

Manure management—

COSTS and PRODUCT FORMS

J. VAN DAM • C. A. PERRY

AN ESTIMATED 30,700 head of beef were confined in feedlots on January 1, 1967 in Los Angeles County. Another 85,000 dairy animals were estimated to be within the confines of its milkshed. Together with the more than three million pen-caged hens, they produce a lot of animal waste. These specialized, factory-farmed animals create special manure-handling problems. A feedlot operation of 10,000 head has a sewage-disposal problem equivalent to that of a city with more than 150,000 people. The animal by-product smells and attracts flies which use the waste as a breeding medium. Sanitation regulations and ordinances are imposed as livestock operations and urbanization seek to coexist.

Operators must eventually remove and dispose of animal wastes of livestock enterprises. When, where, and how can seem an insurmountable problem, but a well planned manure-handling and marketing program can minimize removal and disposal costs.

Removal and marketing

A study to determine the actual cost of removal and disposal of manure from a beef feedlot in Los Angeles County was recently completed by the Agricultural Extension Service. Manure was prepared for marketing in three basic forms and sold under four pricing conditions. Manure processing, packaging, and marketing began with the mounding of the manure in the corrals followed by its removal to a compost stockpile. Corral cleaning and stockpiling (when contracted out) cost 25 cents per cubic yard, with feedlot employees hand cleaning that portion of the corral impossible to reach by mechanical equipment. When the cost of this labor was added to the con-

tractor's bid price, cleaning and stockpiling costs totaled 39.2 cents per cubic yard. The costs of mounding and stockpiling, usually included in cattle feeding expenses, were included in the analysis of this study to furnish a more complete background on manure handling and disposal costs.

Manure was allowed to cure in a compost pile at least six months before processing. The manure could then be marketed unprocessed as composted manure; marketed processed as composted bulk; and marketed processed as composted packaged manure. The latter was packed in paper bags of 2-cubic-foot capacity. Moisture and temperature conditions were conducive to composting activity throughout the processing period.

Processing plant

The processing plant was an open, 20-foot-square, three-level steel structure, which included elevators, an $1\frac{1}{16}$ -inch vibrator screen separator, a pulverizer, overhead gravity-flow storage tanks for bulk loading, and two sackers for packaging the processed manure.

Composted manure was bulldozed from the stockpile, elevated to the top level and dropped onto the vibrating screen separator on the second level that then moved the large screenings to the pulverizer on the ground level. Seventy-five per cent of the composted manure passed through the $1\frac{1}{16}$ -inch screen vibrator, ready for packaging or bulk storage. The mill processed 14 cubic yards per hour at a cost of 9.5 cents per cubic yard. The elevator and storage bin costs amounted to 3.7 cents per cubic yard. The preprocessing operation of bulldozing the manure from the stockpile, transporting it to the raw product elevator and elevating it to the upper level of the processing plant cost 35.8 cents per cubic yard.

Packing costs

The cost of processing manure from the storage bin through packing, with a packing capacity of 37 cubic yards per hour, was \$1.21 per cubic yard. The packaging units were used to less than 50 per cent of their capacity during the study period.

The accumulated variable cost per cubic yard for the various product forms were: 3.5 cents for the composted unprocessed manure; 49.5 cents for the processed bulk; and slightly over \$1.70 for the processed packaged manure. Fixed costs per cubic yard, including overhead, depreciation, and interest, were 7 cents, 15.5 cents and 17.5 cents respectively. The combined fixed and variable costs per cubic yard amounted to 10.5 cents for the unprocessed product, 65 cents for the processed bulk and \$1.88 for the packaged, processed form.

Marketing was done on the basis of either pickup or delivery. Approximately 20 per cent of the processed manure was delivered. Delivery was free in any sale of a 10-cubic-yard-minimum load within a 15-mile radius. Accumulated costs are shown in table 1.

A total of 17,472 cubic yards of manure was processed during the study period. Thirty-five per cent of this was packaged and 65 per cent was marketed in bulk form. Unprocessed manure loaded out by plant personnel totaled 15,310 cubic yards. An undisclosed amount of unprocessed manure from the compost pile was marketed on a self-service basis with the buyer furnishing all labor and loading equipment. This did not detract from the study as all revenue, regardless of volume, was net revenue because all costs were borne by the buyer. Total cubic yard volume by product form is shown in table 2.

Based on the range in selling prices that were reported, and an estimate that

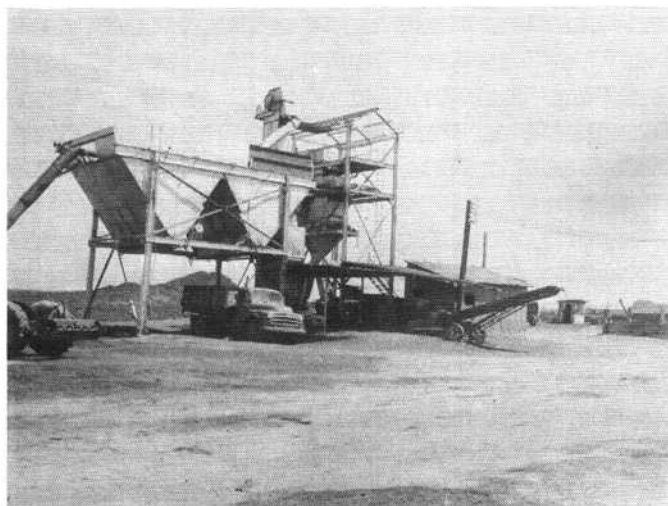
TABLE 1. FIXED AND VARIABLE COSTS BY PRODUCT FORM

Operation	Product form		
	Processed		Unprocessed
	Bulk	Packaged	
	Cost/cu yd		Cost/cu yd
Preprocessing	\$0.258	\$0.358	\$0.035
Processing	0.100	0.100	...
Storage	0.037	0.037	...
Packaging	...	1.213	...
Total operational costs	\$0.495	\$1.708	\$0.035
Overhead	0.015	0.010	0.020
Depreciation	0.100	0.120	0.030
Interest	0.040	0.045	0.020
Total Costs FOB Plant	\$0.650	\$1.883	\$0.105
Loading, over 3 cu yds*	0.100	0.110	0.170
Delivery, 10 or more cu yds	1.020	...	1.020
Total cost per cu yd delivered	\$1.770	...	\$1.295

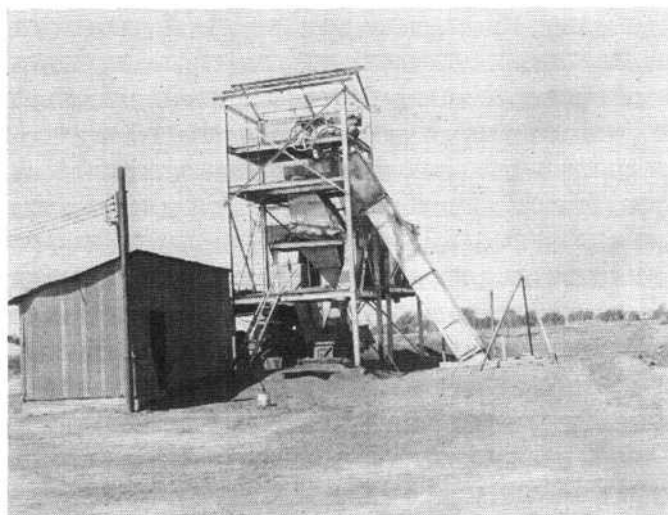
* Costs for loading 3 cubic yards or less are \$0.170 for the bulk processed and unprocessed \$0.090 for the processed packaged

TABLE 2. MANURE VOLUME BY PRODUCT FORM

Product		Cubic yards
Removed from corral and stockpiled		60,000
Processed		
Bulk	Delivered	2,288
	FOB Plant	9,100
		11,388
Packaged		6,084
Total processed		17,472
Unprocessed		15,310
Amount nonrecoverable		2,722
Total handled by plant personnel		35,504
Remaining in stockpile or removed by buyers using their own equipment and labor		24,496



Manure stockpile and processing plant for 14,000-head feedlot.



Conveyor and processing plant for feedlot manure.

20 per cent of the manure was sold at the maximum price, the weighted average price per cubic yard was \$3.80 for the packaged manure; \$2.40 for the processed bulk; \$1.40 for the unprocessed bulk, and \$1.00 per cubic yard, at the stockpile, for unprocessed manure with the buyer furnishing loading equipment and labor.

The study feedlot of 14,000-head total capacity occupied 40 acres of which 3.5 acres were used by the processing plant, manure storage and work areas. The storage area accommodated green manure, composted manure and processed bulk and packaged storage. The area designated for processing included the processing plant and loading facilities.

Volume percentages of stockpile removals, by final product type, were 46 per cent for the unprocessed, 35 per cent for processed bulk and 19 per cent for the processed packaged form. Based on the volumes of the different product forms

handled in the feedlot studied, the composted unprocessed manure had the greatest market potential. The processed bulk product had the greatest net revenue based on net returns, product form volumes and weighted average price, less total costs.

During the study some buyers from out of the immediate area purchased unprocessed manure, did their own removal, and provided their own equipment and labor. One buyer quoted his processing costs as only 50 cents per cubic yard. The fact that he purchased unprocessed manure when a similar processed product was immediately available lends plausibility to his quoted costs. Comparable costs must be substantiated to be valuable and, although it cannot be concluded that the study costs were excessive, there is a need for further information and additional study.

Throughout the study the need for keeping records was evident. Records pro-

vide management with the cost information upon which sound decisions can be based. As output increased, unit costs decreased—either through internal economies as output is expanded, or because overhead charges were then distributed over a larger number of units produced.

While this study was not intended to determine the market for manure, it did determine that there was a market for various product forms—all within a competitive price range. A livestock feedlot operator can probably make a profit from the sale of manure. With a manure-handling program based on a knowledge of the characteristics of animal wastes and on known costs, profitable management determinations can be made on how and what segment or segments of the market to supply.

J. Van Dam and C. A. Perry are farm advisors, Agricultural Extension Service, Los Angeles County.