A Survey of The Production And Marketing of Cattle Manure In Arizona

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Contents

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ISSUED IN FURTHERANCE OF COOPERATIVE EXTENSION WORK IN AGRICULTURE AND HOME ECONOMICS ACTS OF MAY 8 AND JUNE 30 1914 IN COOPERATION WITH THE U S DEPARTMENT OF AGRICULTURE GEORGE E HULL DIRECTOR OF EXTENSION SERVICE THE UNIVERSITY OF ARIZONA COLLEGE OF AGRICULTURE TUCSON ARIZONA

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A Survey of The Production And Marketing of Cattle Manure In Arizona

By Thomas M Stubblefield and Arthur H Smith [1]

Introduction

The income from the sale of manure out of feedlots and dairies has been very important in the past in Arizona. Manure has sold for as high as $3.00 a ton.

Vanvig in 1956-57 found that short-fed steers and heifers were fed 116 to 127 days.[2] 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, many feedlots had an average production of 3,100 pounds of manure per head capacity of feedlot. Moran found that the average investment in feedlots in Arizona in 1957 was $47.38 per head capacity.[3] Thus the production of manure from 240 days of feeding (two short-fed steers 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 percent on the average investment in the feedlots.

It is estimated that, on the average, a dairy cow will produce 4

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1 AGRICULTURAL ECONOMIST AND GRADUATE STUDENT IN THE DEPARTMENT OF AGRICULTURAL ECONOMICS THE UNIVERSITY OF ARIZONA RESPECTIVELY

2 VANVIG ANDREW CATTLE FEEDING COSTS IN ARIZONA, AGRICULTURAL EXPERIMENT STATION REPORT NO 140 THE UNIVERSITY OF ARIZONA TUCSON OCTOBER 1956 P 7

3 MORAN LEO J NONFEED COSTS OF ARIZONA CATTLE FEEDING, AGRICULTURAL EXPERIMENT STATION TECH BUL 136 THE UNIVERSITY OF ARIZONA.

tons (air dry) of manure per year. According to Hill, 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.[4] 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 2.8 percent to 6.8 percent—at $2.00 per ton the return on the capital investment would be from 1.8 percent to 4.6 percent.

The price of dairy and feedlot manure has never been uniform throughout the irrigated valleys in the state. Its price has been determined at the farm on which it has been applied. Manure demand has been different for different kinds of agricultural producers —that is, vegetable growers, cotton producers, etc. Cattle feeders in Pinal County usually have received a lower price for their fertilizer than have the feeders in the Salt River Valley.

Production

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 43,000 head of dairy cows in Maricopa County and 7,000 head in Pinal, Pima, Cochise, and Graham Counties. Production of manure from these numbers of dairy cows is estimated at 200,000 tons a year.[5]

Cattle feeding in Arizona has increased very rapidly since 1950. Ten years ago, feeders were able to sell such manure as was then produced by the cattle and calves being fed with very little, if any, difficulty. (There were exceptions to this where the feedlots were located too great a distance from the fields to make it economical for this manure to be used. Also, 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 has the production of manure in the past two or three years.

Production of manure has not increased as rapidly as has the number of fed cattle and calves because the feeders have been feeding a higher concentrate ration in recent years. The rule of thumb for the production of manure in the feedlots up to 1959 was that the weight of manure produced (air dry) was 50 percent of the weight of the air-dry feed fed. Since 1959, the ratio has dropped to approximately 40 percent of the weight of the feed fed, due to reduction in the roughage content of the ration.

We estimate that 505,000 tons of manure were produced in commercial feedlots and dairies in Arizona in 1962—345,000 in commercial feedlots and 200,000 tons in dairies. Most of the dairy manure was produced in the Phoenix area —172,000 tons. Approximately

4 HILL, JAMES S RESOURCE REQUIREMENTS FOR PRODUCING MILK IN CENTRAL ARIZONA DEPARTMENT OF AGRICULTURAL ECONOMICS, THE UNIVERSITY OF ARIZONA, MARCH 1961 P 11

5 THIS INCLUDES THE MANURE PRODUCED BY REPLACEMENT HEIFERS

Table 1. Estimated Production of Manure in Arizona Feedlots.

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

240,000 tons of the feedlot manure was produced in the Phoenix area with Gila Bend-Mohawk-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. Thus, 412,000 tons, or about 75 percent of the total manure production in the state, was produced in the Phoenix area.

Chemical Analysis of Dairy and Feedlot Manure

Table 2 gives the chemical analysis of eight manure samples taken from feedlots in the spring of 1963. Table 3 shows the analysis of four composite samples of manure taken in the summer of 1963—two from feedlots and two from dairies.[6]

These data indicate that feedlot and dairy manure varies a great deal in chemical content. Dairy

[6] THESE COMPOSITE SAMPLES WERE MADE OF FIVE SAMPLES WHICH WERE TAKEN AT RANDOM FROM TWO STOCKPILES OF FEEDLOT MANURE AND FROM ONE STOCKPILE OF DAIRY MANURE AT LEAST ONE YEAR OLD AND FROM A DAIRY FEEDLOT THAT WAS IN CURRENT USE

Table 2. Chemical Composition (Air Dry) of Steer Manure of Eight Samples Taken from Four Feedlots in the Phoenix Area.

	Moisture	Nitrogen	Ash	pH	Total Soluble Salts	Sodium
	(percent)	(percent)	(percent)		(percent)	(percent)
Range	57.9 - 28.3	2.34 - 1.18	37.9 - 9.4	6.5 - 8.1	8.73 - 4.42	.69 - .32
Average	40.2	1.68	20.4	7.3	6.06	.52

Table 3. Chemical Composition of Feedlot and Dairy Manure Samples Taken from Two Feedlots and Two Dairies Located in the Phoenix Area. [a] (In Percent)

Composite Sample	Moisture	Nitrogen	Potassium	Available Inorganic Phosphorus[b]	Ash	Total Soluble Salts	Sodium
1 (feedlot)	21.2	1.29	1.42	0.26	44.1	6.56	0.62
2 (feedlot)	24.2	2.25	2.43	0 96	28.7	10.77	0.87
3 (dairy)	35.8	.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 feedlot	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

manure may be a little lower in nitrogen content than feedlot manure. Based on these analyses, a ton of feedlot manure contains from 24 to 47 pounds of nitrogen.

The salt content of barnyard manure has been the subject of some concern. The analysis indicates that the sodium content is moderate—.27 to .87 percent 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 percent or 88 to 215 pounds per ton.

Assuming these manure samples were representative, the average total soluble salts in feedlot manure with the moisture content of 40 percent would be close to 120 pounds per ton, while dairy manure would be lower. (An acre-foot of water that contains a thousand parts of total soluble salts per million parts of water contains 2,718 pounds of soluble salts.)

Average nitrogen content of feedlot manure with 40 percent moisture would be approximately 34 pounds per ton. The amount of phosphorus in the manure samples (Table 3) is adequate to support bacterial action to break down the manure.

A limited number of experiments have been conducted in Arizona to determine the value of manure as fertilizer and soil conditioners. The results (Tables 4 and 5) of experiments conducted on the Mesa Experiment Station, 1946-1949, on alfalfa were inconclusive.

W. D. Pew found it advantageous to use high quality feedlot manure

Table 4. Alfalfa Fertilizer Test, Mesa Experiment Farm, 1946-1948, Summary of Effects of Treatments on Hay Yields and Money Gain. (a)

Year	No. of cuttings	525 lbs. Liq. Phos. Acid (b, d)	600 lbs. Tr. Superphosphate (b)	200 lbs. Tr. S. & 10 T. Manure (c)	200 lbs. Tr. Super. (c)	175 lbs. Liq. Phos. (c)	10 T. Manure (d)
1946	3	8,788	9,397	8,564	8,699	8,272	7,673
1947	5	19,098	17,277	17,672	17,360	16,606	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 (e)		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) SEED BROADCAST AND IRRIGATED UP

(B) ONLY 1 PLOT OF EACH OF THESE RESULTS ONLY INDICATIVE

(C) TREBLE SUPERPHOSPHATE AND MANURE APPLIED TO PLOWED LAND AND DISCED IN POORER STANDS ON MANURED PLOTS

(D) LIQUID PHOSPHORIC ACID APPLIED IN FIRST AFTER SEEDING IRRIGATION

(E) ANNUAL YIELDS FROM CHECK PLOTS — 7,333 LBS., 14 901 LBS AND 13 613 LBS

Table 5. Alfalfa Fertilizer Test Yields, Mesa Farm, 1949, Started February 18, 1949, Field Cured Weights in Lbs. Per Acre. (a)

Cutting	Check No. Fert.	10 T. Man & 75 lbs P_2O_5 (b)	100 lbs. P_2O_5 & 35 lbs K_2O (c)	50 lbs N & 100 lbs P_2O_5 ("10-20") (d)	100 lbs P_2O_5 (e)	100 lbs. P_2O_5 in Liq. Phos. (f)	100 lbs. P_2O_5 (g)
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

(A) CUTTING DATES — MAY 26 JUNE 29 AUGUST 1 SEPTEMBER 17 AND NOVEMBER 5

(B) MANURE AND TREBLE SUPERPHOSPHATE PLOWED UNDER

(C) TREBLE SUPERPHOSPHATE AND SULPHATE OF POTASH PLOWED UNDER

(D) HARROWED IN AFTER PLOWING

(E) TREBLE SUPERPHOSPHATE HARROWED IN

(F) LIQUID PHOSPHORIC ACID APPLIED IN PRE SEEDING IRRIGATION 2/8/49

(G) TREBLE SUPERPHOSPHATE PLOWED UNDER 1/19/49

on lettuce[7] The results of the experiments conducted by him is given in Table 6

The following are the conclusions of these experiments

A summary of the data presented in Table 6 shows that guar as a green manure crop is not as effective in improving head lettuce yields as is feedlot 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, 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 was better on the green manure and feed-

7 LETTUCE RESEARCH IN ARIZONA SUMMARY FOR 1958 AGRICULTURAL EXPERIMENT STATION REPORT NO 182 THE UNIVERSITY OF ARIZONA TUCSON ARIZONA FEBRUARY 1959 P 13

Table 6. Effects of Guar and Steer Manure on Production of Head Lettuce, Fall Crop, Experiment Station, Mesa.

Treatment	Harvests		Total
	First	Second	
	Cartons per acre*		
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

* TWO DOZEN SIZE

lot manure plots as compared with the check

Abbott and Tucker 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 subsoil during leveling in 1959 [8] The results of these experiments up to date are given in Table 7, page 10

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

The manure must be completely broken down before all of the nitrogen is all available to be used by the plants It is probable that all of the nitrogen in the manure is not broken down until the third year

Rodney and Sharples found that Lisbon lemon sizes were increased by applications of steer manure [9] They summarized the results of their experiments as follows

> Yield and leaf composition data are presented from a 3 x 2 x 2 (nitrogen x phosphate x steer manure factorial experiment on Lisbon lemons growing in a calcareous sandy soil on the Yuma Mesa in southwestern Arizona
>
> Increasing N fertilization from 1 pound/tree/year to 2½ 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

8 SIXTH ANNUAL REPORT ON SOIL FERTILITY AND FERTILIZER RESEARCH AGRICULTURAL EXPERIMENT STATION AND AGRICULTURAL EXTENSION SERVICE COLLEGE OF AGRICULTURE UNIVERSITY OF ARIZONA TUCSON ARIZONA FEBRUARY 1963 P 66

9 RODNEY D R AND SHARPLES G C RESPONSES OF LISBON LEMON TREES TO APPLICATION OF NITROGEN PHOSPHATE AND MANURE PROCEEDINGS OF THE AMERICAN SOCIETY FOR HORTICULTURAL SCIENCE VOL 78 PP 181 185 DECEMBER 1961

Table 7. Effect of Fallow, Manure, and Green Manure on Soil Productivity and Nitrogen Fertilizer Requirements of Cotton.

Main Treatment	Lbs. N/A. Applied*	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 @ 10 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	--	--

* SIDE DRESSED WITH UREA JUNE 1, 1961, JUNE 5, 1962

Fruit sizes were increased by applications of steer manure, but not by other fertilizer treatments.

The P content of leaves was unrelated to phosphate applications but was inversely related to the amounts of N applied.

The K content of leaves was relatively high in the low N series of treatments and lower where phosphate and higher levels of N were applied. (See Table 8 for the results of the Lisbon lemon fertilizer experiments.)

Pew indicated that feedlot manure increased water penetration. This aspect of penetration of feedlot and dairy manure has

Table 8. Lisbon lemon yields as affected by nitrogen, phosphate, and manure treatments.

Treatments*	1957	1958	1959		
	No. fruit per tree	No. fruit per tree	No. fruit per tree	Field boxes per tree	No. fruit per box
N_1	49.3 a	65.1 a	383 a	1.58 a	241.2 bcd
N_1 + P . . .	48.7 a	145.9 bc	692 abc	3.04 b	227.3 abcd
N_1 + M . .	86.9 ab	168.2 cd	1000 cd	4.93 d	207.1 a
N_1 + P + M	76.2 ab	187.9 cde	1039 d	5.04 d	217.8 abc
N_2	45.5 a	109.1 ab	662 ab	2.95 b	244.0 cd
N_2 + P . . .	72.3 ab	249.0 f	794 bcd	3.82 bc	219.7 abc
N_2 + M . . .	93.6 ab	243.7 ef	1075 d	5.03 d	208.6 a
N_2 + P + M	117.6 b	261.3 f	1060 d	5.05 d	212.2 a
N_3	50.3 a	101.3 ab	692 abc	3.09 b	250.7 d
N_3 + P . . .	92.7 ab	212.8 def	1085 d	4.77 cd	214.6 ab
N_3 + M . . .	128.1 b	236.9 ef	1107 d	5.40 d	205.7 a
N_3 + P + M	125.4 b	249.3 f	1103 d	5.25 d	203.8 a
Significance	**	**	**	**	**

* N_1 = 1 LB OF N/TREE/YR, N_2 = 2½ LBS OF N/TREE/YR; N_3 = 4 LBS N/TREE/YR; P = 2 LBS P_2O_5/TREE/YR; M = 10 TONS STEER MANURE/ACRE/YR

** INDICATES STATISTICAL SIGNIFICANCE AT THE 1% LEVEL.

MEAN VALUES ARE STATISTICALLY DIFFERENT IF THEY DO NOT HAVE A COMMON SUBSCRIPT LETTER AFTER THE VALUE.

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 studied the rate of water entry into soil as affected by manuring.[10] This work was conducted at Scotts Bluff Experiment Station. 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

10 MAZURK, A. P., CASPER, H. R. AND RHODES, H. F. RATE OF WATER ENTRY INTO AN IRRIGATED CHESTNUT SOIL AS AFFECTED BY 39 YEARS OF CROPPING AND MANURIAL PRACTICES. AGRONOMY JOURNAL, VOL. 47, PP. 490-493, OCTOBER 1955

corn (nonmanured). Where manure was applied annually since 1942 to the continuous corn plot the rate of water entry was 7 cm per hour.

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

Market For Manure

It is estimated that the following amounts of manure were used on citrus, grapes, and vegetables in Maricopa County in 1962:

Citrus	25,000 tons
Grapes	15,000 tons
Vegetables	120,000 tons
Total	160,000 tons

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

The landscaping industry in Arizona used about 30,000 tons. Thus, there were approximately 310,000 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 was stockpiled. This was not all surplus product. A few feedlots 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 2 to 3 years.

Another problem involved in the sale of manure is that a large part of the vegetable production is to the west and north of the Phoenix metropolitan area. Those feedlots located east and south of Phoenix find that the hauling costs to 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.

Structure Of The Manure Market

There are at least four different methods of marketing manure.

First, the feeder or his representative contacts the farmer and sells directly to the farmer with the feeder arranging for the spreading of the manure on the buyer's field.

Second, the farmer contacts the

feeder and buys the manure in the feedlot with the farmer buyer making the arrangements for the hauling and spreading of the manure.

Third, the manure hauler contacts the farmer to determine if the farmer is interested in purchasing manure and at what price. The hauler then contacts the feedlots 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.

Fourth, a dealer contracts with the feeder or dairyman to purchase his manure, then stockpiles the manure until the dealer finds a buyer. The dealer may either own his own trucks or contract for the hauling and spreading of the manure.

Up to mid-1963, most of the manure was marketed by the third method—the hauler being the merchandiser.

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. He is inclined to try to purchase manure at a lower price. If the dairymen and feedlot operators are finding it more difficuult 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 be franchised by the Arizona Corporation Commission. They are required to file 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 two different rates—$1.25, and $1.50—per ton for the first mile plus 5 cents a mile for every mile thereafter.

The $1.25 rate is to be charged when transporting manure in Phoenix and vicinity.[11] The $1.50 rate applies to 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. (Those individuals who wish to have more complete details of these tariff rates should contact the Arizona Corporation Commission.)

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11 THE TERM VICINITY MEANS ALL POINTS AND PLACES WITHIN 30 MILES (AIR MILES) FROM POINT OF PICKUP, REF M F - A C C NO 102

Conclusion

Production of manure in Arizona has increased faster during the last five years than has the use. In 1962, production exceeded use by 8 to 10 percent. This increase in production relative to demand has caused the price to decline.

In a few instances, the feedlot operators paid more in 1962 for the removal of manure from their feedlots and stockpiling it than they received for the product in the stockpile.[12] This was somewhat the exception. Most of the manure produced in 1962 sold for $1.00 to $1.50 per ton at the feedlot.

Feedlots located in the southeastern part of the city of Phoenix and to the east and south of Phoenix were the ones that had the greatest difficulty in selling the manure produced in their feedlots.

The cattle feeders in Arizona are faced with two problems: (1) location of the feedlot in relation to the farms on which the manure can be used, and (2) that of increasing the size of the market for the manure.

Once a feeder has located his feedlot, his geographic position is fixed. The only time he can consider the location of his feedlot in relation to the location of farms on which manure may be used is at the time of establishing his feedlot or at the time of moving his feedlot location.

Vegetable producers in Maricopa County are apparently using all the manure they want on vegetable production. It is our opinion that vegetable and citrus producers in Yuma County as well as vegetable producers in Cochise County would increase their use of manure as a fertilizer if the feedlots were located close enough to make it economically feasible to keep the cost of manure somewhere around $5.00 per ton spread on the field. It is doubtful that this potential increase in the use of manure in these two counties would be great enough to use the present production.

It appears to us that the best prospect for additional market outlets for manure is to cotton producers in areas where cotton is produced from pump irrigation and where the water costs are too high for it to be profitable to grow alfalfa and grain crops to be included in the crop rotation. In order to maintain high yields under these conditions, it may be necessary to use barnyard manure. For these reasons, it may be wise for feedlot operators to keep this matter in mind when contemplating relocation of their lots for any reason.

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12 IT IS NECESSARY TO REMOVE MANURE FROM FEEDLOTS IN ORDER TO PREVENT THEM FROM BECOMING BOGGY DURING PERIODS OF RAIN

This publication is issued by the
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the Agricultural Experiment Station
of The University of Arizona. See
your local County Extension Agent
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