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LABOR PRODUCTIVITY AND EMPLOYEE INCENTIVE PROGRAMS FOR COMMERCIAL PLANTS IN THE FEED INDUSTRY

by

RICHARD VALIANT KANTOR

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Approved by:

Robert R Mc

Major Professor

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INTRODUCTION

The word "productivity" is gaining wide recognition and much attention by all levels of management in a wide variety of industries. The primary reason for this is the alarming decline in the rate of productivity growth in the 1970's and through the first three years of the 1980's. This has been fueled by two economic recessions, inhibiting government policies and poor management practices.

The investigation reported here focuses specifically on labor productivity within the feed industry. McEllhiney (1983) indicated that labor costs con stitute the single largest element of controllable costs in both feed trucking and manufacturing. As wage rates and the cost of benefits increase, labor costs per ton delivered or manufactured will increase unless that labor can be made more productive. There are those in the feed industry who think that these costs can be brought under control and are demonstrating that it can be done by providing incentives to employees - pay for productivity - resulting in higher pay for employees and lower labor costs for employers (Ibid).

This investigation will focus on labor productivity and the effect of incentive plans in the feed industry.

LITERATURE REVIEW

Improving productivity is a complex problem involving many levels of management's concern. In pursuing the objective of productivity improvement, it is essential to recognize and admit the unpleasant fact that our understanding of productivity is severely limited. According to McClure (1982), in order for a company to improve productivity, there are several key questions it must answer:

(1) Are management/employee/union relations such that employees would

support management's desire to pursue productivity improvement?

(2) Does the company have a positive voting among its employees on working conditions, pay levels, company policy and administration, and job security?

(3) Is top management willing to share with employees, at all levels, the economic benefits from improvements in productivity?

(4) Is the company's accounting system 'healthy' and flexible enough to accept changes required to portray product data effectively?

(5) Does top management believe that the company's performance depends substantially on the efforts of its employees?

Productivity involves three basic areas: (1) Capital investment, technology, and research and development; (2) Management; and (3) Personnel, or the human factor, in the productivity challenge (Rosow, 1981). It is obvious that there are no easy solutions. Productivity is the measure of how efficiently management uses all people, machines and materials to make a product or provide a service. The key to improving productivity is the overall effectiveness of the organization as a whole. The commitment to improvement must involve everyone from top management, were it is initiated, down to the employee on the shop floor.

The erosion of U.S. productivity which has escalated at an alarming rate in the previous decade has received much attention from various sources. The Council of Economic Advisors to the President of the U.S. (1980) reported that between 1948 and 1965, (labor) productivity growth in the private, non-farm sector averaged 2.6% per year. In 1966-73, this rate declined to 2.0%. Since 1973, private, non-farm productivity growth has averaged less than 1.0% per year (GAO, 1980).

Productivity has become a "buzz word" among industry people and is certainly one of the greatest challenges to U.S. industry in the 1980's (Tuttle, 1980).

POLICY

In raising productivity, the principal role is played by private enterprise and the supporting role by government. Tuttle (1980) indicated that it is an almost universal opinion by industry members that government should take four actions to help industry. First, it should provide aids to capital formation and capital recovery that would be competitive with those available in other industrialized nations. Second, it should reduce restrictions on the patent procedure on government-owned inventions. Third, it should stimulate cooperative research and development efforts. Finally, it should relax or rescind production and productivity-stifling regulations whose costs exceed their benefits. It was also noted that a more liberal and realistic depreciation policy is needed from government. Otherwise, industry people feel that the government should avoid restricting the functions of industry. In the fall of 1977, GAO sent questionnaires to 1,200 firms throughout the country to obtain their perspectives on productivity and to determine whether there is an appropriate role for the federal government. A vast majority of those firms said they do not want federal assistance, and most are adamantly opposed to any further government interference in private sector operations (Statts, 1980).

Productivity improvement must be initiated as a long term, on-going commitment by top management within a company. United States management has too often gone for the "quick fix" approach to productivity (Tuttle, 1981). An "instant" program is unrealistic and probably would not last very long before it would be dropped. Arthur P. Thompson of TRW Inc. says simply, "The key to productivity is management. We really don't do enough long range planning, and short range solutions are not good enough. The major key to unlocking this is top management who should insist on good planning. The top executives set the environment for productivity and quality throughout the organization. If they don't require excellence, you probably won't get it." There are at least four distinct phases to go through in implementing an integral productivity program:

1. Development of an awareness throughout the company.

2. A detailed analysis of every company activity, diagnosing strengths and weaknesses.

3. Establishing a productivity measuring system, and training managers and employees.

4. Setting numerical goals and productivity objectives that will be reviewed periodically by line management.

If a company's management arrives at a clear understanding that an improvement of the relationship of individual and combined inputs to the total output is what productivity is all about and they realize that productivity is a fundamental, on-going company objective, it becomes probable that the organized effort for improvement will become an integral part of that company (Fabricant, 1981).

PRODUCTIVITY MEASUREMENT

There are two broad classes into which productivity measurements can be grouped - one includes those measures which relate output of a producing enterprise, industry, or economy to one type of input, such as labor, capital or energy; the other includes those which relate output to a combination of inputs, extending to a weighted aggregate of all associated inputs (Mark, 1981). The output-per-unit of labor input is probably the most familiar, and a very useful, measure of labor productivity. Other measurements of productivity include output per unit of capital and output per unit of energy output. In the processing industries where energy is an important and costly item, the measurements of output per kilowatt hour or output per cubic foot of natural gas are good indicators of how efficiently a fuel is being used.

INPUT

Labor input is also measured in physical terms. Industry is concerned with the total number of hours worked by all employees engaged in the production and the transportation processes. This may include, or exclude, management, clerical and hourly employees depending upon how the measurement is accounted for. Since the final output of the organization, or sector being measured, reflects the activities of all individuals involved in the production and distribution process, complete coverage of labor input is usually appropriate. This may or may not include hours not worked but paid for such as vacations, holidays and sick leave, depending on management's concept of what actual input is. Hours paid for but not worked are a cost of labor; but on a absolute level, it may not be appropriate to include these hours in labor input (Mark, 1981).

Because of the different definitions that can be applied to the components of productivity measures and the different analytical uses that involve productivity measures, a wide range of productivity measures can and have been developed. These measurements can be applied to a variety of productivity areas that are to be analyzed by a particular sector of an industry (Ibid).

The measurement of productivity trends involves several general problems. First, because of difficulties in obtaining direct quantity measures of input and output, the coverage of certain sectors must be excluded or, in many cases, substitute measures or approximations must be used. Second, since most data are collected for purposes other than productivity measurement, definitions and procedures already established for reporting information on production and inputs must be used. These may, or may not, be consistant with concepts appropriate for productivity measurement (Ibid).

It is up to the individual company involved to define the parameters in which it will measure productivity.

OUTPUT

Productivity refers to the finished product and its relationship to input. For a homogenous product, production in physical terms is merely a count of units produced. Certain conditions must be fulfilled. The product should be of specified quality, and must conform to precise standards of size and volume. In industries that produce a variety of products or heterogeneous products, the different units must be expressed on some common basis (Mark, 1981).

TECHNOLOGY

In the past few years, U.S. productivity growth has slipped to last place among all major industrial nations (Jones, 1981).

Our factories are aging: the average U.S. factory is 20 years old, while Japan's is only 10 and West Germany's is 12. France and West Germany have been investing about two times, and Japan about three times, as much of their gross national product in plant and equipment than has the U.S. It is obvious that if U.S. industry plans to remain competitive in world markets, this trend must be reversed (Ibid).

Companies such as Emerson Electric of St. Louis, who have made efforts to invest in new technologies in their plants, have had dramatic savings in costs of manufacturing and increased productivity.

In 1982, Emerson managed to pare $160 million from manufacturing costs by such methods as automating plants and improving the productivity of its workforce by 5.2%. At Emerson's Paragold, Arkansas appliance motor plant, for instance, seven teams of 90 salaried employees developed programs that squeezed $4.7 million from costs in 1982 without laying off workers. Savings like these help explain why Emerson, which earned $300 million on sales of $3.5 billion in 1982, has consistently outperformed its competitors (Business Week, 1983).

Another electronics company invested $250,000 in instrumentation and other process refinements and, almost overnight, cut waste on one product line from $3 million a year to $1 million a year. To get the same return from revenues, sales would have had to be doubled (Ibid).

Industries must commit capital expenditures to the renovation, or building, of new facilities that will cause increased productivity while retaining the product quality and quantity demanded.

Government must work towards policies that will encourage investment in new technologies and facilities. The inflationary times of the 1970's have had a stifling effect on encouraging industry to make such investments. The savings and investment incentives in the recent tax cuts, the assault against costly federal regulation of business and the heartening progress toward price stability are all important conditions for the growth the country needs to heal the wounds of three years of economic stagflation. But, many analysts fear that the promise of growth won't be realized unless the government can reduce the record budget deficits that the current government programs are generating (Bacon, 1983).

The White House has relied on the Federal Reserve Board to fight inflation through a restrictive monetary policy while following a fiscal policy characterized by huge deficits. The unintended result has been a policy that impedes investment and works at cross-purposes with the goal of the current administation tax cuts (Ibid).

So far as the impact on business is concerned, monetary and fiscal policies differ in one important point, Federal Reserve Board member Henry Wallich noted. Monetary policy, working principally through interest rates, affects business investments and housing, along with some durable consumer goods. Fiscal policy, working through tax changes and government spending for wages, salaries and transfers, affects primarily consumption, since most income goes for consumption rather than savings, and since tax reductions predominantly have been applied to personal, not business income.

Thus, Mr. Wallich said, "By putting the burden of restraining inflation on monetary rather than fiscal policy, an implicit decision is made to pay for disinflation through relatively less investment rather than relatively less consumption. This has a damaging consequence for the capital stock of the economy, for future jobs and for future growth". This high interest rate policy is discouraging investment at a time when the U.S. already lags behind its industrial competitors in terms of gross fixed capital formation as a share of gross national product (see Table I). The figures in Table I are for 1981, the last full year for which the Commerce Department has data (Ibid).

TABLE I

GROSS FIXED CAPITAL FORMATION AS A SHARE OF GNP

Country	%
Japan	31.0
Canada	24.5
West Germany	22.9
France	21.2
Italy	20.3
U. S.	17.1
United Kingdom	16.9

Government policies to lower interest rates and increase investments to improve industrial efficiency are needed, and this will ultimately have to come about through fiscal policy changes and not restrictive monetary policies.

Another obstacle to technological innovation is excessive government regulation of industry and technology that has been imposed without any visible effort to determine whether the benefits justify the enormous costs. According to one authority: Each dollar that Congress appropriates for regulation results in an additional $20 cost imposed on the private sector of our economy. These costs of regulations divert resources that could be used for technological improvements - improvements that are necessary to keep U.S. industry competitive in world markets (Jones, 1981).

Reginald H. Jones, (1981) CEO and Chairman of General Electric Company, gives the following driving forces for this technological renaissance:

(1) Increasing competition from foreign multi-nationals. With newer, more highly automated plants, cooperation from their own governments, aggressive global strategies, and sometimes a greater commitment to the product quality desired by the American consumer, these foreign multi-

nationals should be driving U.S. companies into greater technological efficiencies, innovation and quality in order to remain competitive.

(2) Energy and materials shortages. Higher costs for energy and materials will also force new, more efficient products and processes.

(3) Changing world demographics, resulting in a rapidly shifting international division of labor. This movement is perhaps the most complex and far reaching. Changes in size and composition of the labor force in both the developed and developing countries indicate more rapid growth in the levels of: (1) low and medium complexity manufacturing in newly industrialized countries; and (2) more and more emphasis in the U.S. on highly automated, "high tech" industries, shifting U.S. domestic resources into the highest value-added segments, that is high technology. Jones puts a good deal of emphasis on the need to gear our industry towards what the Japanese call "sunrise" industries. These are industries that will allocate resources in an area that will allow for greatest efficiency in their use. In the same respect, industry people should realize that the "sunset" industries must not be protected by government policies that allow them to survive as in the case of Chrysler several years ago. "Sunset" industries should be phased out as the competitive nature of a free marketplace dictates (Ibid).

MANAGEMENT'S ROLE

The role of management is to provide effective leadership to bring out the best in people and organizations. The organization's existence will ultimately lie in the hands of its managers to provide leadership that will keep the organization a productive, on-going concern. While an organization cannot create leadership, it can be catalytic in enhancing the leadership potential already present. Since leadership is basically a self-development process, it is important that top management select for advancement to key managerial positions those who show leadership promise, and provide the appropriate climate, opportunity, challenge and incentive for those selected to further develop their leadership skills. The approaches taken, and the techniques practiced, by management have tremendous potential for either stimulating or depressing productivity (Ranftl, 1981).

It is the job of the production manager to maintain stability and continuity in the manufacturing process if productivity improvements are expected. The manager's job is to keep crises from developing on the production floor so that the production workers can focus their attention on quality and productivity (Hayes, 1981).

Management's attitudes, actions and personal examples pervade the organization and directly affect employee attitudes, motivation and actions. Since employees take their cues from management and respond to the perceived reward system, it is particularly important that management clearly convey its feelings about the importance of productivity. Management must also convey a strong desire to see active productivity improvement efforts throughout the organization and its intention to equitably reward increased productivity (Ranftl, 1981).

The new objectives of the organization, performance goals and a system to reward those who are producers at the expense of those who don't produce must be identified in order for a productivity program to be successful. Management must provide the environment for productivity improvement. This is the bottom line in management's role to increase productivity (Ibid).

EMPLOYEE INVOLVEMENT

Employee involvement is the single most important attribute to a productivity program. It is the employees' attitudes that can make or break a program. Employees must be convinced, before a program is implemented, that improving productivity is in their best interest as well as the company's. They must also be convinced that the company will share with them the benefits of increased productivity in an equitable way.

Another important issue in the executive suite is the cost involved. For example, during the Solar Turbine of San Diego, California, 17-month start-up period, total outlays were $79,000 for an employee involvement program. Audited savings that resulted from employee ideas amounted to $90,000 on an annual basis - a respectable return since the $79,000 included one-time costs for the development of training materials and other start-up costs. Since then, Solar's involvement strategy has posted returns of $3.00 on every one dollar spent on the program - a return which is not unusual. Perhaps more importantly, these returns do not include financial benefits from the commonly reported gains in employee morale, lower turnover and absenteeism, improved cooperation or renewed commitment to productivity and quality that results from the involvement strategy (Werther, 1982).

Employees can be a critical judge of how the system works because they observe the system constantly from an inside view. They know where the failures are within the system and must be provided with a climate to help correct those failures or they may go uncorrected. A communication flow must be designed so that these observations are fed back to management. Employees must be allowed to play a key role in analyzing the observations and helping to correct observed problems. This has been accomplished in Japan and, to some extent, in the U.S. through Quality Circles and Quality of Work Life programs. At the plant level, this takes the form of employee participation in problem identification and solving relative to their work and work environment. At the early stage of employee involvement, a mutual trust must be established between employees, salaried and supervisory people (Tuttle, 1982).

It is important that reasonable and obtainable goals in improving productivity be established; otherwise employees may become disillusioned with the program, and it may never get off the ground. If confidence in the system is lost, it may be very difficult to find acceptance of a new program with obtainable goals in the future. The program must be a long term, on-going concern for all involved. Short, "quick fix" programs are only good for the period of time involved and may damage long term employee interest.

Productivity programs should have tangible pay offs for contributing workers. An effective reward system will regularly recognize the contributions of employees in a highly visible and direct way and thereby stimulate employee efforts (Shetty, 1983). This may take the form of any one of a number of incentive programs. Traditionally, profit sharing programs were the norm for this type of program. In more recent years, pay for productivity and employee stock option plans have gained more acceptance in this area. The pay for productivity programs are probably the most effective. These programs are based on the number of work hours saved for a given number of units produced compared to the number of hours required to produce the same number of units during a prior base period (GAO, 1981). Tindle Mills, a non-union subsidary of Beatrice Foods, located in Springfield, Missouri uses this type of program based on a sliding scale of man hours per ton on a prior based two decimal figure. For each one hundreth decrease (0.01) in man hours per ton, there is a corresponding incremental increase in cents per hour added to the employees base wage (Coleman, 1973). Since its inception in the 1960's, Tindle has experienced a 50 percent improvement in labor productivity (Reed, 1982).

ConAgra, Inc. initiated a program in their unionized plant in Knoxville, Tennessee with extremely good results. After the first full year, employees increased their hourly earnings 7.0%, with a 5.5% decrease in hours worked. During the first four weeks of the second year they increased their hourly earnings 11.6%, with a decrease in hours worked of 5.8%. After 56 weeks, there was a 27.2% reduction in man hours per ton; and weekly production increased in the same period by 148 tons or a 9.1% increase in tons produced weekly. This resulted in an overall direct labor cost per ton decrease of 11.4% (Totto, 1982).

Grain Terminal Association's Feed Division uses a different approach to productivity incentives. GTA constantly develops new programs as needed on a short term basis. The programs are developed as a contest over a period of time with a predetermined ending date. Their management feels this gives the company the flexibility, in the event that a program does not work, to phase it out and replace it with another. GTA has had good results with this approach. During the first seven months of the 1982 fiscal year, their overall production productivity was up 12.2% (Wiseman, 1983).

GTA indicates that labor is the single largest cost involved in feed manufacturing and the one over which managers have the greatest control. Through these incentive programs, GTA has focused on that area.

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PURPOSE

The purpose of this study is to investigate productivity for a surveyed segment of the feed industry. The study will focus on the effectiveness of feed plants that have incentive plans versus feed plants with no incentive plans on labor efficiency for 1982. The author hopes that this study will encourage management in the feed industry to focus on productivity and specifically to look at incentive plans as an important tool in helping to improve productivity in the feed plant.

METHODS

In December of 1982, 639 surveys (Appendix A) were sent to 204 companies selected from the 1982 American Feed Manufacturers Association Directory. The Directory was used for ease of obtaining addresses. All companies that could be ascertained as having feed plants were included and sent surveys. Of the 204 companies surveyed, 43 companies responded with 152 surveys completed.

The survey's purpose was threefold: (1) to collect general information such as location of plant, 1982 tonnage, and product mix information; (2) to collect labor efficiency data, and (3) to provide a listing and explanation by management of past, current and future incentive plan programs.

The surveys were sorted into commercial and integrated plants to be analyzed separately. Commercial feed plants are those that manufacture feed for the purpose of wholesale and retail sales. Integrated plants are those that manufacture feed to be fed to livestock on the premise or at some other company-owned facility such as feed lots and poultry operations. Integrated operations are deleted from this study as a result of missing values generated from the statistical analysis because of a lack of observations.

Statistical Analysis System was used to analyze the data using general linear module programming for linear regression analysis and least square means testing. Linear Regression was used for only those plants reporting labor efficiency for 1975, 1980, 1981, and 1982. Least Square means testing was used to analyze the incentive plan plants versus plants with no incentive plans, and the volume analysis.

RESULTS AND DISCUSSION

Linear Regression Analysis

The linear regression analysis (Figure 1) indicates a trend toward improved labor efficiency for the 21 observed plants that reported labor efficiency for 1975, 1980, 1981, and 1982. The slope of the line is not significant (P > .05) and the R-Square value is .0004. The R-Square value indicates that the regression equation 1.005111 - .0021227X is not a good predictor of the trend line. This is a result of the wide range of observed labor efficiency in all years reported.

ANALYSIS OF 1982 MANUFACTURED FEED LABOR EFFICIENCY AND PLANT UTILIZATION BY VOLUME FOR COMMERCIAL PLANTS

Labor Efficiency

This analysis (Table 1) combines both feed plants that have an incentive plan with feed plants that do not have an incentive plan. The purpose was to observe possible economies of scale from Volume 1 (0 - 24999 tons per year) up to Volume 4 (75000 plus tons per year). As Table 1 indicates, there was evidence to show from the data collected that economies of scale did exist. The labor efficiency improved in each volume category observed, starting with an average of 1.42 MH/T for Volume 1 and improving to an average .61 MH/T for Volume 4 or a difference (P < .05) of .81 MH/T.

Plant Utilization

Plant utilization (Table 2) also improved from Volume 1 through Volume 4 in each volume category with a difference (P < .05) between volume 1 and volume 4 of 18% or from 72% to 90% of plant utilization.

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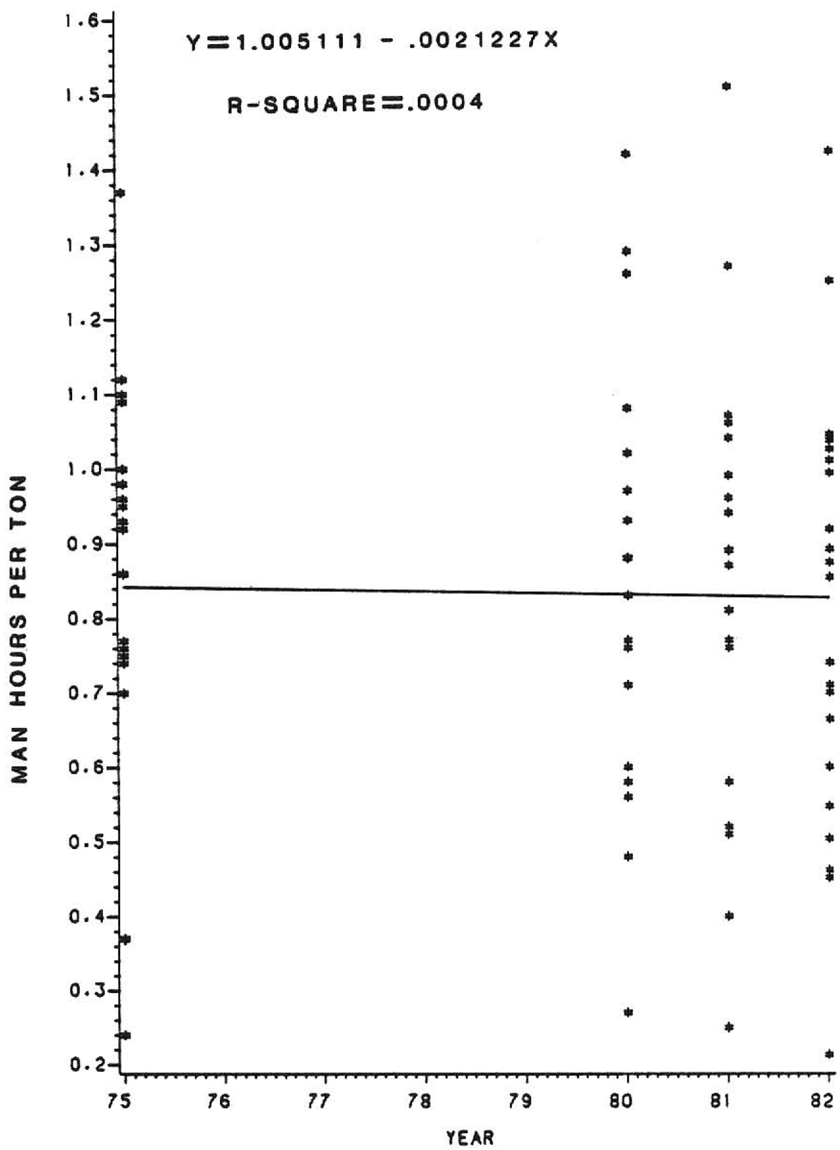

FIG. 1 LINEAR REGRESSION ANALYSIS OF LABOR EFFICIENCY(MH/T) FOR MANUFACTURED FEED

TABLE 1.

ANALYSIS OF 1982 MANUFACTURED

FEED LABOR EFFICIENCY* BY VOLUME FOR COMMERCIAL PLANTS

Volume	Observations	Mean Labor Efficiency (MH/T)	S. E.	Range Minimum	Range Maximum
0 - 24999	39	1.42[a]	.07	.37	3.01
25000-49999	47	.92[b]	.06	.21	1.56
50000-74999	22	.79[bc]	.09	.20	1.48
75000 +	21	.61[c]	.09	.21	1.17

* Labor efficiency is calculated by dividing total manhours worked by total tonnage produced (MH/T).

Values with the same subscript are not significantly different ($P < .05$)

TABLE 2.

ANALYSIS OF 1982 PLANT UTILIZATION*

BY MANUFACTURED VOLUME FOR COMMERCIAL PLANTS

Volume	Observations	Mean Utilization (%)	S. E.	Range Minimum	Range Maximum
0 - 24999	40	72[a]	3	36	149
25000-49999	42	78[a]	3	40	138
50000-74999	22	83[ab]	5	58	116
75000 +	21	90[b]	5	66	128

* Utilization is calculated by dividing actual 1982 tonnage by reported plant capacity.

Values with the same subscript are not significantly different ($P < .05$)

1982 LABOR EFFICIENCY ANALYSIS BY CLASS OF FEED

This analysis is divided into seven classes of feed (Table 3): broiler, layer, turkey, swine, dairy, beef/sheep and specialty feeds. Plants were sorted into one through seven class categories depending on the number of classes of feed manufactured. If a plant manufactured 75% or more of one class of feed, it was considered to be a one class plant. There were no observations in the two class category. Table 3 indicates there was an increase in mean man hours per ton from one class plants with 0.50 MH/T up to seven class plants with 1.13 MH/T. There was a wide range of efficiency in each class category.

ANALYSIS BY VOLUME AND PRODUCT FORM

Product form was divided into two categories, mash and pelleted feed. Mash indicated plants that were greater than 50% mash and less than 50% pelleted. Pelleted indicated plants that were less than 50% mash and greater than 50% pelleted. The original model had the following four categories: 100% mash, mash $> 50\%$ and pelleted $< 50\%$, mash $< 50\%$ and pelleted $< 50\%$ and 100% pelleted feed plants. Because of a lack of observations in the 100% mash and 100% pelleted plant categories, missing values were generated. Plants that were 100% mash or pelleted feed have been included in the mash and pelleted definitions given above.

Labor Efficiency and Plant Utilization for Mash Plants in the Range of 0 - 24999 Tons Per Year

Plants in the range of 0 - 24999 tons/yr that were mash (Table 4) with no incentive plan had a numerical advantage over mash plants that had an incentive plan. Mash plants with no incentive plan had a mean labor efficiency of 1.15 MH/T and a reported range of .37 - 2.55 MH/T. This was

TABLE 3.

1982 LABOR EFFICIENCY* ANALYSIS BY CLASS OF FEED

Class	Observations	Range (MH/T)	Mean (MH/T)	S.D.
1	36	.10 - 1.48	.50	.36
2	0			
3	2	.16 - .56	.36	.28
4	9	.21 - 1.46	.79	.47
5	36	.55 - 1.97	1.04	.34
6	39	.27 - 2.92	1.01	.51
7	20	.46 - 3.01	1.13	.61

* Labor efficiency is calculated by dividing total manhours worked by total tonnage produced (MH/T).

not different ($p > .05$) from mash plants that had an incentive plan with a mean labor efficiency of 1.29 MH/T and a reported range of .60 - 1.97 MH/T.

Plant utilization of mash plants (Table 5) with no incentive plan had a numerical advantage over mash plants with an incentive plan. Mash plants with no incentive plan had a mean utilization of 69% with a reported range of 51 - 120%. This was not different ($p > .05$) from mash plants that had an incentive plan with a mean utilization of 65% and a range of 48 - 82%.

Labor Efficiency and Plant Utilization for Pelleted
Plants in the Range of 0 - 24999 Tons Per Year

Pelleted plants (Table 4) with no incentive plan in the range of 0 - 24999 tons/yr had a numerical advantage over pelleted plants with an incentive plan. Pelleted plants with no incentive plan had a mean labor efficiency of 1.17 MH/T with a range of .77 - 1.90 MH/T. This was different ($p < .05$) from pelleted plants that had an incentive plan with a mean labor efficiency of 2.24 MH/T and a reported range of .95 - 3.01 MH/T.

Plant utilization of pelleted plants (Table 5) with no incentive plan had a numerical advantage over pelleted plants with an incentive plan. Pelleted plants with no incentive plan had a mean utilization of 74% and a reported range of 50 - 117%. This was not different ($p > 0.05$) than pelleted plants that had an incentive plan with a mean utilization of 70% and a reported range of 36 - 149%.

Labor Efficiency and Plant Utilization for Mash
Plants in the Range of 25000 - 49999 Tons Per Year

Plants in the range of 25000 - 49999 tons per year that were mash (Table 4) with no incentive plan had a numerical advantage over mash plants that had an incentive plan. Mash plants with no incentive plan had a mean labor efficiency of .84 MH/T and a reported range of .21 - 1.30 MH/T. This was not different (P > .05) from mash plants that had an incentive plan with a mean labor efficiency of 1.05 MH/T and a reported range of .41 - 1.38 MH/T.

Plant utilization of mash plants (Table 5) with no incentive plan had a numerical advantage over mash plants with an incentive plan. Mash with no incentive plan had a mean utilization of 92% and a reported range of 52 - 138%. This was not different (P > .05) from mash plants that had an incentive plan with a mean utilization of 74% and a reported range of 43 - 114%.

Labor Efficiency and Plant Utilization for Pelleted Plants in the Range of 25000 - 49999 Tons Per Year

Pelleted plants (Table 4) with no incentive plan in the range of 25000 - 49999 tons per year had a numerical advantage over pelleted plants with an incentive plan. Pelleted plants with no incentive plan had a mean labor efficiency of 1.01 MH/T and a reported range of .61 - 1.46 MH/T. This was not different (P > .05) from pelleted plants that had an incentive plan with a mean labor efficiency of 1.00 MH/T and a reported range of .55 - 1.56 MH/T. Plant utilization of pelleted plants (Table 5) with no incentive plan did not have a numerical advantage over pelleted plants with an incentive plan. Pelleted plants with no plan had a mean utilization of 72% and a reported range of 40 - 97%. This was not different (P > .05) from pelleted plants that had an incentive plan, with a mean utilization of 81% and a reported range of 55 - 110%.

Labor Efficiency and Plant Utilization for Mash Plants in the Range of 50000 - 74999 Tons Per Year

Plants in the range of 50000 - 74999 tons per year that are mash (Table 4) with no incentive plan had a numerical advantage over mash plants that had an incentive plan. Mash plants with no incentive plan had a mean labor efficiency of .69 MH/T and a reported range of .20 - 1.09 MH/T. This was different ($P < .05$) from mash plants that had an incentive plan, with a mean labor efficiency of 1.06 MH/T and a reported range of .92 - 1.07 MH/T.

Plant utilization of mash plants (Table 5) with no incentive plan had a numerical advantage over mash plants with an incentive plan. Mash plants with no incentive plan had a mean utilization of 83% with a reported range of 72 - 110%. This was not different ($P > .05$) from mash plants that had an incentive plan with a mean utilization of 66% and a range of 57 - 99%.

Labor Efficiency and Plant Utilization for Pelleted Plants in the Range of 50000 - 74999 Tons Per Year

Pelleted plants (Table 4) with no incentive plan in the range of 50000 - 74999 did not have a numerical advantage over pelleted plants with an incentive plan. Pelleted plants with no incentive plan had a mean labor efficiency of .98 MH/T with a reported range of .50 - 1.50 MH/T. This was not different ($P > .05$) from pelleted plants that had an incentive plan with a mean labor efficiency of .87 MH/T and a reported range of .71 - 1.01 MH/T.

Plant utilization of pelleted plants (Table 5) with no incentive plan had a numerical advantage over pelleted plants with an incentive plan. Pelleted plants with no incentive plan had a mean utilization of 87% and a reported range of 65 - 116%. This was not different ($P > .05$) from pelleted plants that had an incentive plan with a mean utilization of 73% and a reported range of 58 - 106%.

Labor Efficiency and Plant Utilization for Mash Plants in the Range of 75000 Plus Tons Per Year

Plants in the range of 75000 tons per year and above (Table 4) that were mash were not numerically different from mash plants with an incentive plan. Mash plants with no incentive plan had a mean labor efficiency of .77 MH/T and a reported range of .19 - 1.12 MH/T. This was not different (P > .05) from mash plants that had an incentive plan with a mean labor efficiency of .77 MH/T and a reported range of .60 - 1.18 MH/T.

Plant utilization of mash plants (Table 5) with no incentive plan had a numerical advantage over mash plants with an incentive plan. Mash plants with no incentive plan had a mean utilization of 95% with a reported range of 76 - 122%. This was not different (P > .05) from mash plants that had an incentive plan with a mean utilization of 80% and a reported range of 89 - 103%.

Labor Efficiency and Plant Utilization for Pelleted Plants in the Range of 75000 Plus Tons Per Year

Pelleted plants (Table 4) with no incentive plan in the range of 75000 tons per year and above had a numerical advantage over pelleted plants with an incentive plan. Pelleted plants with no incentive plan had a mean labor efficiency of .71 MH/T with a reported range of .21 - 1.17 MH/T. This was not different (P > .05) from pelleted plants that had an incentive plan with a mean labor efficiency of .73 MH/T and a range of .45 - .87 MH/T.

Plant utilization of pelleted plants (Table 5) with no incentive plan did not have a numerical advantage over pelleted plants with an incentive plan. Pelleted plants with no incentive plan had a mean utilization of 80% with a reported range of 67 - 99%. This was not different (P > .05) from pelleted plants that had an incentive plan with a mean utilization of 82% and a range of 66 - 128%.

TABLE 4.

ANALYSIS OF 1982 MANUFACTURED FEED LABOR EFFICIENCY*

BY MANUFACTURED VOLUME AND PRODUCT FORM** FOR COMMERCIAL PLANTS

Incentive Plan	Volume	Mean Labor Efficiency (MH/T)	S. E.
	0 - 24999		
No	Mash**	1.15[a]	.25
Yes	Mash	1.29[a]	.30
No	Pelleted**	1.17[a]	.12
Yes	Pelleted	2.24[b]	.26
	25000 - 49999		
No	Mash	.84[a]	.11
Yes	Mash	1.05[a]	.16
No	Pelleted	1.01[a]	.07
Yes	Pelleted	1.00[a]	.08
	50000 - 74999		
No	Mash	.69[a]	.07
Yes	Mash	1.06[b]	.12
No	Pelleted	.98[b]	.07
Yes	Pelleted	.87[ab]	.08
	75000 +		
No	Mash	.77[a]	.07
Yes	Mash	.77[a]	.15
No	Pelleted	.71[a]	.06
Yes	Pelleted	.73[a]	.09

* Labor efficiency is calculated by dividing total manhours worked by total tonnage produced (MH/T).

** If mash is > 50 and pelleted is < 50, then form = mash; if mash is < 50 and pelleted is > 50, then form = pelleted.

Values with the same subscripts are not significantly different within volume sets ($P < 0.05$).

TABLE 5.

ANALYSIS OF 1982 PLANT UTILIZATION*

BY MANUFACTURED VOLUME AND PRODUCT FORM** FOR COMMERCIAL PLANTS

Incentive Plan	Volume	Mean Utilization (%)	S. E. (%)
	0 - 24999		
No	Mash**	69[a]	11
Yes	Mash	65[a]	11
No	Pelleted**	74[a]	5
Yes	Pelleted	70[a]	11
	25000 - 49999		
No	Mash	92[a]	9
Yes	Mash	74[ab]	10
No	Pelleted	72[b]	6
Yes	Pelleted	81[ab]	6
	50000 - 74999		
No	Mash	83[a]	8
Yes	Mash	66[a]	14
No	Pelleted	87[a]	8
Yes	Pelleted	73[a]	10
	75000 +		
No	Mash	95[a]	6
Yes	Mash	80[a]	14
No	Pelleted	80[a]	6
Yes	Pelleted	82[a]	9

* Utilization is calculated by dividing actual 1982 tonnage by reported plant capacity.

** If mash is > 50 and pelleted is < 50, then form = mash; if mash is < 50 and pelleted is > 50, then form = pelleted.

Values with the same subscripts are not significantly different within volume sets ($P < 0.05$).

ANALYSIS BY VOLUME AND PRODUCT PACKAGE

Product package was divided into two categories, bulk and bagged feed plants. Bulk indicated plants that were greater than 50% bulk and less than 50% bagged. Bagged indicated plants that were greater than 50% bagged and less than 50% bulk. The original model had the four following categories, 100% bulk, bulk > 50% and bagged < 50%, bulk < 50% and bagged > 50% and 100% bagged plants. Because of a lack of observations in the 100% bulk and bagged plant categories, missing values were generated.

Plants that were 100% bulk and bagged have been included in the bulk and bagged definitions given above.

LABOR EFFICIENCY AND PLANT UTILIZATION FOR BULK PLANTS IN THE RANGE OF 0 - 24999 TONS PER YEAR

Plants in the range of 0 - 24999 tons per year that were bulk (Table 6) with no incentive plan had a numerical advantage over bulk plants that had an incentive plan. Bulk plants with no incentive plan had a mean labor efficiency of 1.13 MH/T and a reported range of .37 - 2.55 MH/T. This was not different ($P > .05$) from bulk plants that had an incentive plan with a mean labor efficiency of 1.41 MH/T and a reported range of .60 - 2.92 MH/T.

Plant utilization of bulk plants (Table 7) with no incentive plan had a numerical advantage over bulk plants with an incentive plan. Bulk plants with no incentive plan had a mean utilization of 77% with a reported range of 50 - 120%. This was not different ($P > .05$) from bulk plants that had an incentive plan with a mean utilization of 75% and a reported range of 36 - 149%.

LABOR EFFICIENCY AND PLANT UTILIZATION FOR BAGGED PLANTS IN THE RANGE OF 0 - 24999 TONS PER YEAR

Bagged plants (Table 6) with no incentive plan in the range of 0 - 24999 tons per year had a numerical advantage over bagged plants that had an incentive plan. Bagged plants with no incentive plan had a mean labor efficiency of 1.19 MH/T with a range of .77 - 1.73 MH/T. This was different ($P < .05$) from bagged plants that had an incentive plan with a mean labor efficiency of 2.12 MH/T and a reported range of 1.21 - 3.01 MH/T.

Plant utilization of bagged plants (Table 7) with no incentive plan had a numerical advantage over bagged plants that had an incentive plan. Bagged plants with no plan had a mean utilization of 66% with a reported range of 51 - 95%. This was not different ($P > .05$) from bagged plants with a mean utilization of 60% and a reported range of 36 - 83%.

LABOR EFFICIENCY AND PLANT UTILIZATION FOR BULK PLANTS IN THE RANGE OF 25000 - 49999 TONS PER YEAR

Plants in the range of 25000 - 49999 tons per year (Table 6) with no incentive plan that were bulk plants had a numerical advantage over bulk plants with an incentive plan. Bulk plants with an incentive plan had a mean labor effficiency of .75 MH/T with a reported range of .21 - 1.30 MH/T. This was not different ($P > .05$) from bulk plants that had an incentive plan with a mean labor efficiency of .93 MH/T and a reported range of .55 - 1.48 MH/T.

Plant utilization of bulk (Table 7) plants with no incentive plan had a numerical advantage over bulk plants with an incentive plan. Bulk plants with no plan had a mean utilization of 81% with a reported range of 40 - 138%. This was not different ($P > .05$) from bulk plants that had a plan with a mean utilization of 74% and a reported range of 55 - 91%.

Bagged plants (Table 6) in the range of 25000 - 49999 tons per year with no incentive plan had a numerical advantage over bagged plants that had an incentive plan. Bagged plants with no incentive plan had a mean labor efficiency of 1.10 MH/T with a reported range of .82 - 1.46 MH/T. This was not different ($P > .05$) from bagged plants that had an incentive plan with a mean labor efficiency of 1.12 MH/T and a reported range of .69 - 1.56 MH/T.

Plant utilization (Table 7) for bagged plants with no incentive plan had a numerical advantage over bagged plants that had an incentive plan. Bagged plants with no incentive plan had a mean utilization of 84% with a reported range of 49 - 90%. This was not different ($P > .05$) from bagged plants that had an incentive plan with a mean utilization of 80% and a reported range of 43 - 114%.

LABOR EFFICIENCY AND PLANT UTILIZATION FOR BULK PLANTS IN THE RANGE OF 50000 - 74999 TONS PER YEAR

Plants in the range of 50000 - 74999 tons per year that were bulk (Table 6) with no incentive plan had a numerical advantage over bulk plants that had an incentive plan. Bulk plants with no incentive plan had a mean labor efficiency of .46 MH/T with a range of .20 - .78 MH/T. This was different ($P < .05$) from bulk plants that had an incentive plan with a mean labor efficiency of .92 MH/T and a reported range of .71 - 1.08 MH/T.

Plant utilization of bulk plants (Table 7) with no incentive plan had a numerical advantage over bulk plants that had an incentive plan. Bulk plants with no incentive plan had a mean utilization of 83% with a reported range of 65 - 116%. This was not different ($P > .05$) from bulk plants that had an incentive plan with a mean utilization of 82% and a reported range of 58 - 106%.

LABOR EFFICIENCY AND PLANT UTILIZATION FOR BAGGED PLANTS IN THE RANGE OF 50000 - 74999 TONS PER YEAR

Bagged plants in the range of 50000 - 74999 tons per year (Table 6) with no incentive plan did not have a numerical advantage over bagged plants that had an incentive plan. Bagged plants with no incentive plan had a mean labor efficiency of 1.20 MH/T with a reported range of .89 - 1.48 MH/T. This was not different ($P > .05$) from the one bagged plant with an incentive plan observed with a mean labor efficiency of 1.01 MH/T.

Plant utilization of bagged plants with no incentive plan (Table 7) had a numerical advantage over the one observed bagged plant that had an incentive plan. Bagged plants with no incentive plan had a mean utilization of 88% with a reported range of 82 - 91%. This was not different ($P > .05$) from the one bagged plant that had an incentive plan with a mean utilization of 58%.

LABOR EFFICIENCY AND PLANT UTILIZATION FOR BULK PLANTS IN THE RANGE OF 75000 PLUS TONS PER YEAR

Plants in the range of 75000 tons per year and above that were bulk plants (Table 6) with no incentive plan had a numerical advantage over bulk plants that had an incentive plan. Bulk plants with no incentive plan had a mean labor efficiency of .39 MH/T with a reported range of .19 - .72 MH/T. This was different ($P < .05$) from bulk plants that had an incentive plan with a mean labor efficiency of .63 MH/T and a reported range of .45 - .87 MH/T.

Plant utlization of bulk plants (Table 7) with no incentive plan did not have a numerical advantage over bulk plants that had an incentive plan. Bulk plants with no incentive plan had a mean utilization of 93% with a reported range of 67 - 122%. This was not different (P > .05) from bulk plants that had an incentive plan with a mean utilization of 97% and a reported range of 76 - 128%.

LABOR EFFICIENCY AND PLANT UTILIZATION FOR BAGGED PLANTS IN THE RANGE OF 75000 PLUS TONS PER YEAR

Bagged plants (Table 6) in the range of 75000 tons and above with no incentive plan did not have a numerical advantage over the one observed bagged plant that had an incentive plan. Bagged plants with no incentive plan had a mean labor efficiency of 1.10 MH/T with a reported range of .94 - 1.17 MH/T. This was not different (P > .05) from the bagged plant with a mean labor efficiency of .87 MH/T.

Plant utilization for bagged plants (Table 7) with no incentive plan had a numerical advantage over the one observed bagged plant with an incentive plan. Bagged plants with no plan had a mean utilization of 81% with a reported range of 69 - 92%. This was not different (P > .05) from the bagged plant that had an incentive plan with a mean utilization of 65%.

TABLE 6.

ANALYSIS OF 1982 MANUFACTURED FEED LABOR EFFICIENCY*

BY MANUFACTURED VOLUME AND PRODUCT PACKAGE** FOR COMMERCIAL PLANTS

Incentive Plan	Volume	Mean Labor Efficiency (MH/T)	S. E.
	0 - 24999		
No	Bulk**	1.13[a]	.15
Yes	Bulk	1.41[ab]	.20
No	Bagged**	1.19[a]	.19
Yes	Bagged	2.12[b]	.38
	25000 - 49999		
No	Bulk	.75[a]	.06
Yes	Bulk	.93[ab]	.10
No	Bagged	1.10[b]	.12
Yes	Bagged	1.12[b]	.12
	50000 - 74999		
No	Bulk	.46[a]	.05
Yes	Bulk	.92[b]	.06
No	Bagged	1.20[c]	.09
Yes	Bagged	1.01[bc]	.16
	75000 +		
No	Bulk	.39[a]	.05
Yes	Bulk	.63[b]	.07
No	Bagged	1.10[c]	.08
Yes	Bagged	.87[bc]	.18

* Labor efficiency is calculated by dividing total manhours worked by total tonnage produced (MH/T).

** If bulk is > 50 and bag is < 50, then = bulk; if bulk is < 50 and bag is > 50, then = bagged.

Values with the same subscript are not significantly different within volume sets ($P < 0.05$).

TABLE 7.

ANALYSIS OF 1982 PLANT UTILIZATION*

BY MANUFACTURED VOLUME AND PRODUCT PACKAGE** FOR COMMERCIAL PLANTS

Incentive Plan	Volume	Mean Utilization (%)	S. E.(%)
	0 - 24999		
No	Bulk**	77[a]	7
Yes	Bulk	75[a]	8
No	Bagged**	66[a]	9
Yes	Bagged	60[a]	14
	25000 - 49999		
No	Bulk	81[a]	5
Yes	Bulk	74[a]	8
No	Bagged	84[a]	10
Yes	Bagged	80[a]	8
	50000 - 74999		
No	Bulk	83[a]	6
Yes	Bulk	82[a]	7
No	Bagged	88[a]	10
Yes	Bagged	58[a]	18
	75000 +		
No	Bulk	93[a]	5
Yes	Bulk	97[a]	7
No	Bagged	81[a]	8
Yes	Bagged	65[a]	17

* Utilization is calculated by dividing actual 1982 tonnage by reported plant capacity.

** If bulk is > 50 and bagged is < 50 then = bulk; if bulk is < 50 and bagged is > 50, then = bagged.

Values with the same subscripts are not significantly different ($P < 0.05$).

SUMMARY AND CONCLUSIONS

The regression trend line in Figure 1 indicates an improvement in labor efficiency for the 21 observed plants reporting labor efficiency in 1975 through 1982. The R-Square value of .0004 indicates that the regression equation is not a good predictor of the trend line. This is a result of the wide range of labor efficiency reported by the plants in the survey. The author feels that the appearance of labor efficiency improvement for this group of plants is encouraging despite the validity of the equation.

The analysis by volume for labor efficiency clearly showed economies of scale from 0 - 24999 tons per year plants on up to 75000 plus tons per year plants. The labor efficiency increased in each volume category starting with 0 - 24000 tons per year on up to 75000 tons per year.

The plant utilization also increased in each volume category beginning with Volume 1 on up to Volume 4.

1982 labor efficiency analysis by classes of feed indicated that as the number of classes of feed manufactured in a given plan increased, man hours per ton also increased. One possibility is that the more classes manufactured, the more product changes there might be thus affecting labor efficiency.

Commercial plants tested by volume and product form indicated that mash plants with no incentive plan in the volume ranges 0 - 24999, 25000 - 49999, and 50000 - 74999 tons per year had a higher mean labor efficiency than mash plants that had an incentive plan. In the range of 75000 plus tons per year, mash plants with no incentive plan had the same mean labor efficiency as mash plants that had an incentive plan.

Mean plant utilization was higher in the mash plants with no incentive plan in all volume ranges than mash plants that had incentive plans.

Pelleted plants with no incentive plans had a higher mean labor efficiency in the volume ranges 0 - 24999 and 75000 plus tons per year than pelleted plants that had incentive plans. In the volume ranges 25000 - 49999 and 75000 plus tons per year, pelleted plants with incentive plans had a higher mean plant utilization than plants with no incentive plan.

Commercial feed plants tested by volume and product package indicated that bulk plants with no incentive plans had a higher mean labor efficiency in all volume ranges than bulk plants with an incentive plan.

Mean plant utilization for bulk plants with no incentive plans were higher in all but the 75000 plus tons per year volume range than were bulk plants that had incentive plans.

Mean labor efficiencies of bagged plants with no incentive plans were higher in the volume ranges of 0 - 24999 and 25000 - 49999 tons per year than were bagged plants that had incentive plans. Bagged plants with an incentive plan had a higher mean labor efficiency in the volume ranges 50000 - 74999 and 75000 plus tons per year than plans with no incentive plan.

Mean plant utilization of bagged plants with no incentive plan was higher in all volume ranges compared to plants with incentive plans.

In most of the observed data for both form and package variables, it appeared that there was a positve correlation between labor efficiency and plant utilization.

It is important to realize that the numerical differences in labor efficiencies, on a cost-of-labor basis, is sensitive to .01 man hours per ton. This is not reflected in the statistical analysis which tested for differences in mean labor efficiencies between incentive plan and no incentive plan plants. For example, if we give the same labor costs per hour and annual tonnage for mash plants with and without an incentive plan

(Table 4) in the volume range 25000 - 49999 tons per year, the following difference in labor cost results - [$10/MH X 1.05 MH/T - $10/MH X .84 MH/T] X 40000 tons per year = $84000 per year or a $2.10 per ton difference between the incentive plan and no incentive plan plants. The difference in man hours per ton is only .21, but a substantially higher labor cost is incurred. As the cost savings example indicates, even small improvements can produce substantial cost savings. The author would like to emphasis this point because the bottom line of labor efficiency improvements are the cost savings that occur as a result of these improvements.

Despite the indications that a majority of the plants with no incentive plan tested by volume, form and package had better labor efficiency figures in 1982 than did plants with incentive plans, 37 plants with plans did report improvements in labor efficiency. After installing an incentive plan in one company's plant, improvements were reported in the batching rate of 20%, the pelleting rate improved 10%, the sacking rate improved 30% and Kilowatt hours per ton decreased by 15%. The company also reported significant reductions in quality problems, fewer accidents in the plant, a higher standard of housekeeping and a tremendous improvement in worker morale. The plant manager stated that incentives introduced produced results far beyond expectations. Another company reported that in a three month period of initiating an incentive plan, the net result in 10 plants was a 3% improvement in labor productivity. The company also reported that the employees have developed more pride in their work and a stronger team spirit. The above companies and others who reported incentive plans in Section C (Appendix A) of the survey not only experienced an increased in labor efficiency, but indirectly because of the incentive plan had less absenteeism, less rework, fewer accidents, improved energy utilization and a reduction in overtime hours worked.

Because there are no set standards as to what good labor efficiency numbers are in the feed industry, it is up to the company to establish its own for their particular plant situation. It must be pointed out that, because of many variables from company to company and plant to plant it would be very difficult to arrive at set standards for labor efficiency to be used on an industry wide basis. The author feels that it is up to the company interested in improving labor efficiency to analyze their individual plant situation and arrive at a program with obtainable goals.

The explanations by management reported in the surveys indicate that incentive plans not only can be a useful tool to help improve labor efficiency but have many benefits as an indirect result of the plan.

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APPENDIX A

FEED INDUSTRY PRODUCTIVITY AND INCENTIVE PLAN SURVEY

(Instruction Sheet)

There are three main sections to this survey: A) "General Information"; B) Labor and Labor Efficiency; and C) Incentive Plans.

We ask that the survey form be completed for a specific feed manufacturing plant. In multi-plant companies, we would appreciate receiving data for more than one location, particularly if incentive plans, etc. should vary from plant-to-plant; but we ask that a separate survey form be completed for each individual plant reported.

A. The "general information" section of the survey form is needed to classify operations by size, product mix, etc. This will help us avoid meaningless "averages" and pinpoint labor efficiency and other factors that, ultimately, affect manufacturing costs.

B. The "labor and labor efficiency" section will help us to identify present and past labor efficiencies and trends, if they exist. If you do not have all of the data requested, please provide what you can.

C. The "incentive plans" section is a key section and is more narrative than statistical; thus the respondent is urged to elaborate on answers to the listed questions and to provide any insight, opinions, or comments that seem appropriate. Incentive plans, like beauty, are in the eyes of the beholder; so if you think that something that you have done provides an inventive to employees; i.e. bonuses, Christmas turkeys, parking spots with employees names on them, anything - it is an incentive plan and should be articulated. If your company does not have an incentive plan, per se, don't be embarrassed, just say so - you will, probably, be in the majority.

FEED INDUSTRY PRODUCTIVITY AND INCENTIVE PLAN SURVEY

Department of Grain Science & Industry
Kansas State University

A. GENERAL INFORMATION

(NOTE: If more than one plant is reported, please use a separate survey form for each.)

1. This report covers (check one):

   a. A single plant operation ( )
   b. One plant of a multi-plant operation ( )

2. This plant is located in ______________________ (name of state).

3. This report covers calendar or fiscal year 1982. (Underline which)

   a. If fiscal year, when does it end? ______________________

4. Total manufactured tonnage of this plant for 1982 was ____________ tons.

5. The approximate product mix for 1982 was:

   a. Class of Feed

Class of Feed	% of Total Tonnage
Broiler (include starter, breeder, etc.) . .	____________ %
Layer (include starter, breeder, etc.) . . .	____________ %
Turkey (include starter, breeder, etc.) . .	____________ %
Swine	____________ %
Dairy	____________ %
Beef/sheep	____________ %
Horse	____________ %
Mineral	____________ %
Other (specify) ________________ . . .	____________ %
Other (specify) ________________ . . .	____________ %
TOTAL	____________ %

   b. Type of Feed

Type of Feed	% of Total Tonnage
Complete	____________ %
Supplement/concentrate	____________ %
Basemix/super concentrate	____________ %
Premix	____________ %
Other (specify) ________________ . . .	____________ %
Other (specify) ________________ . . .	____________ %
TOTAL	____________ %

c. Form of Feed — % of Total Tonnage

Form of Feed	% of Total Tonnage
Mash	________ %
Pellets/ crumbles	________ %
Cubes	________ %
Textured feeds	________ %
Blocks	________ %
Liquid	________ %
Other (specify) ____________ . . .	________ %
Other (specify) ____________ . . .	________ %
TOTAL	________ %

d. Unit — % of Total Tonnage

Unit	% of Total Tonnage
Bulk	________ %
Bags 25 lbs.	________ %
Bags 50 lbs.	________ %
Bags 80 lbs.	________ %
Bags 100 lbs.	________ %
Other (specify) ____________ . . .	________ %
TOTAL	________ %

Comment regarding product mix: ______________________

____

____

____

____

6. Please estimate your average run size ____________ tons.

   a. Approximately how many product changes do you experience per eight hour shift? ____________

7. The estimated one eight hour shift (5 days per week) annual production capacity of this plant is ____________ tons.

8. Normally, for the report plant, the work schedule is ________ hours per shift, ________ shifts per day, ________ days per week.

9. In addition to manufactured feed tonnage, approximately ________ tons per year of non-manufactured (jobbed) items are handled through this plant (this would include pet foods, milk replacers, blocks, etc., etc.)

   a. Are these tons included in your calculation of labor efficiency (man-hours per ton)? (check one) Yes ( ) No ( )

   b. Are the manhours required to handle this tonnage included in your calculation of labor efficiency? (check one) Yes ( ) No ( )

B. LABOR AND LABOR EFFICIENCY

1. Are labor efficiency records maintained for this plant? Yes ( ) No ( )
(check one)

2. If yes, please complete the following for your most recent accounting year (fiscal or calendar 1982); If no, please complete the # personnel column.

a. Employees charged to production:

Classification	# Personnel	Hours Charged	Manhours/Ton
Managers	________	________	________
Clerical	________	________	________
Mill Workers	________	________	________
Maintenance	________	________	________
Other ________	________	________	________
Other ________	________	________	________
Other ________	________	________	________
TOTAL	________	________	________

NOTE: If labor efficiency records are not maintained by classification, just show the totals and indicate with an * the classifications that are included in the calculation of manhours per ton for manufacturing and trucking.

b. Employees charged to trucking:

Classification	# Personnel	Hours Charged	Manhours/Ton
Managers	________	________	________
Clerical	________	________	________
Truck Drivers	________	________	________
Truck Maintenance	________	________	________
Other ________	________	________	________
Other ________	________	________	________
Other ________	________	________	________
TOTAL	________	________	________

NOTE: If labor efficiency records are not maintained by classification, just show the totals and indicate with an * the classifications that are included in the calculation of manhours per ton for manufacturing and trucking.

3. Are all hours paid, including vacations, holidays, jury pay, etc., included in the total hours used in your calculation of manhours per ton? (check one)
Yes ( ) No ( )

a. Please estimate the total number of manhours paid for vacations, holidays, jury pay, etc. (exclude long term disability) during 1982 that were not worked. ____________ manhours.

4. If records are available for past years, please indicate the total manhours per ton by year.

Manhours Per Ton

Year	Production	Trucking	Year	Production	Trucking
1960	______	______	1975	______	______
1965	______	______	1980	______	______
1970	______	______	1981	______	______

5. Are overtime records maintained for this plant? (check one) Yes ( ) No ( )

6. If yes, please indicate the overtime percentage experienced during the last accounting year.

Production ____________ % Trucking ____________ %

NOTE: Overtime hours worked divided by total hours paid (including O.T.) equals overtime %.

C. INCENTIVE PLANS

The primary purpose of this study is to determine the types of employee incentive plans that are currently employed in the feed industry and the apparant results of these plans as evidenced by improvement or lack of improvement in labor efficiency or worker productivity. Incentive plans take many forms, some of which are: suggestion plans, profit sharing, pay for productivity, mileage or tonnage pay for truck drivers, bonuses based on productivity or profitability, etc., etc. Your completion of this portion of the survey will provide information that will be of value to the feed industry.

A. Incentive Plans for Plant (Production) Employees

1. Please list the incentive plans now in place at this plant for mill workers.

	Plan	Date Started
a.	______________________	__________
b.	______________________	__________
c.	______________________	__________
d.	______________________	__________

Please explain, briefly, how these plans are structured and your opinions of their effectiveness:

Plan (a) ______________________________________

____

____

Plan (b) ____

____

____

Plan (c) ____

____

____

Plan (d) ____

____

____

B. Incentive Plans for Truck Drivers

	Plan	Date Started
a.	______________________	__________
b.	______________________	__________
c.	______________________	__________
d.	______________________	__________

Please explain, briefly, how these plans are structured and your opinions of their effectiveness:

Plan (a) ____

____

____

Plan (b) ____

____

____

Plan (c) ____

____

____

Plan (d) ____

____

____

2. Do you plan to discontinue any of these plans? (check one) Yes ( ) No ( )

   a. If yes, please explain: ____________________

   ____

   ____

   ____

3. Have you tried incentive plans in the past that have since been discontinued?

   (check one) Yes ( ) No ( )

   a. If yes, please describe the plan(s) & explain why they were discontinued.

   ____

   ____

   ____

4. Are you considering, at this time, installing an incentive plan at this location?

   (check one) Yes ( ) No ( )

   a. If yes, please explain: ____________________

   ____

   ____

5. Can you positively identify changes in mill worker or truck driver labor efficiency as a result of any of the plans now offered to employees?

   (check one) Yes ( ) No ( )

   a. If yes, please explain in as much detail as possible: ____________________

   ____

   ____

   ____

   ____

   ____

   ____

   ____

   ____

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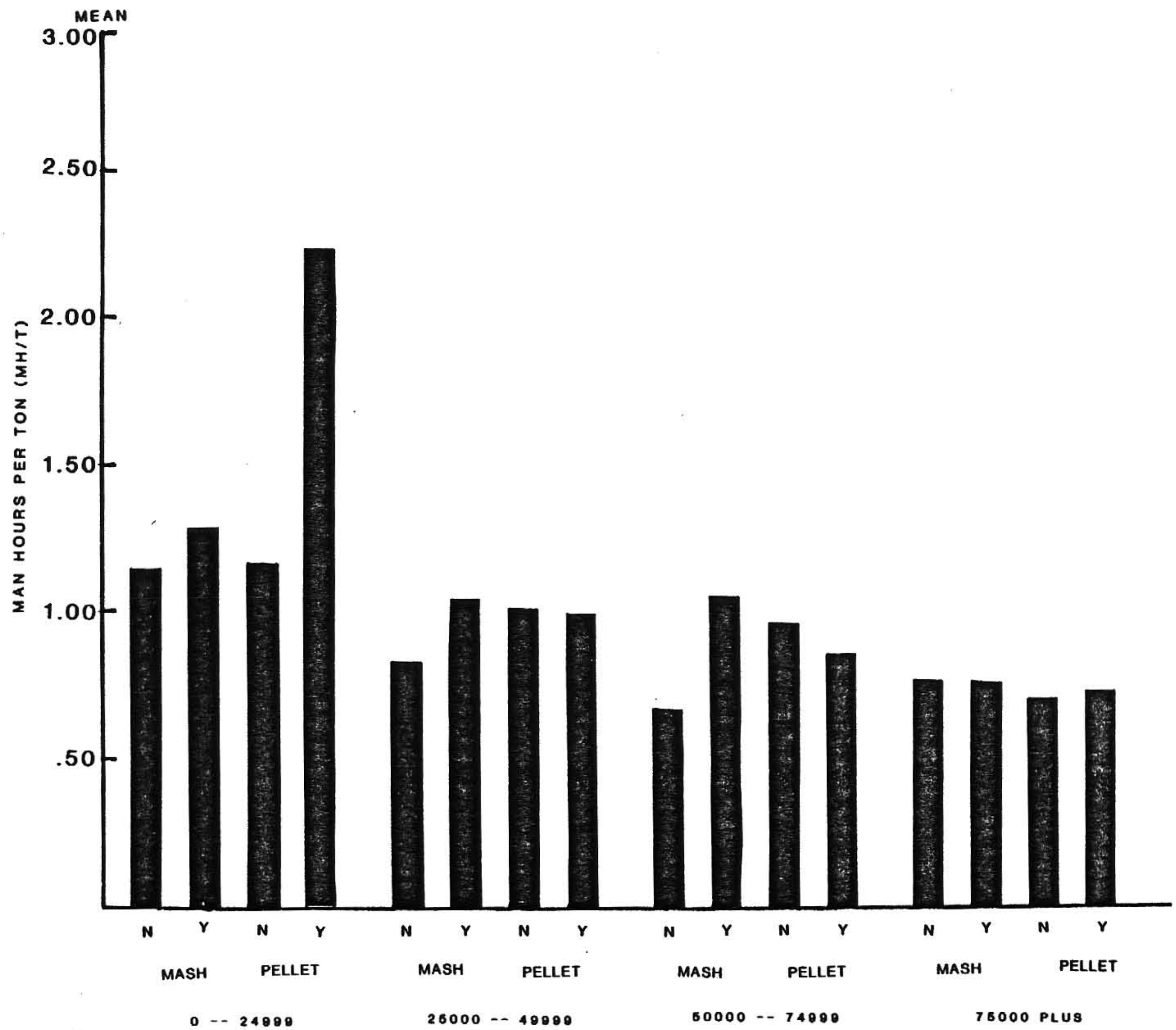

FIG.2 AVERAGE LABOR EFFICIENCY BY MANUFACTURED VOLUME AND FORMFOR 1982

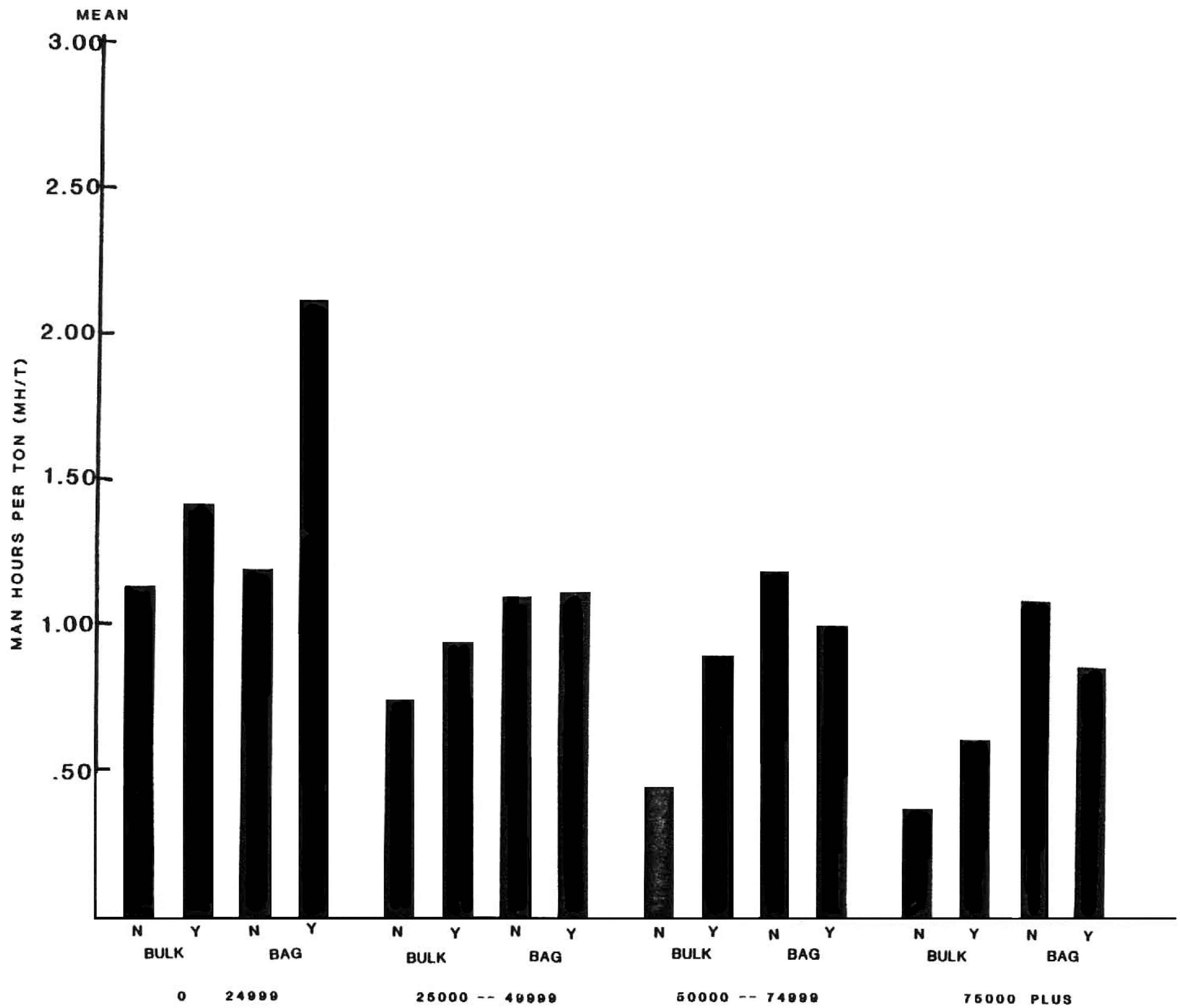

FIG.3 AVERAGE LABOR EFFICIENCY BY MANUFACTURED VOLUME AND PACKAGE FOR 1982

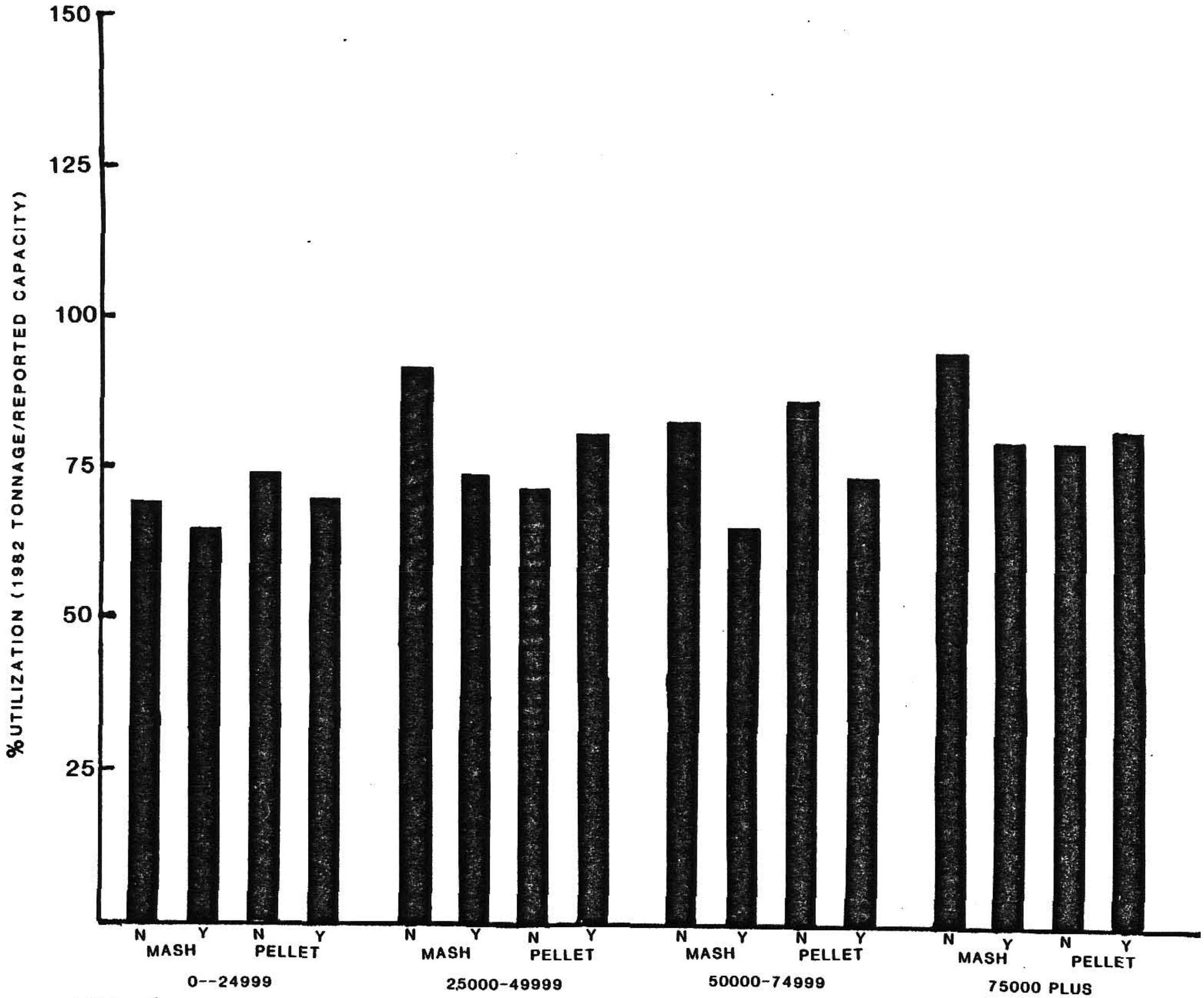

FIG. 4 AVERAGE UTILIZATION BY MANUFACTURED VOLUME AND FORM FOR 1982

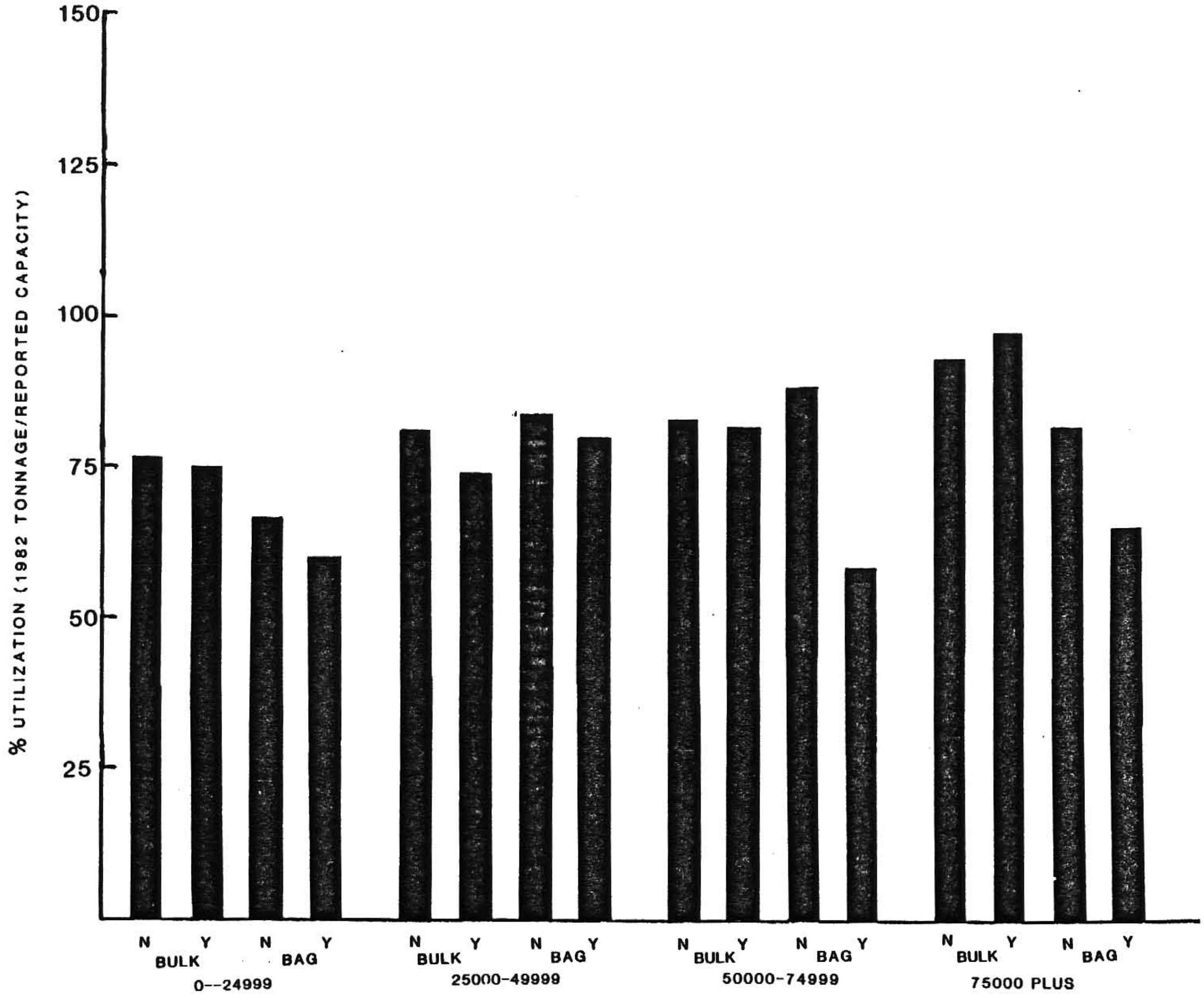

FIG.5 AVERAGE UTILIZATION BY MANUFACTURED VOLUME AND PACKAGE FOR 1982

LABOR PRODUCTIVITY AND EMPLOYEE INCENTIVE PROGRAMS FOR COMMERICAL PLANTS

IN THE FEED INDUSTRY

by

RICHARD VALIANT KANTOR

B. S., UNIVERSITY OF MISSOURI, 1981

AN ABSTRACT OF A MASTER'S THESIS

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MASTER OF SCIENCE

Department of Grain Science

KANSAS STATE UNIVERSITY
Manhattan, Kansas

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ABSTRACT

In December of 1982 a survey entitled "Feed Industry Production and Incentive Plan Survey" was sent to 204 companies involving single and multiplant operations throughout the United States. The data collected was used to analyze the labor efficiency and utilization of plants which had an incentive plan against plants that did not have an incentive plan.

A regression analysis indicates an improvement in labor efficiency for 21 plants reporting efficiency for 1975, 1980, 1981 and 1982.

Labor efficiency and plant utilization increased from Volume 1 through Volume 4.

Labor efficiency decreased beginning with feed plants that manufactured one class of feed up to feed plants that manufactured seven classes of feeds.

Commercial plants tested by volume and feed form indicated that mash plants with no incentive plan in the volume ranges of 0 - 24999, 25000 - 49999 and 50000 - 74999 tons per year had a higher mean labor efficiency. In the range of 75000 - plus tons per year, mash plants with no incentive plan had the same mean labor efficiency as mash plants that had an incentive plan.

Mean plant utilization was higher in the mash plants with no incentive plan in all volume ranges.

Pelleted plants with no incentive plan had a higher mean labor efficiency in the volume ranges 0 - 24999 and 75000 - plus tons per year. Pelleted plants with an incentive plan had a higher mean labor efficiency in the volume ranges 24000 - 49999 and 50000 - 74999 tons per year.

Mean plant utilization for pelleted plants with no incentive plan was higher in the volume ranges 0 - 24999 and 50000 - 74999 tons per year. In the volume ranges 25000 - 49999 and 7500 - plus tons per year, pelleted

plants with an incentive plan had a higher mean utilization.

Commercial feed plants tested by volume and product package indicated that bulk plants with no incentive plan had a higher mean labor efficiency in all volume ranges than did bulk plants that had an incentive plan.

Mean plant utilization for bulk plants with no incentive plan were higher in all but the 75000 tons per volume range.

Mean labor efficiency of bagged plants with no incentive plan was higher in the volume ranges 0 - 24999 and 25000 - 49999 tons per year. Bagged plants with an incentive plan had a higher mean labor efficiency in the volume ranges 50000 - 74999 and 75000 - plus tons per year.

Mean plant utilization of bagged plants with no incentive plan was higher in all volume ranges.

In most of the observed data for both Form and Package variables, it appears that there was a positive correlation between labor efficiency and plant utilization.

Thirty-seven of the 40 plants that had a plan, reported that there were positive improvements in labor efficiency as a result of incentive plans installed in their plants.