton of seed.

[e]Olin-Matheson 1963 price for NH_3 gas when picked up by grower in his own tank.

[f]Computed on the basis of 1.5 cents per lb. of seed cotton for both picking and hauling.

[g]Source: Arizona Agriculture 1963, p. 18.

[h]Total charge per 500-pound gross-weight bale (includes drying of seed cotton and use of lint cleaners). Source: Economic Research Service, Marketing Economics Division, United States Department of Agriculture, Charges for Ginning Cotton, Costs of Selected Services Incident to Marketing, and Related Information, Season 1962-63, Report ERS-2 (Washington: May 1963).

[i]Includes 20-cent contribution to National Cotton Council, and 10-cent contribution to Arizona Growers Association, and $1.00-contribution to Cotton Producers Institute. Source: Arizona Agriculture 1963, p. 19.

Table 14 shows that if a cotton farm in Arizona had climatic and soil conditions similar to those of the Mesa Experiment Station, the value of using manure at the rate of ten tons per year would be $7.81 a ton. However, it is suspected that similar increases in yield could be obtained from using a total of 20 tons of manure over a three-year period. In the first year each acre should be spread with ten tons of manure, and five tons per year thereafter. The same yields, when divided by a 20-ton figure, make manure worth $11.71 per ton. However, since this hypothesis has not been tested on experimental plots, the results from using 30 tons of manure over a three-year period at ten tons per year is presently a more valid figure for showing the per ton value of manure for use on cotton lands.

The significance of manure being worth $7.81 per ton to cattle feeders and dairymen is not only the possibility of a higher return on investment, but in the vast expansion of the manure market. Maricopa and Pinal Counties had a combined total of nearly 300,000 acres harvested from cotton in 1962; if all cotton farmers were to use 10 tons of manure on each acre devoted to cotton, approximately three million tons of manure would be needed to meet their demands each year. While it is unlikely that 100% of the cotton farmers would use manure on all of their acreage,

it is necessary to have only 50,000 acres to require the total yearly production of feed lot and dairy manure produced in Arizona.

With manure worth $7.81 to the cotton farmer, the question becomes one of finding the price per ton of manure to the feeder at the feed lot. This creates a bargaining situation for the feeder and cotton farmer to settle on a price; the outcome would most likely be a price within the limits of the value of manure to the farmer less the transportation cost to his field.

Table 15 gives approximate distances in highway miles from the center of the three areas of feed lot concentration in the Phoenix area to two of the cotton-producing areas of Arizona--the Harquahala area of Western Maricopa County and the Maricopa area of Western Pinal County. The rate of the hauler with 50 cents per ton for 0-10 miles inclusive and 25 cents per ton per each 5 miles has been used. The 15-cent piling charge has been excluded, but the $1.00 spreading charge has been included.

Knowing the value of manure and the hauling and spreading charges incurred, delineates the limits in which bargaining will take place between feeder and farmer. Assuming that an average price of $5.00 per ton is arrived at, the highest return on investment--8.2 per cent (using Vanvig's figures)--accrues to feeders in the Mesa-Chandler

TABLE 15.--Total Cost of Hauling to Two Cotton-Producing Areas in Arizona from Feed Lots in the Phoenix Area.

Feed Lot Area	Road Miles to Harquahala	Transportation Cost to Harquahala	Road Miles to Maricopa	Transportation Cost to Maricopa
Avondale-Surprise	70	$4.50	50	$3.50
Phoenix-Tempe	85	5.25	35	2.75
Mesa-Chandler	90	5.50	30	2.50

area. While Phoenix-Tempe and Mesa-Chandler feeders are still priced out of the Harquahala market, the lowest return on investment--1.64 per cent--is received by Avondale-Surprise feeders when selling to cotton farmers in the Harquahala area. This wide range of returns on investment signifies the importance of the location of the feed lot in relation to the value of manure and transportation costs to the farmers' fields. Furthermore, the returns on investment are affected by the relative bargaining positions of the two parties involved. Given the present social and legal problems affecting feed lots in the Phoenix area, it may be that the cotton farmers would be in a relatively stronger bargaining position. However, the feeders may find themselves in a relatively stronger bargaining position--in spite of the current institutional problems--if it became necessary for cotton farmers to require organic matter to maintain or increase present yields of cotton.

Moreover, if feed lots were located in a 0-10 mile radius of a manure-consuming area, the return on investment (using Vanvig's figures) would be 16.4 per cent when manure is sold at $5.00 per ton at the feed lot.

CHAPTER VI

RELOCATION OF FEED LOTS

The Possible Solution

The Relocation Decision

Improved prices to feeders from by-product sales of manure do not change the nature of the institutional problems facing feeders at present locations in the Phoenix area. The feeders have tried to minimize the social cost of operating a cattle feeding business by using deodorants and sprinklers to lay the dust. One feeder (20) noted that in spite of the industry's attempt to abate nuisances associated with cattle feeding, complaints regarding objectionable odors and dust continue to be expressed by the public. It is possible that feeders can minimize the social cost of operating a feed lot in the Phoenix area, or stall for relocation time, through the establishment of a "nuisance board" which would be designed to review nuisance suits prior to court action; possibly, an agreement could be reached by both parties without involving the court.

The juxtaposition of the economic considerations preventing the feed lot operators from ceasing cattle

feeding and/or relocating the feed lots to the economic considerations favoring the feed lot operators to cease cattle feeding and/or relocating the feed lots is a basis by which Phoenix area cattle feeders can reach a decision for action when the "discontinuing and/or relocating margin" is crossed. While it now appears more desirable for operators to continue cattle feeding in the Phoenix area, the discontinuing and/or relocating margin could be crossed in the future when affected by one of the following factors, combination of factors, or possible non-listed factor:

(1) the unprofitability of cattle feeding
(2) the likely loss of a nuisance suit
(3) the necessity of new equipment or costly repairs
(4) the opportunity cost of cattle feeding on higher-valued land at present locations as opposed to land values at other locations
(5) the opportunity cost in terms of return on investment of marketing manure from present locations as opposed to marketing manure from possible feed lot locations closer to the by-product market.

Relocating the Feed Lots

If and when the discontinuing and/or relocating margin is crossed, feed lot owners will have to decide whether to stay out of cattle feeding or relocate. The assumption in this discussion is that they will decide the latter.[1] Once the individual decision is made to relocate the feed lot, the feeder can either set up his plant in a new location in Arizona or in some other part of the country. Presently, cattle feeders in the Phoenix area have received offers to relocate elsewhere in the country, as well as in other areas of Arizona. Following Wright's figures (13) of the feeding efficiency of cattle being fed in the two western states (California and Arizona) having mild winters, it appears that these two states have a comparative advantage in pen feeding relative to other areas of the country. While there are advantages to be gained for commercial feed lots to relocate in either state,[2] this study will assume that the feed lot owners

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[1]As evidenced by the "Cow Town" and Gila River Indian Reservation negotiations carried out by feeders which are later discussed in this chapter.

[2]For example, Arizona ships cattle and calves to California; relocating Arizona feed lots in California would be a transportation cost saving. On the other hand, both Arizona and California feeders buy feed and cattle from more easternly sources; Arizona saves relatively more when making supply purchases.

will seek first to relocate in Arizona.[1]

Since the primary business of feed lots is to produce beef, the locational requirements for a feed lot should not be fully described in terms of the by-product. Cattle feeding tends to be an agglomerative industry; according to Seltzer (33):

> Cattle feeding in the west is carried on in large scale feedlots, often in a relatively concentrated geographical area. This concentration of available slaughter cattle facilities encourages packer buying. . . . Such concentration of feedlot capacity makes it easy for the packer-buyer to visit the feedlots and assemble the numbers and classes of slaughter cattle which his killing requirements demand.
>
> Such large feedlots become markets in themselves, and the operators of these feedlots feel that they have, in some cases, developed packer contacts which are advantageous.

Furthermore, since zoning regulations tend to concentrate nuisance-producing plants in specified land use districts, it is probable that feed lots will agglomerate not only for advantages to be gained from cattle marketing, but also in response to zoning ordinances when they relocate in a new locale. Thus, this author also assumes that feed lots will relocate not separately, but as an industry in total. In terms of choosing an optimum location, it is only necessary to pick an area in Arizona

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[1]As evidenced by Phoenix area feeders desire to initiate negotiations with the Pinal County Planning and Zoning Commission and representatives of the Gila River Indian Reservation which is discussed later in this chapter.

large enough to meet the land requirements of feed lots relocating from the Phoenix area.

It is not necessary to use formal location theory to find an area for relocation of the cattle feeding industry in Arizona.[1] By drawing up a list of the desirable aspects for a site, it is feasible to evaluate different parts of Arizona without location theory per se. The optimum factors include: (1) availability of water, (2) nearness to good highways, (3) nearness to railroad, (4) proximity to by-product markets, (5) availability of land, (6) sparseness of residential housing, (7) little future urbanization of adjacent property, and (8) favorable zoning provisions.

Through an inspection of the "Irrigated Areas in Arizona" map (34), it can be seen that the Phoenix, Casa Grande, Yuma-Wellton, and possibly the Safford areas of Arizona contain large enough by-product areas. Due to population growth and urbanization, the Phoenix-Maricopa County area can be eliminated; due to a saturated by-product

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[1]For those individuals desiring a discussion of location theory see Edgar S. Dunn, Jr., The Location of Agricultural Production (Gainesville: Univ. of Florida Press, 1954); Edgar M. Hoover, The Location of Economic Activity (New York: McGraw-Hill, 1948); Walter Isard, Location and Space-Economy (New York: John Wiley & Sons, 1956); August Losch, The Economics of Location (New Haven: Yale Univ. Press, 1954); and Alfred Weber, Theory of the Location of Industries (Chicago: Univ. of Chicago Press, 1929).

market situation, the Yuma-Wellton area can also be eliminated. This leaves the Safford and Casa Grande areas. In terms of the by-product market, Graham County, in which Safford is located, cropped 39,160 acres in 1962 (as tabulated by Arizona Agriculture 1963). However, Pinal County, in which Casa Grande is located, harvested 258,095 acres in 1962 (32). Without taking the other factors into consideration, Pinal County is the most desirable location for the cattle feeding industry. If a sector of the Casa Grande area of Pinal County can be found that meets all the other requirements, the placement problem will be resolved.

The irrigated areas of Pinal County are contained within an approximate 25-mile radius of Casa Grande (34). This 25-mile (air mile) radius contains the municipalities of Maricopa, Sacaton, Magna, Florence, Coolidge, Casa Grande, Stanfield, Eloy, and Picacho. Pinal County had a total population of 62,673 in 1960 (14). The tri-city area (Coolidge, Casa Grande, Eloy) had 36,000 persons, while the Maricopa-Stanfield area (areas west of state highway 87) contained 6,000 persons (35). Moreover, the projected population growth for Western Pinal County shows that the tri-city area will receive the larges proportion of increase by 1980 relative to other parts of Pinal County (35).

Adequate water is available in the Maricopa-Stanfield area to support cattle feeding; furthermore, the Southern Pacific railroad line and good highways are in this area. Depending upon the availability of land and favorable zoning provisions, the preceding analysis shows that the Maricopa-Stanfield area of Western Pinal County would be a desirable site for the relocation of the Phoenix area feed lots.

An identical problem situation faced dairymen in the Los Angeles-Orange County area of California. Fletcher and McCorkle (36) reported the old location problems and the new location benefits of these dairymen after relocation efforts were initiated. They noted as follows:

> There are several ways in which population growth and industrial development tend to "limit" directly milk production in an area.
>
> One way in which urbanization applies pressures on dairymen to relocate in through conflicts between dairymen and their residential neighbors over odors, flies, and animal and dairy noises. Complaints to local officials have sometimes forced dairymen to reduce operations, and in some cases permits have been revoked. Dairymen have been forced to undertake costly programs to control the sources of complaints, thereby reducing profits. In other cases, dairymen have found themselves in the position of prior non-conforming uses when residential or commercial zoning is applied to their area. The result may be to deny the producer the right to expand or improve his operation for greater efficiency and profitability. Finally, nearby open areas which had been used for waste disposal no longer can be used because of subdivisions, raising a serious and potentially costly waste disposal problem.
>
> The second way in which urbanization encourages relocation of dairies is through inflation of land

values, increasing the fixed costs of established operations through higher taxes and tempting producers to sell their land to capitalize on rising values. . . .

In response to this situation, efforts were initiated as early as 1940 to zone areas for the needs of the dairy industry. Early efforts died because dairymen were opposed and the objectives and advantages of comprehensive zoning were misunderstood. The efforts were continued after World War II, with the support of local officials, and finally succeeded in 1955 and 1956 when three separate areas were incorporated within the southeastern Los Angeles-Orange producing district to retain them for the use of market milk production.

The first area to incorporate was Dairyland in Orange County. . . . The entire city is zoned A-2--heavy agricultural--with a minimum one-acre tract size. . . . The second area to incorporate, and the largest of the three, is in Los Angeles County. Dairy Valley, incorporated in 1956, contains 8.75 square miles. . . . The third of the special-purpose incorporations, Cypress, in Orange County, was incorporated in July 1956, with an area of 7 square miles. . . .

Advantages that dairymen have gained from protective zoning under localized control have been twofold.

First, the establishment of the "cities" created areas in which dairies are automatically allowed, thus eliminating special permit requirements, and in which a producer could expand or improve his facilities without fear of unnecessary delay or expense. Nuisance complaints from residential areas may continue, especially against producers on the edge of the dairy zones, but the concentration of dairies tends to establish "reasonableness" for the objectionable operations.

The second way in which zoning can be advantageous to dairymen concerns taxes. Theoretically, since residential subdivisions, commercial uses, and industrial developments are excluded, land values in the zoned areas should reflect a discounted stream of future net earnings in agricultural uses. This would tend to stabilize

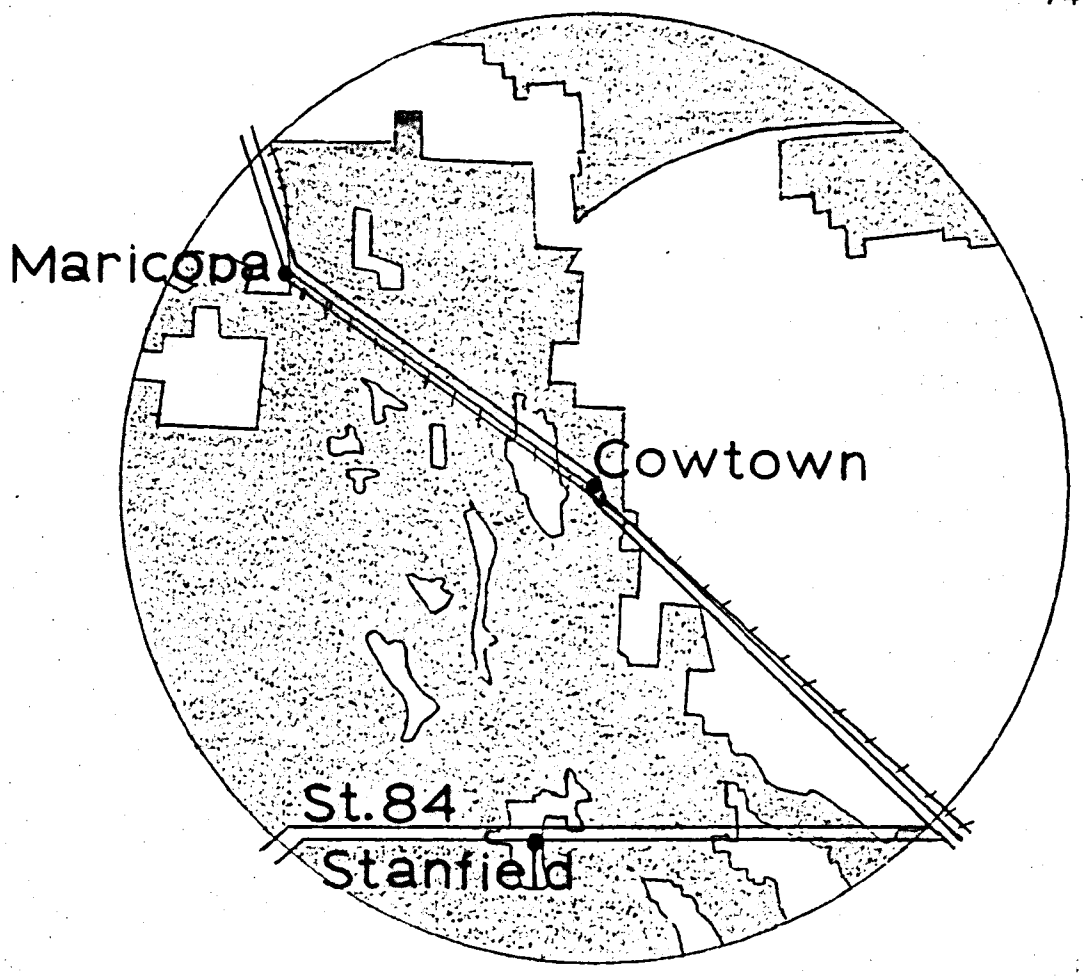
> land prices and hold assessed values lower than if assessments were based on highly inflated values reflecting potential subdivision or commercial or industrial use of the land.

Thus, Fletcher and McCorkle's study show the desirability of having cattle feeders and local zoning officials meet and make provisions for the protection of the industry from nuisance complaints prior to actual relocation.

"Cow Town"

The Arizona Cattle Feeders' Association has negotiated with the Pinal County Planning and Zoning Commission to create a "feed lot zone" for cattle feeding pens and related industries in the Maricopa-Stanfield area of Western Pinal County. Presently under consideration are 18 sections of land adjoining the Maricopa-Casa Grande highway and the Southern Pacific Railroad. The location is about two miles southeast of the municipality of Maricopa and adjacent to the Maricopa Indian Reservation. Figure 2 shows the location center of the proposed "Cow Town" development. This area would be rezoned from its present general rural to CL-2 or industrial cattle feeding. The August 28, 1963, Casa Grande Dispatch (37) reported:

> Backers of the giant Pinal County project have already found excellent response from landowners in the area and backing from the town of Maricopa has been equally gratifying. Only a few of the landowners in the area have yet not agreed to go along with the rezoning. Under Arizona Statutes,



Key

Highway
Railroad
Irrigated Land

Scale

1/4 in. = 1 mile

Figure 2.--Sketch Map of Irrigated Land Located Within 10-Mile Radius of the Center of Cow Town.

Source: Department of Agricultural Economics and Agricultural Engineering, Irrigated Areas in Arizona map, Agricultural Experiment Station and Cooperative Extension Service (Tucson: University of Arizona, 1963).

> no one can be forced to rezone his land against his will and those not wishing their property to go under the rezoning will be bypassed and left in the general rural classification, according to spokesmen.

Since one Phoenix area feeder has bought land[1] and built a feed lot in the general Cow Town area already, it seems likely that others will follow.[2] The benefit of Cow Town is that it is zoned for heavy industrial use; the Pinal County Planning and Zoning Commission has made provision for a buffer area of at least one mile to separate the industrial zone from residential uses. Appendix 5 is the resolution of the Pinal County Planning and Zoning Commission pertaining to Cow Town; and Appendix 6 contains the proposed industrial buffer provision. Appendix 7 is the proposed Easement Agreement between cattle feeders in connection with odors, dust or flies arising from a cattle feeding operation.

Manure Marketing

Campbell (38) noted that Pinal County soils are comparatively poor in organic matter and nitrogen. Therefore,

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[1]This study does not have information relating to land values of feed lots in the Phoenix area nor for land values in the Cow Town area of Pinal County.

[2]The Arizona Cattle Feeders' Association is negotiating with representatives of the Gila River Indian Reservation in regards to the possibility of leasing land on the Reservation near Santan Mountain. Details and progress of this negotiation relevant to feed lots locating on Indian land has not been analyzed by this author since the knowledge of this situation did not occur until the completion of this study.

it may be necessary for Pinal County cotton farmers to need manure to maintain and/or increase yields.[1] Figure 2 shows the irrigated acres in the Maricopa-Stanfield area that lie within a 10-mile radius of the center of the proposed "Cow Town" zone. There are approximately 108,800 irrigated acres in this area.[2] Of the 391,045 irrigated acres in Pinal County, 150,660 acres were devoted to cotton production in 1962 (32). Thus, 38.5 per cent of the irrigated acres in Pinal County are in cotton. When applying this percentage to the number of irrigated acres in the 10-mile radius surrounding the location center of Cow Town, 41,888 acres could be assumed to be in cotton production in 1962.

It was noted previously that feed lots in the Phoenix area produced an estimated 240,000 tons of manure per year. If these feed lots were to relocate in Cow Town, and produce the same volume of manure per year, it is possible that feeders could sell all of their manure in this Maricopa-Stanfield area. Following Abbott and Tucker's (30) test on continuous cottong using 10 T/A of manure per year, the supply of 240,000 tons of manure could support 24,000 acres of cotton production.[3] This necessitates

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[1] Based upon results shown in Table 12.

[2] Compiled by inspection of Irrigated Areas in Arizona map (34).

[3] Since the suggestion that 20 T/A spread on cotton land over a 3-year period can produce equivalent results has not been tested, this analysis will be based upon the tested 10 T/A per year results.

57.3 per cent of the cotton-producing acres in the Maricopa-Stanfield area using Cow Town feed lots' manure. It is possible, then, that feeders could sell all of their manure within a 0-10 mile radius of the center of Cow Town.

Using the transportation rate for hauling manure of the hauler who can charge 50 cents for 0-10 miles inclusive and $1.00 for spreading, the charge for hauling manure to any point in the 10-mile radius of Cow Town is identical.[1] When manure is worth $7.81 per ton to the cotton farmer spread on the field, the maximum price per ton that the feeder can receive is $6.31--a return on investment of 20.6 per cent.[2] However, it is unlikely that feeders could sell manure at this margin; it would be necessary to ration part of the value of using manure to cotton farmers. The final price agreed upon by both parties depends upon the bargaining power that each wields.[3]

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[1]The added loading charge has been omitted.

[2]Assuming that $47.38 per head capacity average investment in feed lots is representative if, and when, feed lots relocate.

[3]"Bargaining power expresses a conclusion about the totality of all market forces influencing prices, the manipulation of bargaining power would include any action by which a firm attempts to establish more favorable prices than those previously prevailing." Fletcher, L. B., "Concept and Importance of Bargaining Power," Bargaining Power in Agriculture, Center for Agricultural and Economic Adjustment, CAEA Report 9 (Ames: Iowa State University Press, 1961), p. 4.

Presently farmers in the Harquahala-Aguila area of Western Maricopa County are willing to pay $5.00 per ton of manure spread on the field. Assuming that this $5.00 price will prevail in the Maricopa-Stanfield area of Western Pinal County, feeders in the Cow Town zone could expect a total revenue of $840,000 (at $3.50 per ton) from manure sales of 240,000 tons to Maricopa-Stanfield cotton farmers. With feeders presently receiving an average price of approximately $1.00 per ton at the feed lot, total revenue for Phoenix area feed lots from manure sales is $240,000. The $600,000 difference represents the opportunity cost of selling manure from Phoenix area, rather than Cow Town locations. This economic consideration is one of the factors affecting the "relocation margin" for Phoenix area feed lot operators.

The $3.50 price per ton of manure is F.O.B. Cow Town; it represents both the average and marginal revenue to Cow Town feeders when selling to Maricopa-Stanfield farmers. Under a delivered-pricing system, feeders would have to charge $4.00 per ton in order to maintain the $3.50 average price. The advantage of a F.O.B. price system is that it eliminates some of the marketing risks and non-transportation costs.

Unless under written contract to sell manure to Maricopa-Stanfield farmers, a feeder would be willing to sell manure to any buyer willing to pay the $3.50 per ton

F.O.B. Cow Town price. The effect of a F.O.B. pricing system would be to eliminate some buyers from the market. For example, farmers in the Harquahala-Aguila area of Western Maricopa County, located 115-140 miles (road miles) from Cow Town, are priced out of the market when manure is worth $5.00 per ton to them (spread on the field) due to transportation costs incurred in hauling. If manure became worth a minimum of approximately $11.00 per ton to them, they would enter the Cow Town manure market.[1]

While Cow Town feed lots may have a monopoly in manure marketing in the Maricopa-Stanfield area, they would not possess a monopoly of organic fertilizers. Peat moss, sawdust, gin trash, guar, sesbania, and composted municipal sewerage are possible substitutes. Furthermore, the chemical fertilizer companies will probably provide much competition. However, if feeders can separate the manure market according to the elasticities of demand of the buyers, it may be possible to increase revenues through price discrimination. For example, if the landscaping industry is willing and able to pay (more inelastic demand) a higher price than $3.50 per ton, it may be possible for

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[1]Regarding the use of manure on lettuce and cotton acreage, cotton acreage appears to be the marginal crop for manure spreading. The marketing of manure should be geared towards the marginal crop.

feeders to extract a greater total revenue by limiting sales of manure to the cotton acreage (relatively more elastic demand) manure market.[1]

One of the problems of manure marketing in the Phoenix area is that feed lots are not located near enough together to facilitate cooperative efforts in making sales. The Cow Town site presents the feeders with an opportunity to create a manure marketing firm; if other industries locate in Cow Town, their industrial wastes could also be handled by the same firm.

The availability of a vast manure market in the Maricopa-Stanfield area is one factor favoring the relocation of Phoenix area feed lots at Cow Town. However, one problem that famers have in crop production is financing their fertilizer programs. Since commercial fertilizer companies make it a practice to extend credit to farmers, it is probable that cattle feeders will have to make similar institutional arrangements. While individual feeders may be willing and able to effect credit arrangements with farmers, it is possible that a centralized management would have more effective control over this area of manure marketing.

If such a firm was to be established, it is possible that not only would this association extend credit to farmers,

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[1]It was noted previously that the landscaping industry used 30,000 tons in 1962.

but it may make contracts with farmers as to delivery dates for manure, arrange for the manure to be hauled to the fields, and handle all monies. The formation of a manure handling joint subsidiary may make it possible to obtain economies of scale by purchasing bulldozers and trucks to carry out a regular pen cleaning program. It may also be possible for the firm to get a franchise to haul manure by either buying out the franchise of an existing manure hauler or approaching the Arizona Corporation Commission for issuance of such a franchise. It is also possible that the joint subsidiary may find it desirable to stockpile manure on an association-owned piece of land. Lastly, this association of feeders may find it advantageous to advertise manure and promote means whereby further research in using manure as fertilizer could be facilitated. Thus developing a completely integrated--horizontally and vertically--manure handling joint subsidiary, the scope of operations extend from pen cleaning to merchandising.

The possible advantages of forming such an integrated manure handling joint subsidiary could be considered another factor for tending the feed lots to agglomerate when possibly relocating the feed lots at new sites. Thus, a favorable site for the relocation of the 30 Phoenix area feed lots is the "Cow Town" zone of Western Pinal County. The immediate benefits of relocating in Cow Town are (1) freedom from the sources

of complaints about objectionable odors and dust in the Phoenix area, and (2) improved economic position through the availability of a vast by-product market for manure.

CHAPTER VII

SUMMARY AND CONCLUSIONS

The problem facing industrial plants producing wastes with nuisance characteristics is where to locate the plant, and how to produce and dispose of waste products in a manner that does not adversely affect the general welfare of other parties in the surrounding community. Zoning regulations are a means by which the community can direct the original location of plants, or prevent their establishment in the community altogether. The object of zoning ordinances is to create zones of uniform character; those plants that preceded the effective date of the zoning ordinance are classified as non-conforming uses. In general, these non-conforming uses are barred from expanding the plant past 100 per cent of the floor area cited at the time of passage of the zoning ordinance.

In terms of the relationship of the plant to the community-at-large, the plant should attempt to eliminate or abate the source of nuisances. The broad aim of the public is to integrate the plant into the best over-all development of the community. Since waste is a cost to the plant, the question to the plant operator is how to minimize the total cost of waste production and disposal.

Economic, social, and legal considerations represent aspects of costs to be minimized when wastes have nuisance characteristics.

The law of nuisance is one means by which the public can insure that the public responsibility of plants producing wastes with nuisance characteristics is met. While one individual has the right to initiate nuisance lawsuits, he must allege and prove some special injury, different in degree and kind from the general public. The greater the population, the more likelihood of complaints being lodged against plants producing and disposing of offensive wastes. The process of urbanization also furthers the possibility of nuisance suits, as the competition for land encourages the transfer of land to higher-valued uses and social utilities.

Industrial plant operators also have the problem of disposing wastes in the least-costly manner. Often wastes are valuable as by-products, in whole or part. If this is the case, the waste can be disposed of in a manner that adds revenue to the total production processes of the plant. Otherwise, plants have to dispose of wastes in a least-cost, socially acceptable plan.

If the economic considerations favoring discontinuation and/or relocation outweigh the economic considerations preventing discontinuation and/or relocation of the plant,

the plant will cease and desist operating at their present site. The "relocation margin" can be said to be crossed when the plant operators find that the opportunity cost of relocating the plant is less than the return on investments elsewhere.

This study was intended to relate the waste problem of commercial feed lot operators in Arizona to industrial-waste problems in general. The emphasis was placed on problems which feeders located in the Phoenix area of Maricopa County are presently undergoing. The problem areas were (1) social, (2) legal, and (3) economic. If the evidence indicated that a relocation of the plants was desirable, recommendations were to be made as to possible new locations.

Due to population growth and urbanization of the Phoenix area, feeders have received complaints from individuals regarding nuisances. While they have tried to minimize the social cost of being non-conforming uses in the Phoenix area through the use of deodorants and sprinklers to lay the dust, it appears that nuisance complaints still continue. While some feeders have been threatened with lawsuits, no case has been brought to court as of December 1963. In light of these conditions, feeders are attempting to establish a "nuisance board" to precede court action on nuisance suits. There is, however, no precedent in Arizona

statutes involving feed lot nuisances. In general, most nuisances are not nuisances per se, but nuisances in particular fact situations. The outcome of any case that reaches court would depend upon judge and jury. However, in lieu of being defendant in a nuisance suit, one feeder in Tempe relocated his feed lot when threatened with a damage suit in spring 1963.

Due to the interrelationship of the value of manure for use as fertilizer and the cost of hauling to the fields, some feeders in the Phoenix area were unable to sell their manure in 1962. Production exceeded use. Feeders in the Phoenix-Tempe and Mesa-Chandler sectors of the Phoenix area often had to use manure on their own lands or stockpile. The feed lots in the Avondale-Surprise sector of the Phoenix area were able to sell their manure due to the advantage of being located closer to the by-product marketing area of Western Maricopa County. Total production of manure in 1962 is estimated to be 505,000 tons--345,000 tons in commercial feed lots and 160,000 tons in dairies. Most of the dairy manure was produced in the Phoenix area--120,000 tons. Approximately 240,000 tons of feed lot manure were also produced in the Phoenix area.

Nearly all this manure was used by the citrus, grape, vegetable, and landscaping industry's need for fertilizer; however, some of the total tonnage produced

had to be stockpiled. One of the reasons why this manure was not being used is that farm land close to metropolitan Phoenix is being taken into one of the new satellite cities and/or housing developments. These farmers hesitate to invest in manure, since the advantages may not be fully realized for two or three years. The market for manure used on acres devoted to lettuce production in Arizona appears to be saturated.

Results of Agricultural Experiment Stations indicate that manure is valuable for increasing yields for lettuce, lemons, and cotton; it is also suggested that manure has value as a soil conditioner and as an agent to cut irrigation costs. The best prospect for the expansion of the manure market is to areas where organic fertilizer may be needed to maintain and/or increase yields of cotton. Manure may be worth $7.81 per ton on cotton acreage when spread at the rate of 10 T/A per year.

If the relocation margin is crossed, there is evidence to indicate that a new location can be found in Arizona. Factors to be included in an optimum location are (1) availability of water, (2) nearness to good highways, (3) nearness to railroad, (4) proximity to by-product markets, (5) sparseness of residential housing, (6) little likelihood of future urbanization of adjacent property, (7) availability of land, and (8) favorable zoning provisions.

It has been shown that the Maricopa-Stanfield area of Western Pinal County meets these qualifications. The Arizona Cattle Feeders' Association is presently carrying on negotiations with the Pinal County Planning and Zoning Commission to establish a cattle feeding and related industry zoning classification for some portion of this area. This development has been named "Cow Town." Phoenix area feeders are also interested in pursuing the possibility of leasing land on the Gila River Indian Reservation.

If feeders do move to the Cow Town zone, they will receive the positive economic benefits of a vast by-product area, as well as eliminating the negative status of being located in the Phoenix area.

If feed lots become located in the Cow Town zoning complex, it is possible that the feeders will form an integrated joint subsidiary manure handling association. It is possible to integrate both horizontally and vertically from pen cleaning to manure merchandising.

The analysis of the problems of the Arizona cattle feeding industry shows that it shares similar problems to those industries in general producing waste products with objectionable characteristics in urban areas. Moreover, an additional study (benefit-cost) of Phoenix area feed lots in relation to their urban environment would provide an useful framework for gaining insight into the problem of social cost.

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APPENDICES

APPENDIX TABLE 1

POPULATION FORECAST, MESA AND CHANDLER, 1965-1980.

Year	Mesa	Chandler	Total
1965	60,000	15,000	75,000
1970	85,000	21,000	106,000
1975	120,000	28,000	148,000
1980	170,000	37,000	207,000

Source: Planning Survey Division, Arizona Highway Department, A Highway Related Economic Survey, July 1960, p. 32.

APPENDIX TABLE 2

ESTIMATED FUTURE POPULATION, MARICOPA COUNTY AND THE CITY OF PHOENIX, 1965-1980.

Year	Population (000)	Increase Over Previous Date (000)	Increase Over Previous Date %	% of Population
		Maricopa County		
1965	800	-	-	53.3[a]
1970	1,020	220	27.5	56.7[a]
1975	1,230	210	20.6	58.6[a]
1980	1,440	210	17.1	60.0[a]
		City of Phoenix		
1965	550	-	-	68.8[b]
1970	670	120	21.8	65.7[b]
1975	820	150	22.4	66.7[b]
1980	1,000	180	22.0	69.4[b]

Source: Advance Planning Task Force, Population Growth of the Phoenix Urban Area, Phoenix, April 1959, p. 13.

[a]Per cent of population of State of Arizona.

[b]Per cent of population of Maricopa County.

APPENDIX 3

SELECTED STATUTES AND NOTES OF DECISIONS

FROM ARIZONA REVISED STATUTES

Article 32. PUBLIC NUISANCES

Sec. 13-601 Definition: effect of inequality of annoyance or damage

Anything which is injurious to health, or is indecent, offensive to the senses, or an obstruction to the free use of property, so as to interfere with the comfortable enjoyment of life or property by an entire community or neighborhood, or by a considerable number of persons, or which unlawfully obstructs the free passage or use, in the customary, of any navigable lake, river, bay, stream canal or basin, or any public park, square, street or highway, is a public nuisance, and is no less a nuisance because the extent of the annoyance or damage is unequal.

Notes of Decisions

2. Nature and elements of public nuisance

There are two kinds of "public nuisance," one of which is class of aggravated wrongs or injuries which affect the morality of mankind, are in derogation of public morals and decency, and being malum in se, are nuisances, irrespective of their location and results, while the other is class of acts, exercise of occupations or trades, and use of property, which becomes nuisances by reason of their location or surroundings and are commonly referred to as "nuisances per accidens." Engle v. Scott (1941) 57 Ariz. 383, 114 P. 2d 236.

A "common or public nuisance" is one affecting rights enjoyed by citizens as part of public, while

a "private nuisance" is one affecting single individual or definite number of persons in enjoyment of private right not common to public. Id.

Question whether conduct of business is nuisance depends on reasonableness, in view of rights and welfare of parties and public. MacDonald v. Perry (1927) 32 Ariz. 39, 255 P. 494. In this case the court said: "What might amount to a serious nuisance in one locality by reason of the density of the population, or character of the neighborhood affected, may in another place and under different surroundings be deemed proper and unobjectionable. What amount of annoyance or inconvenience caused by others in the lawful use of their property will constitute a nuisance depends upon varying circumstances and cannot be precisely defined."

3. Matters Constituting Public Nuisance - In General

Rev. Code, 1928 Sec. 4693 which provided for punishment for maintenance of "public nuisance," the punishment for which was not otherwise prescribed was intended to cover offenses against the public peace, health and morals not elsewhere punishable by statute which were known at common law as undesirable nuisances and any act which under the common law was construed as a public nuisance was a violation thereof and punishable unless made punishable elsewhere in the statutes. Engle v. State (1939) 53 Ariz. 458, 30 P. 2d 988.

8. Injunction to Abate Public Nuisance in General

Invasion of property right need not be shown to justify injunction to abe public nuisance at state's instance, but rule as to property rights applies only when complainant is private individual attempting to abate public nuisance. State ex re. Sullivan v. Phoenix Sav. Bank & Trust Co. (1948) 68 Ariz. 42, 198 P. 2d 1018.

An injunction will issue to restrain public nuisance, though acts complained of are punishable under penal provisions of statutes.

9. Actions by Private Persons

A public nuisance may not be enjoined at the suit of a private person unless he alleges and proves some special injury. Engle v. Clark (1939) 53 Ariz. 472, 90 P. 2d 994.

Source: Arizona Revised Statutes, Volume 5, Title 13, Chapter 2. St. Paul: West Publishing Company, 1956.

Article 1. HEALTH MENACES

Sec. 36-601 Public nuisances dangerous to public health

A. The following conditions are specifically declared public nuisances dangerous to the public health:

1. Any condition or place in populous areas which constitutes a breeding place for flies, rodents, mosquitoes and other insects which are capable of carrying and transmitting disease-causing organisms to any person or persons.

5. All sewerage, human excreta, waste water, garbage or other organic wastes deposited, stored or exposed so as to be a potential instrument or medium in the transmission of disease to or between any person or persons.

6. Any vehicle or container used in the transportation of garbage, human excreta or other organic material which is defective and allows leakage or spilling of contents.

9. The pollution or contamination of any domestic waters.

12. Buildings or any parts thereof which are in a filthy condition which may endanger the health of persons living in the vicinity.

17. The storage, collection, transportation, disposal and reclamation of garbage, trash, rubbish, manure and other objectionable wastes other than as provided and authorized by law and regulation.

B. When the commissioner of public health has reasonable cause to believe from information furnished him or from investigation made by him that any person is maintaining a nuisance or engaging in any practice contrary to the health laws of the state or contrary to regulations promulgated thereunder, he shall forthwith serve upon such person by registered mail a cease and desist order requiring the person, upon receipt of the order, forthwith to cease and desist from such act. Within fifteen days after receipt of the order, the person to whom it is directed may request the state board of health to hold a hearing. The board, as soon as practicable, shall hold a hearing, and if it determines the order is reasonable and just and that the practice engaged in is contrary to the health laws of the state or the regulations promulgated thereunder, the board shall order such person to comply with the cease and desist order.

C. Upon the failure or refusal of a person to comply with the order of the board, or if a person to whom the order is directed does not request a hearing and fails or refuses to comply with the cease and desist served by mail under the provisions of subsection B, the commissioner may file an action in the superior court of the county in which a violation has occurred, restraining and enjoining in further acts. The court shall proceed as in other actions for injunctions.

Sec. 36-602 Abatement of nuisances, sources of filth and causes of sickness

When a nuisance, source of filth or cause of sickness exists on private property, the county or city board of health department shall order the owner or occupant to remove it within twenty-four hours at his own expense. The order may be given to the owner or occupant personally, or left at his usual place of abode. If the order is not complied with, the board or department shall cause the nuisance, source of filth or cause of sickness to be removed, and expenses of removal shall be paid by the owner, occupant or other person who caused the nuisance, source of filth or cause of sickness.

Notes of Decisions

1. In general

While remedies of summary abatement and criminal action for violation of city ordinance might be used against public nuisance, they did not always afford complete remedy, and it was generally discretionary with trial court as to whether writ of injunction against such nuisance should issue. Engle v. Scott (1941) 57 Ariz. 383, 114 P. 2d 236.

To establish public authorities' right to demand proper remedy for nuisance per se, it was necessary to prove only the act which constituted nuisance as matter of law, but when act was not a nuisance per se, it was necessary to prove, not only the act, but circumstances which made it a nuisance. Id.

No portion of the health law of this state attempts to or could grant to health boards the authority to arbitrarily declare a given condition a nuisance. Globe School Dist. No. 1 of Globe, Gila County v. Board of Health of City of Globe (1919) 20 Ariz. 208, 179 P. 55.

Source: Arizona Revised Statutes, Volume 11, Title 36, Chapter 6, St. Paul: West Publishing Company, 1956.

APPENDIX 4

FEED LOT FERTILIZER SCHEDULE, APRIL 1963

1962 Feed Lot Operation

Approximate total volume of manure carryover from 1961 to 1/1/62 _____

Total number of head marketed from 1/1/62-12/31/62 _____

Amount of manure per ton of feed (estimate) _____

Total volume of manure produced from 1/1/62-12/31/62 (tons) _____

Total cost of handling:

(1) in lots _____

(2) transportation _____

(3) spreading _____

Total amount (tons) spread on own land _____

Approximate total value of this manure spread on own land _____

Total volume of manure sold to others from 1/1/62-12/31/62 (tons) _____

	To Whom	Amount	Price Received Per Ton	Contract?
(1)	_____	_____	_____	yes/no
(2)	_____	_____	_____	yes/no
(3)	_____	_____	_____	yes/no
(4)	_____	_____	_____	yes/no
(5)	_____	_____	_____	yes/no

In any of the above sales does the price received per ton include the costs of handling?

(1)

(2)

(3)

(4)

(5)

Additional comments regarding 1962 operations?

1963 Feed Lot Operation

Approximate total volume of manure carryover from 1962 to 1/1/63 _____

Total number of head marketed and in lots from 1/1/63 to 4/1/63 _____

Amount of manure per ton of feed (estimate) _____

Total volume of manure produced from 1/1/63 to 4/1/63 (tons) _____

Total cost of handling:

(1) in lots _____

(2) transportation _____

(3) spreading _____

Total amount (tons) spread on own land from 1/1/62-4/1/63 _____

Approximate total value of this manure spread on own land in this period _____

Total volume of manure sold to others from 1/1/63-4/1/63 (tons) _____

	To Whom	Amount	Price Received Per Ton	Contract?
(1)	_____	_____	_____	yes/no
(2)	_____	_____	_____	yes/no
(3)	_____	_____	_____	yes/no
(4)	_____	_____	_____	yes/no
(5)	_____	_____	_____	yes/no

In any of the above sales does the price received per ton include the costs of handling?

(1)

(2)

(3)

(4)

(5)

Additional comments regarding January 1, 1963-April 1, 1963 operations?

Approximate total volume of manure currently in pens _____

Approximate total volume of manure currently in piles _____

Your approximate valuation of total manure (excluding costs of handling) _____

What is your opinion about spraying manure for odor in regards to benefit received to costs involved?

Other comments:

APPENDIX 5

RESOLUTION, PINAL COUNTY PLANNING AND ZONING COMMISSION

WHEREAS, the Pinal County Planning and Zoning Commission considers the orderly growth of Pinal County of paramount importance; and,

WHEREAS, the future growth and development of Pinal County industrial zones is of the utmost concern to the Commission; and,

WHEREAS, the proposed "Cow Town" zoning complex is an integral part of the future industrial development of Pinal County; and,

WHEREAS, the Commission is fully cognizant of the conflicts which have been met by cattle feeding industries in Maricopa County in the processes of the great urban development of that area; and,

WHEREAS, it is the desire of the Commission to prevent future conflicts between urban residential areas and industrial areas, specifically the "Cow Town" zoning complex; and,

WHEREAS, the Commission desires to express its intentions to the Board of Supervisors of Pinal County and to any interested parties as to the perpetual retention of

the "Cow Town" industires, including cattle feeding operations and its related industries;

NOW, THEREFORE, BE IT RESOLVED BY THE PINAL COUNTY PLANNING AND ZONING COMMISSION:

That it shall, now and in the future, exercise to the utmost, all of its regulatory powers to prevent future conflicts between the proposed industrial and surrounding residential areas of the zoning complex known as "Cow Town" and shall now and forever strictly comply with all laws, ordinances and regulations which govern said Commission, so as to afford maximum protection for the future tenants of said zoning complex and the surrounding residential areas to allow each and all of them perpetual zoning protection, and said Commission will further act with diligence in specifically applying the provisions of Section 1701 (e) of the County Zoning Plan, Ordinance 61862 related to the CI-2 Industrial zone as further protection to the aforesaid parties.

Dated this 9th day of September, 1963.

Pinal County Planning and Zoning Commission

APPENDIX 6

PROPOSED AMENDMENT TO SEC. 1709 INDUSTRIAL BUFFER REQUIRED

Same as in Section 1609 except as follows:

When there is a reasonable certainty that any cannery, fertilizer plant, refinery, commercial feed lot, meat packing plant, tallow works, and any other like business will, in the present or in the future, foreseeably conflict and cause any flood, traffic or health hazard or nuisance by its proximity to pre-existing residential zones, then the said industry shall not be allowed to locate in the CI-2 zone with a minimum distance of one mile from said pre-existing residential zone or zones or such distance of greater than one mile if it can reasonably be foreseen that a greater distance is reasonably required for the protection of said residential zones.

No residential zone shall be allowed to be established within a distance of one mile from said pre-existing industrial zone, as set out above or a greater distance than one mile if reasonably necessary for the protection of the reasonable permancy of said industry.

Nothing in this section shall be interpreted to restrict the zoning for non-residential uses within the buffer area provided herein.

"Reasonableness", as used above, with regard to distances shall be determined by the Commission; and the burden of showing reasonableness shall be on the proponant of the location of the new industrial use or upon the proponants of the new residential zone, whichever is applicable.

Nothing in this article shall be interpreted to deny the right of appeal to Boards of Adjustment.

APPENDIX 7

EASEMENT AGREEMENT

Know all men by these Presents:

Whereas, many individuals, firms and corporations have been for many years and presently are engaged in the business of commercial cattle feeding in various places within the State of Arizona, which commercial cattle feeding shall hereinafter be called "pen feeding", and

Whereas, in the course of pen feeding, dust, odor and flies may occur in the immediate area where the pen feeding takes place, as well as in the areas thereabout, and

Whereas, though pen feeding is permitted by zoning law in the places where such pen feeding is now conducted, such pen feeding must be or may be terminated because of residential uses encroaching within the pen feeding areas, and

Whereas, some homes have been built so close to cattle feeding pens that the enjoyment of these homes is or may be affected by the dust, odors or flies purportedly coming from the feeding pens, as a result lawsuits have been brought against the feeding operators asking damages and for the prohibiting of such pen feeding, and

Whereas, as a consequence of the operating and legal difficulties faced by persons seeking to conduct a pen feeding business in the areas where people are or may in the future live adjacent thereto, pen feeding operators are desirous of finding a place where zoning authorizes their business and where they will be protected against lawsuits which may be filed by adjoining land owners or occupants as a result of the occurrence of odors, dust or flies, and

Whereas, the Board of Supervisors of Pinal County has amended its zoning ordinances so as to permit pen feeding on the property hereinafter described and set forth after the names of the undersigned, which property will be hereinafter referred to as "Pinal pen feeding area", and

Whereas, in order to encourage the locating of pen feeding, the undersigned are willing to grant to one another, their heirs, legal representatives, successors and assigns, easements and rights each permitting the other to cause the odors, dust and flies occurring from pen feeding to come upon and across their property and to agree for themselves, their heirs, legal representatives, successors and assigns that no action in equity or at law will be commenced for damages or for an injunction in connection with odors, dust or flies arising from a cattle

feeding operation being conducted by any one or more of the undersigned.

NOW, THEREFORE, in consideration of the mutual covenants herein made and entered into, the undersigned hereby covenant and agree as follows:

1. Each of the undersigned

(a) acknowledge that there may be pen feeding take place continuously or from time to time on all or part of the Pinal pen feeding area;

(b) consent to the pen feeding set forth in (a) above;

(c) grant to the owners of all of the Pinal pen feeding area a right and easement to cause odor, dust and flies which may be caused by pen feeding taking place in such Pinal pen feeding area to come upon and across the property set forth after the undersigned's name;

(d) convenant and agree that no legal action of any nature will be taken in an attempt to prohibit or enjoin pen feeding from commencing or continuing within the Pinal pen feeding area;

(e) convenant and agree that no legal action of any nature will be taken in an attempt

to collect damages as a consequence of odor, dust or flies coming upon or across the undersigned's property from pen feeding taking place within the Pinal pen feeding area;

(f) covenant and agree that the rights, and easements given and made in (a), (b), (c), (d) and (e) above to those persons owning that part of the Pinal pen feeding area not belonging to the undersigned, shall inure to the benefit of any person who may buy or lease part or all of the property set forth after the name of the undersigned.

2. This Easement Agreement shall inure to the benefit of and be binding upon each of the undersigned, their respective heirs, legal representatives, successors and assigns, and shall run with the land described hereinafter and as set forth opposite the names of the undersigned.

3. This Easement Agreement shall become effective upon its recordation with the County Recorder of Pinal County, and shall remain in effect so long as there shall be a pen feeding operation being conducted within the Pinal pen feeding area. If there is no pen feeding operation being conducted within the Pinal pen feeding area five (5)

years from the date this Easement Agreement becomes effective, this Easement Agreement shall terminate forthwith without further action on the part of any of the undersigned.

Dated this _____ day of _____, 1963.

NAME DESCRIPTION OF PROPERTY OWNED