Final Report
Cooperative Agreement for the Demonstration of an Ergonomic Intervention in the Red Meat-Packing Industry at Farmland Foods, Inc., Denison, Iowa

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16. Abstract (Limit: 200 words) A job redesign effort was undertaken at Farmland Foods, Inc., Denison, Iowa, a major meat packing facility. Management/labor teams were formed with members from every department in the firm. These teams were trained in team building and ergonomic principles. One of the functions of the teams was to prioritize jobs for ergonomic redesign. The teams also developed and implemented solutions. Significant reductions were noted in the incidence and severity of cumulative trauma disorders (CTDs), lost production days, restricted duty days, and personnel turnover. Team analysis of CTD related outcomes, survey data, and team performance data revealed that a majority of the teams functioned well. Internal work processes within the groups which did not function as well needed improvement, specifically in resolving conflicts based on differing viewpoints. Overall employee responses indicated that the workers were feeling less pain in their bodies overall and that the pain they were feeling was less severe. Recommendations were presented for the development and implementation of large scale ergonomics interventions.

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ABSTRACT

An ergonomic-focused, job redesign effort in a major meat-packing plant is described. Joint management-labor teams composed of representatives from each department of the plant were formed and trained in team building and ergonomic principles. These teams prioritized jobs for ergonomic redesign and developed and implemented solutions. Sources of data for evaluating the effectiveness of this program included: an attitude survey, a physical symptom survey, OSHA 200 logs for Cumulative Trauma Disorders (CTDs), plant turnover and absenteeism data, observations, videotapes, and employee interviews about their jobs, tools, and pain experienced at work.

The participatory ergonomics project at the plant was associated with significant reductions in: the incidence and severity of CTDs, lost production days, restricted duty days, and plant turnover. Team analyses of CTD-related outcomes, survey data, and team performance data revealed that a majority of the teams functioned well. Those that performed less than optimally needed to work on the internal work processes within their groups and resolve conflicts based on differing viewpoints. Employee responses to the attitude survey revealed that employees are feeling less pain in their bodies overall and that this pain is less severe. In particular, those employees who had their jobs changed during the ergonomic program had less severe pain, as well as lower intentions to turnover, and more positive attitudes about the ergonomics program.

Recommendations for the development and implementation of large-scale ergonomics interventions are made based on these findings and the observations of the University team

assigned to the project. These recommendations include: reconfiguration of the teams to not include top plant management; greater involvement of maintenance personnel; smaller teams with members who develop more ergonomics expertise; continual ergonomics training of team members; more involvement of plant employees; team accountability to plant employees; enhanced team autonomy; training on internal team work processes; attention to ergonomic project documentation; release time and overtime for team members; more systematic job analysis; establishing preventive ergonomic measures in the future; employment of a full-time ergonomist; and the development of a management information system.

INTRODUCTION

Statement of Problem

This cooperative research demonstration project was conducted to research and document the organization, training and operation of an ergonomics program in a red meat-packing plant based on an employee involvement team concept. In addition, the project was designed to support and assist employee ergonomics teams in finding and evaluating feasible solutions to specific red meat-packing ergonomics-related problems, as well as, to provide an ergonomic improvement demonstration case study that could be used as a model by other groups in the red meat-packing industry.

Scope and Objectives

The purpose of the cooperative agreement between the Centers for Disease Control, the University of Nebraska-Lincoln, and Farmland Foods, Inc., was to create functional ergonomics teams that could develop, document, and validate ergonomic activities that result in the reduction of cumulative trauma disorders and other related injuries and illnesses in the red meat-packing industry. The various activities consisted of ergonomic job analysis, engineering controls, administrative controls, education and training, employee involvement, and gaining management and employee commitment.

The overall goal of the project was to develop an ergonomics program that would have long-term implications and, at the same time, address specific current ergonomic-related problems in a dynamic production environment.

The research demonstration project was designed for one year consisting of four phases of activity: program development and ergonomics training (Phase I), job selection, evaluation and solution implementation (Phase II), follow-up and evaluation (Phase III), and final reporting (Phase IV).

The project consisted of 11 task objectives or goals:

1. Obtain management program commitment
2. Assess current ergonomics activities
3. Establish, train, and interact with ergonomics teams
4. Assist in documenting, selecting, and evaluating jobs
5. Help devise, assess, and implement ergonomics solutions
6. Help evaluate the effectiveness of ergonomics solutions
7. Evaluate OSHA 200 log incidence and severity data
8. Survey and evaluate worker attitudes and perceptions related to the ergonomics program
9. Survey and evaluate worker perceptions of pain and discomfort related to job design
10. Survey and evaluate ergonomics team effectiveness
11. Draft and present a final project report

Methods

A number of methods were utilized in conducting this research and providing technical assistance where appropriate. A more detailed description of the method used for each type

of project activity is provided in the "Results" section of this report. These methods include:

1. Classroom training/education of employees
2. Voluntary employee questionnaires
3. Direct observations
4. Team building processes
5. Data collection/review and analysis
6. Ergonomic job analysis and job improvement

BACKGROUND

Ergonomics Fundamentals

Ergonomics Program Concepts and Goals

The term "ergonomics" literally means the study of work. In the sense of modern industrial ergonomics the term "ergonomics" deals with workers and workplaces and the application of scientific knowledge and methods in making job improvement changes to achieve specific work safety and productivity goals (Putz-Anderson, 1988).

The modern practice of ergonomics requires an interdisciplinary approach and effort. Traditional areas of ergonomics involvement are physical ergonomics, information processing, work space and work methods design, product design, and job performance.

Ergonomic techniques require the application of specialized knowledge and experience in such areas as job analysis, engineering design, human factors, process engineering, occupational health, medicine, medical management, industrial hygiene and safety,

management information systems, organizational behavior, leadership and management, training and communications, research and development, employee involvement, and quality control.

In using the ergonomics approach, the various technical and managerial disciplines and methods are brought to bear on a single problem. That problem is the reduction or elimination of workplace stressors directly or indirectly related to the following goals:

1. Reduction of injury and illness, cumulative trauma, physical strain, and stress
2. Reduction of lost time injuries, illnesses, and accidents
3. Reduction of medical costs
4. Reduction of absenteeism and turn-over
5. Decreased probability of accidents and errors
6. Improved quality and productivity
7. Improved employee attitudes

The costs of ignoring ergonomics improvement in the workplace are significant. For example, one American meat-packer was fined $4.33 million in 1988 by OSHA for a series of workplace injuries, cumulative trauma disorders (CTDs). In terms of operating cost burden, a single case of carpal tunnel syndrome (CTS) can run as high as $100,000; a cost of $40,000 per case is not unusual (Pulat & Alexander, 1991). In many cases, ergonomics improvements can reduce the cost of workers' compensation. In 1985, workers' compensation cost for all U.S. industry exceeded $22 billion or a 14% increase since 1984. Research identifying the 10 leading work-related diseases and injuries in the U.S. revealed

that 5 were related to ergonomics (Alexander, 1986). Some research indicates that body strain, eyestrain, and hand-wrist problems can reduce productivity by as much as 15%-30% due to poor ergonomic design of workstations and processes (Pulat & Alexander, 1991).

Not that many years ago ergonomic improvement was thought of as something "nice" to do. Today it is increasingly viewed by industrial leadership as something necessary to do. A good industrial ergonomics program is cost effective and beneficial for both management and workers because it can make a significant and tangible contribution to employee safety and health. In many cases, ergonomic job improvements can provide greater efficiency and quality for the same dollar spent (Pulat & Alexander, 1991).

Ergonomic Job Analysis

Job analysis is best used to identify sources of stress before they result in an injury or illness in the workplace. Job analysis can also be used to evaluate improvements in workstation, work method or tool design. There are several common ways to perform a job analysis: work methods and stressor analysis and ergonomics checklists. The former technique is favored and used by the authors. A work methods and stressor job analysis consists of the following main components or steps:

1. OSHA 200 log review and analysis
2. Job/task description (observation, measurements, worker input)
3. Stressor identification, qualification, and quantification
4. Problem Identification
5. Engineering analysis of stressors and injury or illness risks
6. Recommendations for job improvement

Job Improvement

Job improvement is the result of effective ergonomic change. Job improvement is monitored, measured and evaluated on a continuous basis until a satisfactory result can be confirmed. Sometimes re-evaluation of the problem and the solutions is required in order to make modifications which will produce the desired results. Job improvements can take the form of several kinds of positive change in an organization:

1. Engineering changes and controls related to tools, workstation, products, processes, materials, and work environment.
2. Administrative changes and controls related to job rotation, personnel selection, medical management, education and training.
3. Management changes and controls related to work organization, performance and reward system, productivity and quality monitoring, injury and illness risk assessment, motivation, attitude change, human values, team-building, cooperation, and employee involvement.

Management Information System

A high value ergonomics program requires a well-designed management information system to ensure program success. The principle uses of such a system are monitoring, measuring, comparing, and decision-making related to injury and illness risk reduction, cost-effectiveness, and various productivity and performance measures. A management information system used to maintain an effective ergonomics program should include the following basic elements:

1. Accurate and inclusive job names and descriptions.
2. Up-to-date personnel job assignments.
3. Appropriate computer hardware and software.
4. A consensus of definitions related to productivity, quality, "light" and "restricted duty" job descriptions and their relationship to certain types of injury and illness.
5. A decision-making process related to management information and ergonomic risk and improvement.
6. Information disseminated in a useable form, in a timely manner, and to the appropriate personnel.
7. Dollar equivalents and measures for all tracking dimensions wherever possible and appropriate.

Farmland Foods Plant - Denison, Iowa

The Farmland Foods plant in Denison, Iowa is a pork slaughter and processing facility which has operated in the area since June 28, 1958. The present physical plant consists of 308,000 square feet of office and production space. The plant slaughters 7,500 to 7800 hogs per day (about 980 hogs per hour on a single shift) and employs 1,200 people of which 914 are production workers. The town of Denison (population 6,800; 1986 census) is located in Crawford County (population 18,935; 1986 census) in western Iowa. About 35% of the worker population live in Denison and 65% live in the surrounding area up to a 50 mile radius.

Plant processing capability includes full edible and inedible rendering operations. Storage capacity for frozen product is 2.15 million lbs. and 12.8 million lbs. for refrigerated items. Processed product capability is 1,000,000 lbs./week of bacon and 1,000,000 lbs. of smoked meats/week. Fabrication capability is 900,000 lbs./week consisting of 2 shifts of ham boning and 1 shift of picnic boning. The production line process is divided into 8 basic areas: kill, rendering, cut, loading, process, boning, specialty meats, and case ready. All areas operate on first shift. Second shift generally includes all areas of production except the kill and cut floor. Third shift is used for clean-up and certain maintenance activities.

Production requirements vary seasonally with the heaviest demands consonant with the Thanksgiving/Christmas and Easter holiday seasons. The typical workload during a heavy production period is 10 hours/day and 6-7 days per week for 3-5 months running. Production workers are represented by the United Food and Commercial Workers Union (UFCW) Local #271 under contract with Farmland Foods, Inc. The current 3-year work contract was approved and signed in September of 1993. The typical production employee or first line supervisor is about 38 years old and has been with the company for approximately 10 years.

The Denison plant has just completed major facilities and management systems improvements over the last 3 years totalling more than $17 million. Improvements include a new $1.2 million livestock warehouse, cutting department refrigeration and workstation upgrades and, a new Business Planning and Control System (BPCS).

In mid summer of 1993, the Denison plant sustained $5 million in damage due to flooding. Losses to the physical plant included destruction of the rendering facility and, damage to the maintenance shops, engine rooms, and ammonia compressor area. Of the 3000

hogs in the yard during flooding, only 160 were lost. Most animals were saved by employees moving them from the yard into the kill floor area in 3 feet of water with flashlights and no electricity. Employee sandbagging efforts were instrumental in avoiding water levels of 12 feet inside the building and helped save the laboratory, government offices, quality control, cafeteria, employee locker rooms and, the research and development area. Remarkably, only 3 full production days were lost. However, the ergonomics demonstration project was impacted by 6-8 weeks due to the flood and full ergonomics program operation was not back on track until later.

Farmland Foods-Denison Ergonomics Program

The Farmland Foods-Denison Plant Ergonomics Program began on a conceptual basis in November 1991 with the assistance of Dr. Michael W. Riley and Dr. David J. Cochran of UNL. However, a formal ergonomics policy statement and management program was not written and approved until January 1993.

In January 1992, an ergonomics committee consisting of 40 employees was formed and an informal training session on ergonomics fundamentals and OSHA was conducted by Dr. David Cochran at the Denison facility. The following month Dr. Cochran toured the plant, video-taped several jobs and reviewed injury and illness data. In March and May 1992, Dr. Cochran conducted 12 hours of ergonomics training for the ergonomics committee at the plant.

In June of 1992, the ergonomics committee was reformed into 5 ergonomics task groups. Ergonomics and safety training of these groups continued under Mr. Ron Gillespie,

Corporate Director of Safety and Industrial Relations (Farmland Foods, Inc.), Mr. David Ozolins, an ergonomics consultant from Environmental & Safety Services, Inc. (ESSI), and Ms. Mary Daniel, R.N., Employee Safety and Health Manager (Farmland Foods-Denison).

By July 1992, the ergonomics task groups had begun to work on job improvement projects and to document progress. In August 1992, Farmland management and UFCW Local #271 agreed to support and work with UNL on an ergonomics demonstration project. UNL submitted a proposal to CDC/NIOSH for this project and it was approved in December 1992. At that time, Ms. Regina Neese of ESSI and Mr. Ron Gillespie drafted and reviewed with Farmland management and labor the first formal "Farmland Foods Ergonomic Program Management Guidelines" (see Appendix A). The guideline was approved by Farmland management and UFCW Local #271 leadership in January 1993. UNL began the cooperative ergonomics demonstration project in January 1993.

The "Farmland Foods Ergonomic Program Management Guidelines" provide the management and labor support statement, objectives, scope, goals, responsibilities, program time line, ergonomics committee organization, medical management program, and employment involvement guidelines for the accomplishment of ergonomic improvement at the Denison, Iowa facility. Management and labor commitment to the ergonomics program was expressed in the following summary statement taken from the Guidelines:

> "It is the policy of Farmland Foods, Inc. to maintain and preserve a safe and healthy working environment. To further these efforts the Ergonomics Committee was created and trained. Farmland management endorses and fully supports the efforts of the Ergonomics Committee to identify and eliminate ergonomic hazards that may

cause unnecessary physical stress and potentially cause injury or illness to any employee.

All managers, supervisors, employees and support staff will work together to identify, review, revise and/or establish safe, ergonomic work methods, procedures, equipment and work stations. This effort shares priority with cost reduction, productivity and quality assurance efforts and will enhance many of the existing continuous improvement efforts. Full cooperation is expected in these efforts.

UFCW Union Local #271 representing workers at Farmland Foods, Denison, Iowa, supports Company efforts to establish and maintain an Ergonomics Program. Local #271 will cooperate by employee involvement on the Ergonomics Committee and Task Groups, and support Program Elements to conduct worksite analysis, work hazard prevention and control, medical management, training and education, and assist with the documentation and monitoring of results. In order for this program to be successful, it will take total commitment from both management and labor."

Farmland Foods Teams and Employee Involvement

A number of researchers in the ergonomics area have recently advocated using employee involvement to make ergonomic changes, or "participatory ergonomics" (Wilson, 1991; Noro & Imada, 1991). The "Farmland Foods Ergonomic Program Management Guidelines" states their commitment to the "team approach" in addressing opportunities for ergonomic improvements. Anecdotal evidence from Honda and Federal Express suggests that ergonomics programs based on team-based employee involvement may have positive

outcomes (Labar, 1992). Commitment to such an approach by Farmland has been demonstrated in the following categories of activities necessary for a good ergonomics program based on employee involvement:

1. Personal concern for employee safety and health
2. Policy statements that emphasize safety and health
3. Job Analysis
4. Medical Management
5. Training and Education

Team Formation and Team Member Selection

As noted above, five department-based ergonomic task forces of 7-9 individuals were established at Farmland. These teams were composed of employees, management, medical staff, and maintenance representatives. Ultimately, the goal of the program is to have these teams consist entirely of employees, maximizing employee involvement in the program. Employees were selected from those who expressed interest in participating in the program and those who had experience in a number of different jobs within the designated area. The role of management and the medical staff in the start-up phase was to facilitate access to information needed for job and CTD analyses and to readily obtain financial resources needed to make ergonomic changes. Maintenance representatives were involved because they were the personnel that would actually implement the changes. Teams reported directly back to their departments and the plant manager. Teams had autonomy to implement low cost solutions, but needed to document and justify substantial changes to upper management. Such justification usually involved an analysis of the CTDs involved in the affected jobs, number of employees affected, and a cost/benefit analysis of the proposed ergonomic change.

Team Training

Team Building Training. Following team formation, the ergonomic task force members participated in team building sessions designed to enhance their abilities to work together. The approach is consistent with suggestions by researchers in this area (Regensburg and Van der Veen, 1990). These training sessions were conducted by an ergonomist associated with the corporate human resources group of the company. University faculty involved in the project assisted in the training. The team building activities included: (a) defining a team; (b) determining the goals of an ergonomics team; (c) establishing group meeting rules and team roles; (d) reviewing guidelines for effective group discussion and constructive feedback; and (e) practicing brainstorming exercises and techniques for consensus building. Thus, the team-oriented skills focused both on how to develop task-oriented skills and interpersonal processes within the group. Such an approach is consistent with those advocated by experts in the teams area (Dyer, 1987; Parker, 1991). (See Appendix B for copies of the team-building handouts).

Team Ergonomics Training. The ergonomics training for the teams given by the corporate ergonomics specialist included the following topics: (a) review of the causes of CTDs (e.g., posture, force, repetition, and the general work environment); and (b) methods to identify and prioritize jobs for ergonomic solutions (e.g., the use of videotape and job analysis techniques). These techniques used a rating system to determine the extent of hand, wrist, arm, and shoulder movement, as well as the position of the back and neck during work. Practice in job analysis was included. General ergonomics training was later offered to all plant employees.

Team Dynamics (Problem Identification, Decision-Making, and Plant Communication)

The ergonomics teams met formally at least twice every month to develop and review their recommendations for job redesign. Team members also met informally throughout each month in order to discuss ergonomics issues. Medical staff supplied the teams with information about the frequencies of CTDs for particular jobs. In addition, self-reported physical pain symptoms and primary tool usage data was summarized and presented to the teams by University faculty in order to facilitate the processes of problem identification. This information plus their own observations and experience in the jobs were used by teams to establish priorities and to suggest ergonomic changes. Teams frequently asked for input from employees to aid in the early detection of CTD symptoms and potential problem jobs. Some of the teams found it very helpful to review their entire departmental area by videotaping all of the jobs and discussing the jobs with the employees who performed the jobs. The corporate ergonomics specialist encouraged teams to start with ergonomic changes that could be easily accomplished. Early success built team members' efficacy in their roles as change agents and their credibility with non-team members.

Records of the ergonomic changes in the plant were maintained by each task force with the aid of the corporate ergonomics specialist and University personnel. Photographs and descriptions of changes were posted in the cafeteria area to inform plant employees. While teams have been the primary force for change, university faculty have assisted the teams in identifying engineering solutions. As stated above, plant maintenance personnel were largely responsible for the implementation of these ergonomic solutions.

ERGONOMIC JOB ANALYSIS AND IMPROVEMENT

Each of the 5 ergonomics teams were encouraged to review, describe, and document on videotape all jobs in their areas of responsibility as a first step in the program. Based on a job description and a review of the job requirements the most stressful jobs were to be identified for job analysis and ergonomic improvement in accordance with ergonomics team training. A summary of each team's activities is presented by the total number of jobs selected for ergonomic improvement action. One completed job from each of four teams was selected to illustrate more fully the job and the activity that took place in finding a solution for improvement. The information provided is taken directly from each team's ergonomics project documentation notebook.

Team #1-Boning and Special Meats

This team selected 14 jobs for ergonomic analysis and improvement. Of these jobs, 13 were completed and 1 was still in process at the end of the research project. A detailed list of all jobs for this team is included in Appendix C. One of the jobs completed has been selected and described below.

Detailed Ergonomics Intervention Example

A. Original Job/Analysis

1. Production Area: plant

2. Job Name: clean square metal tubs

3. Shift: 1 & 2

4. Number of Workers Assigned: 11

5. Job/Task Objective: high pressure wash metal tubs

6. Ergo Problem Identification Date: 10-92

7. Assigned Priority: immediate (high risk)

8. Job/Task Description:

Move metal tanks by mule to tub wash area to steam hose clean. Worker remains outside the tub with steam hose, then push tub to tilt position to drain water out of bottom drain hole. Worker is required to reach and twist to clean lower/bottom tub surfaces.
Tub weight is approximately 250-275lbs.

9. Physical Stressors:

a) high force (arms, shoulders, legs)
b) full extension of upper extremities
c) compression load on upper torso from tub edge

10. Cognitive/Psychological Stressors:

a) some workers cannot perform job due to physical abilities requirements
b) keeping up with line speed (work pace)

11. Estimated Number of Task Repetitions/Worker:

pulls, pushes, twists = 4,830/shift
= 24,150/week
= 1,255,800/year

12. Estimated Work Cycle Task Time: Not available.

13. OSHA 200 Log Incidence/Severity History:

1993 Severity of Cases

OSHA Recordable:	20
Physician Cases:	16
Restricted Work Cases:	4
Lost Day Cases:	5

1993 Number of Entries

CTD Cases:	4
Injury Cases:	16
Lost Work Days:	8
Restricted Days:	55

1992 Severity of Cases

OSHA Recordable:	16
Physician Cases:	14
Restricted Work Cases:	5
Lost Day Cases:	2

1992 Number of Entries

CTD Cases:	4
Injury Cases:	12
Lost Work Days:	5
Restricted Days:	44

14. OSHA 200 Log 1992+1993 Cost Impact:

Direct Workers' Comp Cost	= $8305.00
Direct Medical Cost	= unknown
Indirect Cost	= unknown

15. Expected Production/Safety Factors:

a) job bidding open to more workers
b) reduce job overload w/service operators
c) increased shelf life of products
d) improved sanitation controls (methods)
e) reduced risk of accident and injury
f) reduced process time to clean

B. Ergonomic Job Analysis

1. Summary of committee's observations and facts related to ergonomic job stress and problem identification:

a) Material handling of tubs for cleaning requires extremely high upper extremity and whole body force and awkward posture to move and balance tubs for cleaning. The danger exists that the tub can fall on the worker's legs or feet while cleaning.

2. Summary of possible solutions considered:

a) mechanical assist design criteria
b) one person does all the cleaning

3. Final solution estimate of stressor elimination or reduction:

a) elimination of all force required to push, pull, tip and position tubs during high pressure steam cleaning

4. Work Order Date: 4-93

5. Estimated Cost of Solution:

Material	= $ 9,600.00
Labor	= $ 4,758.00
Total	= $14,358.00

C. Modified Job Analysis and Solution Follow-up Evaluation

Analysis and evaluation in process.

Team #2-Cut

This team selected 17 jobs for ergonomic analysis and improvement. Of these jobs, 3 were completed and 14 were still in process at the end of the research project. A detailed list of all jobs for this team is included in Appendix C. One of the jobs completed has been selected and described below.

Detailed Ergonomics Intervention Example

A. Original Job Analysis

1. Production Area: cut department
2. Job Name: pack loin ends
3. Shift: 1
4. Number of Workers Assigned: 3
5. Job/Task Objective: pack loin end pieces in boxes
6. Ergo Problem Identification Date: 6-93
7. Assigned Priority: immediate (high risk)
8. Job/Task Description:

> Empty cartons are lined with plastic and carried to line. Loin end pieces or sirloin pieces (approx. 3 lbs. each) come off conveyor form the center cut saw. Pieces fall into a stainless steel tub which stands 42 inches off of floor surface. About 4,200 loin end cuts are processed per day. The workers use a metal hook to snag each piece individually, lift it out of the tub, then pack and arrange the loin ends in one carton, and sirloins in a different carton (15 pieces per carton). The carton are placed on a stand. Once each box is filled the worker labels the box, lifts the box, carries it to a scale, checks weight, lifts again and takes it to a conveyor where it then goes to the cooler.

9. Physical Stressors:

a) forward bending at the waist
b) extend legs and toes to reach work
c) static hand grip
d) flexion and extension of the shoulder
e) high pulling and lifting forces
f) lift and carry load
g) high repetition

10. Cognitive/Psychological Stressors:

a) none identified

11. Estimated Number of Task Repetitions/Worker:

pushes, pulls, twists	= 4,200/shift
	= 21,000/week
	= 1,092,000/year
boxes processed/worker	= 280/shift
	= 1,400/week
	= 72,800/year

12. Estimated Work Cycle Task Time: 160 sec/box

13. OSHA 200 Log Incidence/Severity History:

1993 Severity of Cases

OSHA Recordable:	0
Physician Cases:	0
Restricted Work Cases:	0
Lost Day Cases:	0

1993 Number of Entries

CTD Cases:	0
Injury Cases:	0
Lost Work Days:	0
Restricted Days:	0

1992 Severity of Cases

OSHA Recordable:	0
Physician Cases:	0
Restricted Work Cases:	0
Lost Day Cases:	0

1992 Number of Entries

CTD Cases:	0
Injury Cases:	0
Lost Work Days:	0
Restricted Days:	0

14. OSHA 200 Log 1992+1993 Cost Impact:

Direct Workers' Comp Cost	= $ 0.00
Direct Medical Cost	= $ 0.00
Indirect Cost	= $ 0.00

Potential back injury/surgery could be $50,000/case.

15. Expected Production/Safety Factors:

a) No significant factors identified.

B. Ergonomic Job Analysis

1. Summary of committee's observations and facts related to ergonomic job stress and problem identification:

If possible, the solutions would eliminate or decrease the following motions/actions: bending forward at the waist, hooking and lifting loins, manually carrying 30-45 lb. boxes.

2. Summary of possible solution considered:

a) install chute to bring empty boxes to the line
b) install roller table at end of line (lower than conveyor)
c) relocate conveyor scale to avoid box lifting

3. Final solution estimate of stressor elimination or reduction:

   a) install chute to bring empty boxes to the line
   b) install roller table at end of line
   c) relocate conveyor scale

4. Work Order/Date: #28981/6-93

5. Estimated Cost of Solution:

Material	= $ 7,400.00
Labor	= $ 4,618.00
Total	= $12,018.00

C. Modified Job Analysis

Modified job analysis and evaluation in process.

Team #3-Kill

This team selected 24 jobs for ergonomic analysis and improvement. Of these jobs, 21 were completed and 3 were still in process at the end of the research project. A detailed list of all jobs for this team is included in Appendix C. One of the jobs completed has been selected and described below.

Detailed Ergonomics Intervention Example

A. Original Job Analysis

1. Production Area: kill

2. Job Name: hog shackler

3. Shift: 1

4. Number of Workers Assigned: 1

5. Job/Task Objective: re-shackle hogs that have come loose or fallen from hanging conveyor (live/semi-live)

6. Ergo Problem Identification Date: 8-93

7. Assigned Priority: immediate (high risk)

8. Job/Task Description:

> Hogs are shackled after stunning on a table and are conveyed to the end of the table. At the end of the table the hogs fall to the floor causing the shackled leg to be picked up by the sticking conveyor chain. Hogs are lifted and conveyed to the next workstation which is the sticker who bleeds the animal. Some hogs (about 200/day) kick the shackle off before the chain lifts them to the sticker workstation. These hogs must be herded and picked up to replace the shackle.

9. Physical Stressors:

a) bending forward and backward (lower back)
b) neck forward posture fatigue
c) arm extension under load
d) high repetition
g) lifting

10. Cognitive/Psychological Stressors:

a) fear of getting hit or kicked by hogs
b) fear of getting behind (work pace)

11. Estimated Number of Task Repetitions/Worker:

pulls, pushes, twists = 1,500/shift
= 7,500/week
= 390,000/year

12. Estimated Work Cycle Task Time: 4.5 sec

13. OSHA 200 Log Incidence/Severity History:

1993 Severity of Cases

OSHA Recordable:	0
Physician Cases:	0
Restricted Work Cases:	0
Lost Day Cases:	0

1993 Number of Entries

CTD Cases:	0
Injury Cases:	0
Lost Work Days:	0
Restricted Days:	0

1992 Severity of Cases

OSHA Recordable:	1
Physician Cases:	0
Restricted Work Cases:	0
Lost Day Cases:	0

1992 Number of Entries

CTD Cases:	1
Injury Cases:	0
Lost Work Days:	0
Restricted Days:	0

14. OSHA 200 Log 1992+1993 Cost Impact:

Direct Workers' Comp Cost	= $ 0.00
Direct Medical Cost	= $ 0.00
Indirect Cost	= $ 0.00

Potential cost from a single face or back injury might be $10,000 to $50,000. Current job design requiring 200 hogs/day to be re-shackled requires a full-time equivalent employee at about $28,622/yr (includes benefits). Product (hog) loss (100 "blowouts"/day with stunning and subsequent trim loss) is estimated at $626,000 annual equivalent loss in product value.

15. Expected Production/Safety Factors:

a) reduced re-shackling
b) reduced "blowout" product
c) reduced risk of injury
d) reduced psychological stress

B. Ergonomic Job Analysis

1. Summary of committee's observations and facts related to ergonomic job stress and problem identification:

a) psychological stress (fear of being injured)
b) back injury potential
c) head and face injury potential
d) high repetition (needless work in re-shackling)

2. Summary of possible solution considered:

a) have stick chain rail raise the hog before it reaches the end of the table and touches the floor
b) add staff to help with overload of re-shackling work

3. Final solution estimate of stressor elimination or reduction:

   a) shortening of the shackle chain will reduce the need to handle and lift hogs; reduction of injury fear

4. Work Order Date: 9-93

5. Estimated Cost of Solution:

Material	= $1,200.00
Labor	= $1,617.37
Total	= $2,817.37

C. Modified Job Description/Analysis

Modified job analysis and evaluation of ergonomic change still in process. Initial review estimated that there has been a 70% reduction in injury risk (as perceived by workers), a 70% reduction in product value loss, and reduced the worker need by 1 person for this work area. Direct annual cost saving due to this improvement is estimated at $436,000.

Team #4-Night Shift

This team selected 21 jobs for ergonomic analysis and improvement. Of these jobs, 15 were completed and 6 were still in process at the end of the research project. A detailed list of all jobs for this team is included in Appendix C. One of the jobs completed has been selected and described below.

Detailed Ergonomics Intervention Example

A. Original Job Analysis

1. Production Area: night boning

2. Job Name: lean shank trimmer

3. Shift: 2

4. Number of Workers Assigned: 3-4

5. Job/Task Objective: line balancing for trimmers

6. Ergo Problem Identification Date: 9-93

7. Assigned Priority: urgent (extreme risk)

8. Job/Task Description:

> Position ham-separate shank meat from shank bone. Remove and trim 95% lean shank from ham-place in tub. When tub is full, twist and turn and dump small tub into large tub-steel knife-repeat workload 96%.

9. Physical Stressors:

a) awkward wrist postures under twisting load
b) "winging" elbows
c) shoulder abduction
d) bending forward at the waist
e) high grip forces
f) cold

10. Cognitive/Psychological Stressors:

a) workload pace is 96%
b) knives not sharp enough, long enough for job

11. Estimated Number of Task Repetitions/Worker:

pushes, pulls, twists = 12,040/shift
= 60,200/week
= 3,130,400/year

12. Estimated Work Cycle Task Time:

16.2 sec work cycle
0.5 sec rest cycle
16.7 sec total cycle

13. OSHA 200 Log Incidence/Severity History:

1993 Severity of Cases

OSHA Recordable:	1
Physician Cases:	0
Restricted Work Cases:	0
Lost Day Cases:	0

1993 Number of Entries

CTD Cases:	1
Injury Cases:	1
Lost Work Days:	0
Restricted Days:	0

1992 Severity of Cases

OSHA Recordable:	0
Physician Cases:	4 (1 was back)
Restricted Work Cases:	2
Lost Day Cases:	2

1992 Number of Entries

CTD Cases:	2
Injury Cases:	1
Lost Work Days:	4
Restricted Days:	7

14. OSHA 200 Log 1992+1993 Cost Impact:

Direct Workers' Comp Cost	= $421.30
Direct Medical Cost	= $1,113.00
Indirect Cost	= $not available

Total Direct Cost (WC+medical) = $1,534.30

15. Expected Production/Safety Factors:

a) Reduction of work cycle load from 96% to 79% (boner) while increasing workload of trimmer from 80 to 88%.

B. Ergonomic Job Analysis

1. Summary of committee's observations and facts related to ergonomic job stress and problem identification:

a) shank boner work cycle load is 96%
b) trimmer work cycle load is 80%
c) shank boner physical stressors are present
d) work load cycle balancing is needed

2. Summary of possible solution considered:

a) IE job work analysis showed that inside knuckle trimmers could remove and trim lean shank to reduce shank boner workload and raise workload of trimmers.

3. Final solution estimate of stressor elimination or reduction:

a) reduced wrist posture/force/repetition stressors
b) eliminated bending at waist and lifting

4. Work Order Date: work order not required

5. Estimated Cost of Solution:

Material	= $ 0.00
Labor	= $50.00
Total	= $50.00

C. Modified Job Analysis

A preliminary evaluation of the modified job estimated that a shank boner work cycle load has been reduced causing a reduction in the bone yield and an increase in the lean shank yield. Since the workload change was incorporated (9-93) it has been estimated that $14,000.00 in increased lean shank yield has been attained with a concomitant positive change in lean shank work cycle and rest times:

a) work cycle time from 16.2 sec to 13.2 sec (18.5% decrease)
b) rest cycle time from 0.5 sec to 3.5 sec (700% increase)
c) total work cycle time of 16.7 sec stayed the same

Team #5-Process

This team selected 28 jobs for ergonomic analysis and improvement. Of these jobs, 12 were completed and 16 were still in process at the end of the research project. A detailed list of all jobs for this team is included in Appendix C.

Detailed Ergonomics Intervention Example

(Information was not available to provide a detailed ergonomics intervention example for this team at the time of the report).

RESULTS

The plant-wide results of the ergonomics intervention project are presented first below, followed by an analysis of the findings by each ergonomics team, and, finally, the findings of the employee survey.

Plant-wide Results of the Ergonomic Intervention Project

Plant-wide data that was gathered to establish the relative success of the ergonomic effort included OSHA 200 logs of employee injuries and illnesses. From this data, we were able to calculate the incidence levels of: Cumulative Trauma Disorders (CTDs), physician-referred CTD cases, lost production days, and restricted duty days. We were also able to collect information on the overall amount of absenteeism and turnover in the plant. Our findings are summarized and discussed below. These results represent aggregated information for the plant departments of Kill and Rendering, Cut, Process, Boning, Special Meats, and Case Ready.

Cumulative Trauma Disorders (CTDs)

One of the most convincing pieces of evidence that the ergonomics intervention program has been a success is the reduction in the incidence rates of CTDs in the overall plant. As stated above, data were obtained on the number of total CTD cases in the major plant departments. The relative incidence of CTDs per 200,000 work hours was calculated by the following formula: ((Number of CTD cases x 200,000)/Total Work Hours for the given period of time). By using these incidence rates, we were able to control for any seasonal or annual fluctuations in the number of hours worked and the associated increase in CTDs.

Each of the yearly time periods examined here begins on March 1 since this was the beginning of the major thrust of the ergonomics project at the Denison plant. Only OSHA logs of CTDs from 1991 or later were used because the plant changed its CTD reporting procedures in 1991 when it adopted the new OSHA guidelines for the meat-packing industry. Thus, these changes make comparisons to previous years uninterpretable. Because we recognized that the effects of the ergonomic changes may take some time to become apparent, we chose to analyze the incidence rates for the post-intervention period (March 1, 1993 to February 28, 1994) in two separate 6 month periods. We anticipated that we would see lower incidence rates in CTDs for the second 6 month period of the study, but not necessarily for the first 6 month period.

As the date show in Figure 1, the incidence rate of CTD cases in the plant rose from 55.30 in the benchmark year of 1991 to 75.46 in 1992. The incidence rate continued to rise in the first 6 months of the 1993 period to 80.46, but then fell over 27% to 58.64 in the second sixth month period following the commencement of ergonomic interventions.

Physician CTD Cases

To assess the impact of the ergonomic interventions on the severity of these CTD cases, we examined the incidence rates for the CTD cases that required a visit to a medical physician. As shown in Figure 2, the physician-referred CTD rate for the 1991 benchmark year was 31.56, rose to 36.74 in 1992 and then began to fall once the ergonomics program was initiated. For the first 6 months of the 1993 period the physician CTD rate was 35.16 while in the latter 6 month period it had fallen to 24.04 (down nearly 32% from the previous time period).

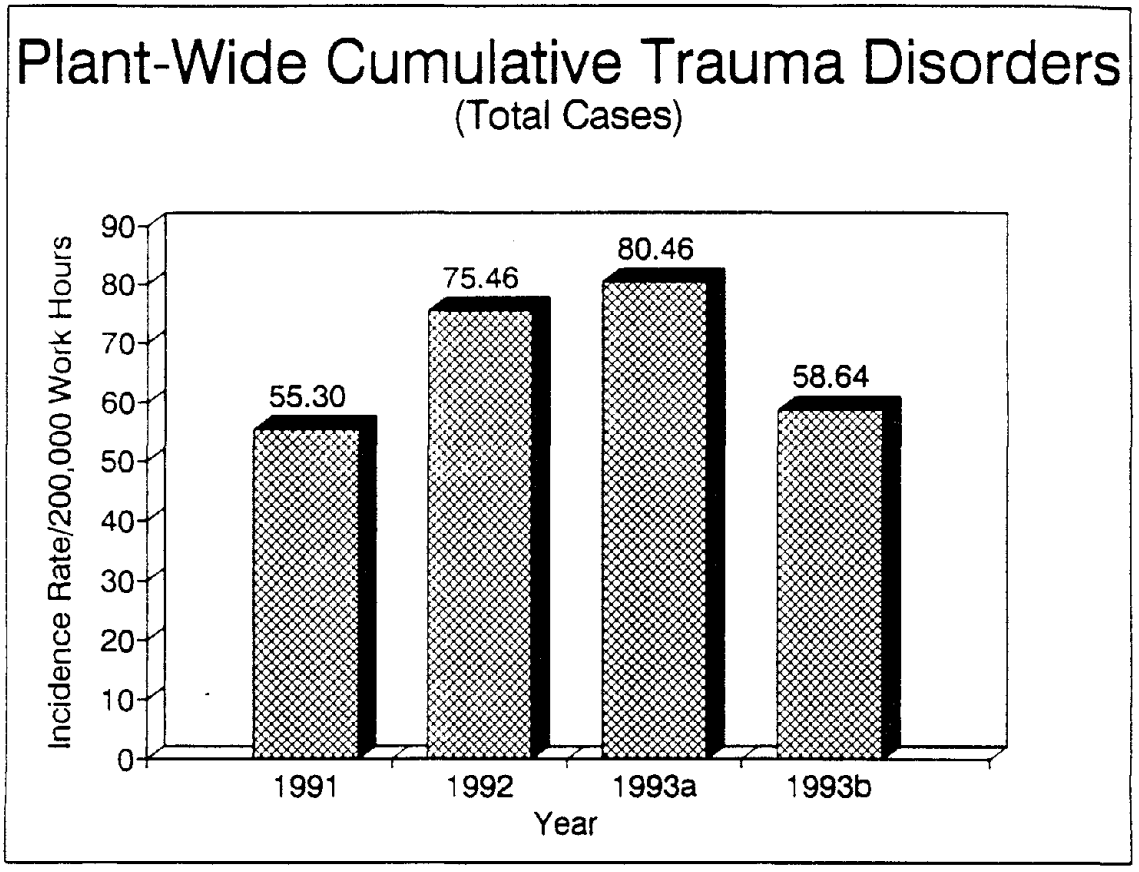

Figure 1. Plant-wide Cumulative Trauma Disorders Incidence Rates

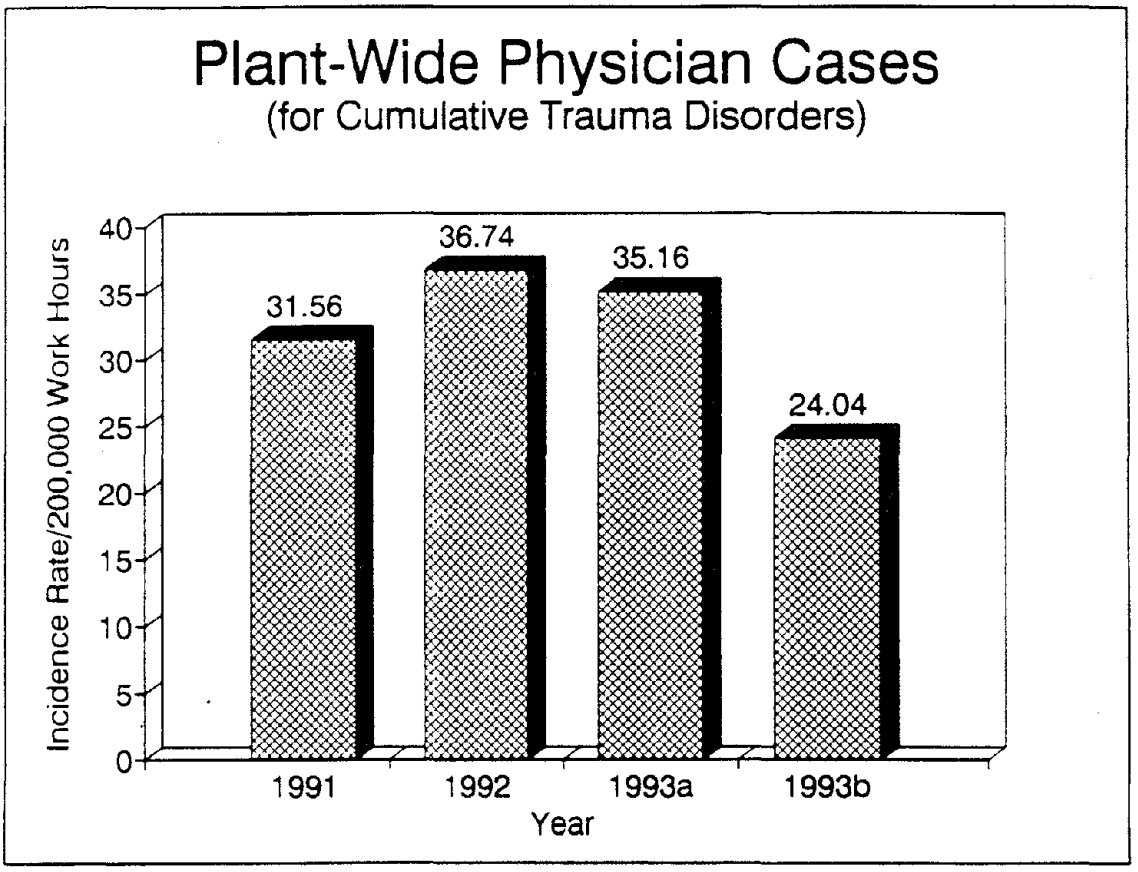

Figure 2. Plant-wide Physician CTD Cases Incidence Rates

Production Days Lost

We also sought to examine the effects of the ergonomics program on the overall productivity of plant personnel. Two types of data were gathered for this purpose. First, we examined the rate of lost production days due to CTD cases. As shown in Figure 3, the production days lost incidence levels decreased steadily across the 1991-1993 time periods. Discussions with plant management revealed that these decreases have, in part, been due to an active effort on the part of plant management since 1991 to reduce the number of production days lost to injuries and illnesses. Medical management personnel mentioned that plant personnel are trying to develop as many "light duty" or "restricted duty" jobs as possible for injured personnel. Thus, these decreases in lost production days should not be interpreted as being totally associated with ergonomic changes in the plant.

Restricted Duty Days

The second dimension of plant productivity we assessed was "restricted duty days." Based on the movement to more restricted duty jobs in the plant when possible, we expected to see a continual rise in restricted duty days across the 1991-1993 time period. As shown in Figure 4, we did find that the restricted duty days incidence rate increased from 227.88 in 1991 to 274.80 in 1992. However, after the ergonomic interventions began, the incidence rate of restricted duty fell to 225.36 in the first 6 months of the 1993 time period, and even further to 204.88 in the second 6 months of the 1993 period. This latter figure represents a 25.5% decrease in the restricted duty days incidence rate since the 1992 peak. Thus, it appears that the lower severity rates of CTDs also resulted in less restricted duty days for plant employees.

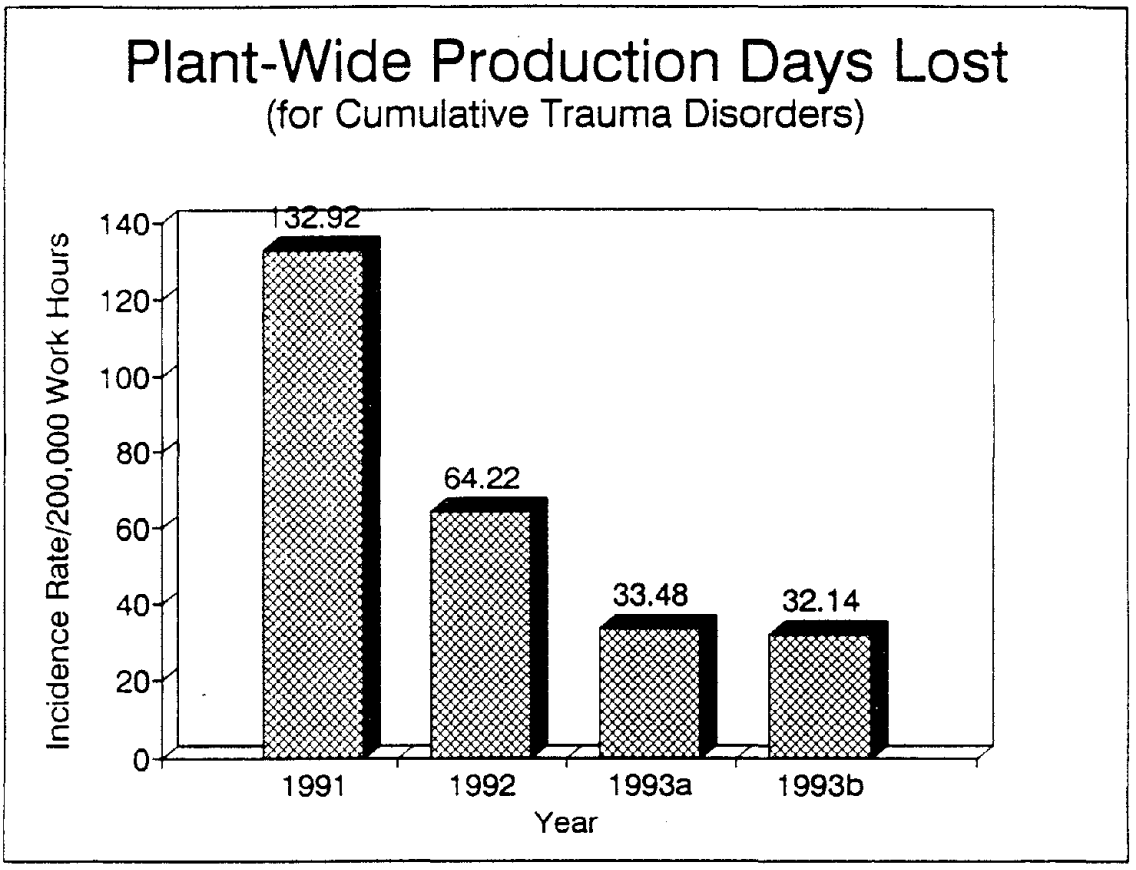

Figure 3. Plant-wide Production Days Lost Incidence Rates

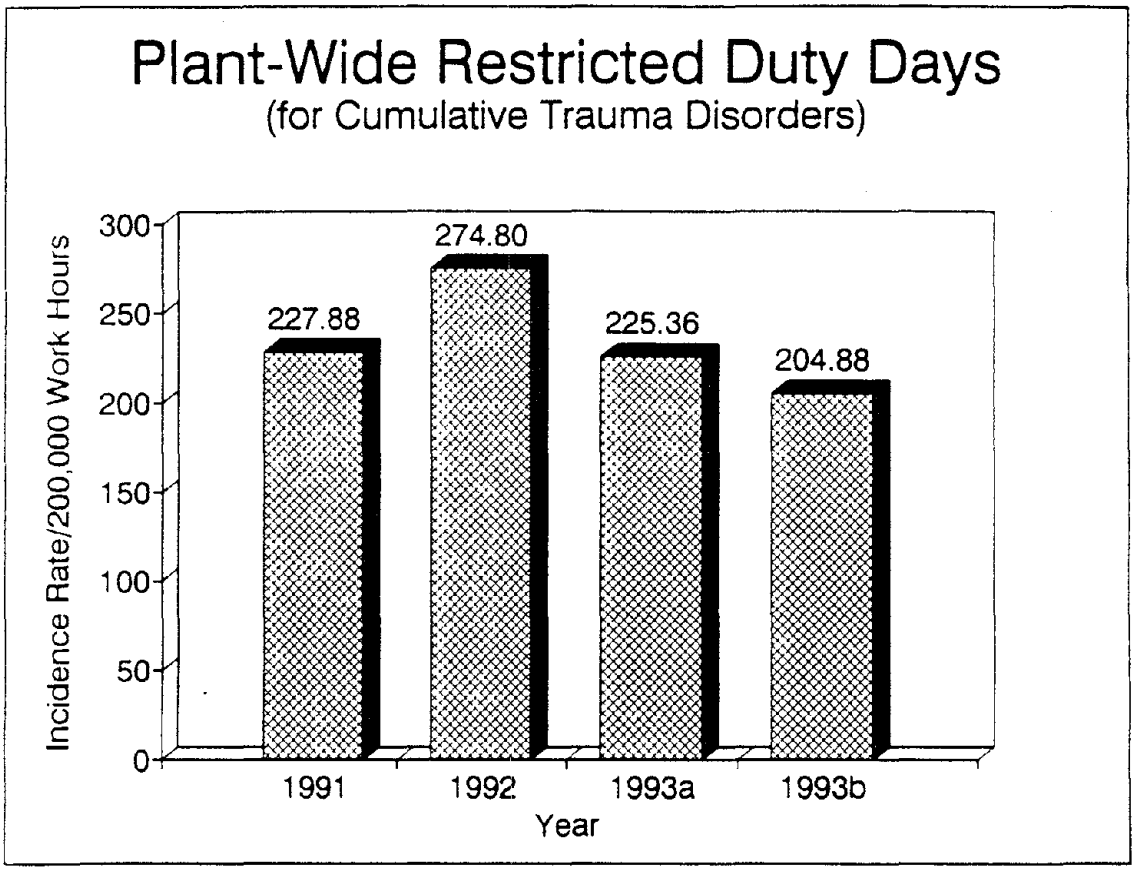

Figure 4. Plant-wide Restricted Duty Days Incidence Rates

Employee Absenteeism

Information was collected on the number of days lost to absenteeism in the plant for 1991-1993. This absenteeism information includes all employee absences from work except vacations, birthdays, and days lost due to industrial illness. As depicted in Figure 5, overall absenteeism did not change much in the time periods of the research study. In 1991, 12.17 days were lost per person in the plant, while in 1992 and 1993, 11.15 and 11.57 days were lost, respectively.

Employee Turnover

Information was also collected on the number of terminations and the number of employees in each of the departments during each of the years in the 1991-1993 period. From this information, we calculated the turnover percentage in the plant for time periods of the study. Figure 6 shows that the percentage of turnover in the plant remained steady from 20.77% in 1991 to 20.70% in 1992 before the ergonomic changes took place. After the ergonomics program became active, the plant-wide turnover percentage fell to 17.67% in 1993. Thus, the costs of recruiting, hiring, and training approximately 25 employees may have been saved, at least in part, by the ergonomics project. Conservatively, we can state that the plant experienced increased retention of employees without an associated increase in CTD incidence levels. Indeed, as noted earlier, CTD incidence rates actually fell.

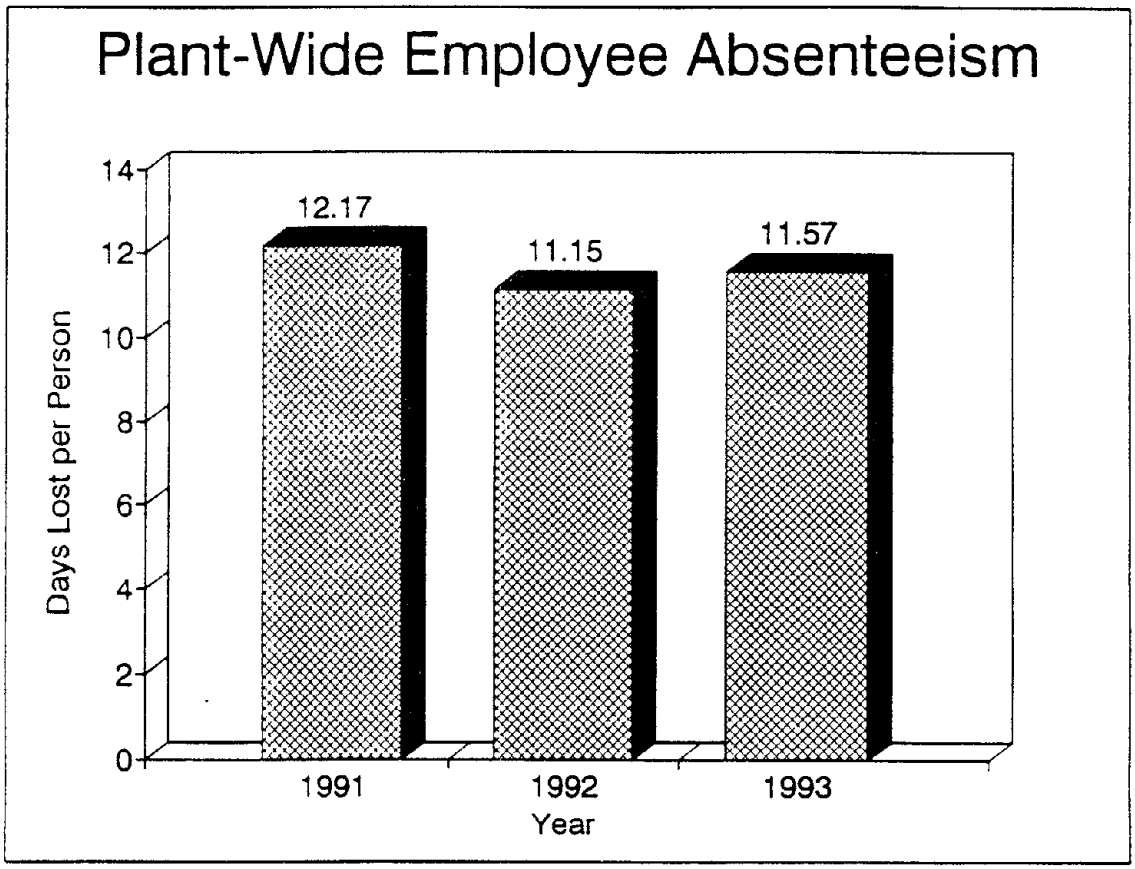

Figure 5. Plant-wide Employee Absenteeism

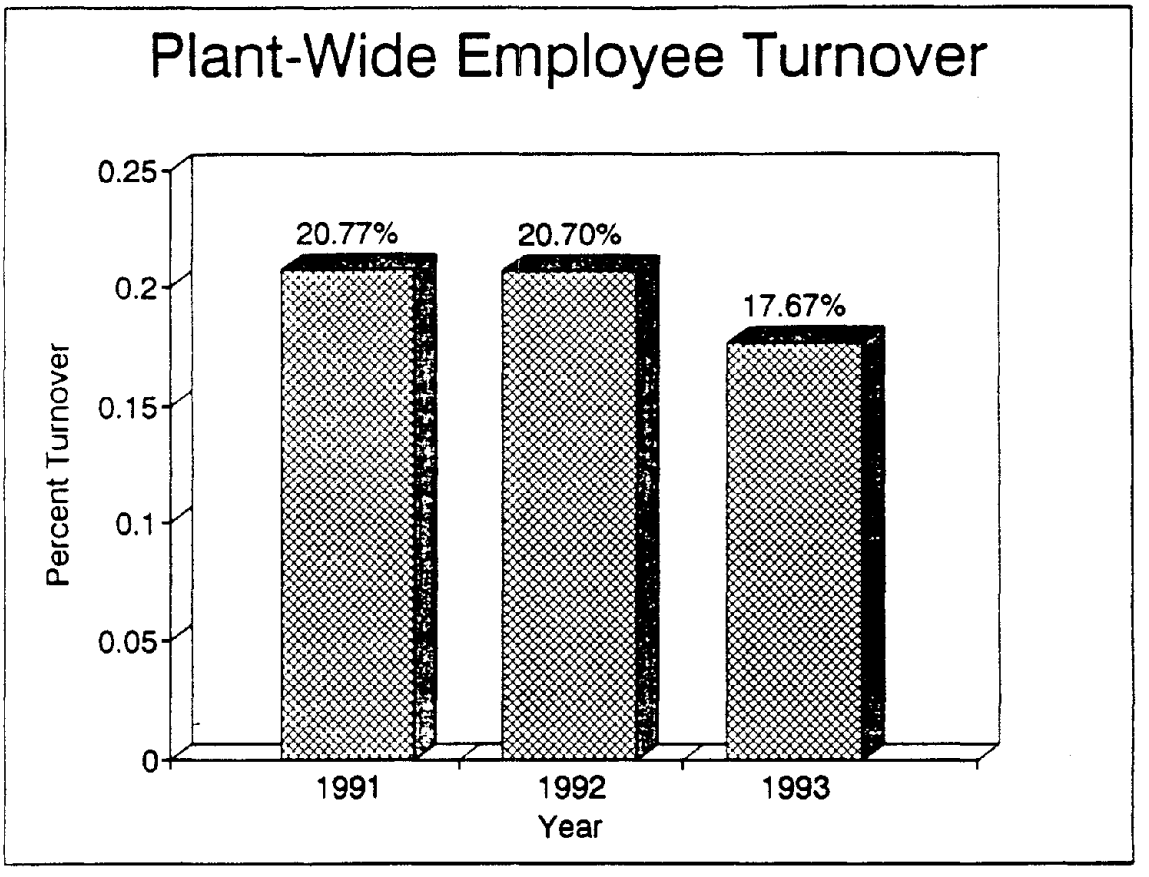

Figure 6. Plant-wide Employee Turnover Percentages

Ergonomics Team Results of the Ergonomic Intervention Project

Cumulative Trauma Disorders

Information on the incidence rate of cumulative trauma disorders by plant departments is displayed in Figure 7. The Kill Department tended to have the highest incidence of CTDs of all departments for each of the years. The trend of CTD incidence rates across the four time periods generally reflected the plant-wide changes discussed above. That is, three of the four departments experienced increases in their CTD incidence rate from 1991 through the first part of 1993. However, incidence rates were lower for the latter half of 1993 for all four departments, with 3 of the departments (Cut, Kill, and Bone/Special Meats) exhibiting large reductions from the previous 6 month period (19%, 33%, and 42%, respectively).

Physician CTD Cases

The objective measure of employees' CTD severity, the physician-referred incidence rate, is displayed by department in Figure 8. These graphs demonstrate that severity of CTDs experienced by plant personnel decreased across 3 of the 4 departmental areas in the latter part of 1993. The largest percentage reductions in physician-referred cases were in the Kill and Boning/Special Meats departments with 51.7% and 47.3% decreases, respectively. In contrast to the other departments, the Process area had a slight increase in the incidence of more serious CTDs.

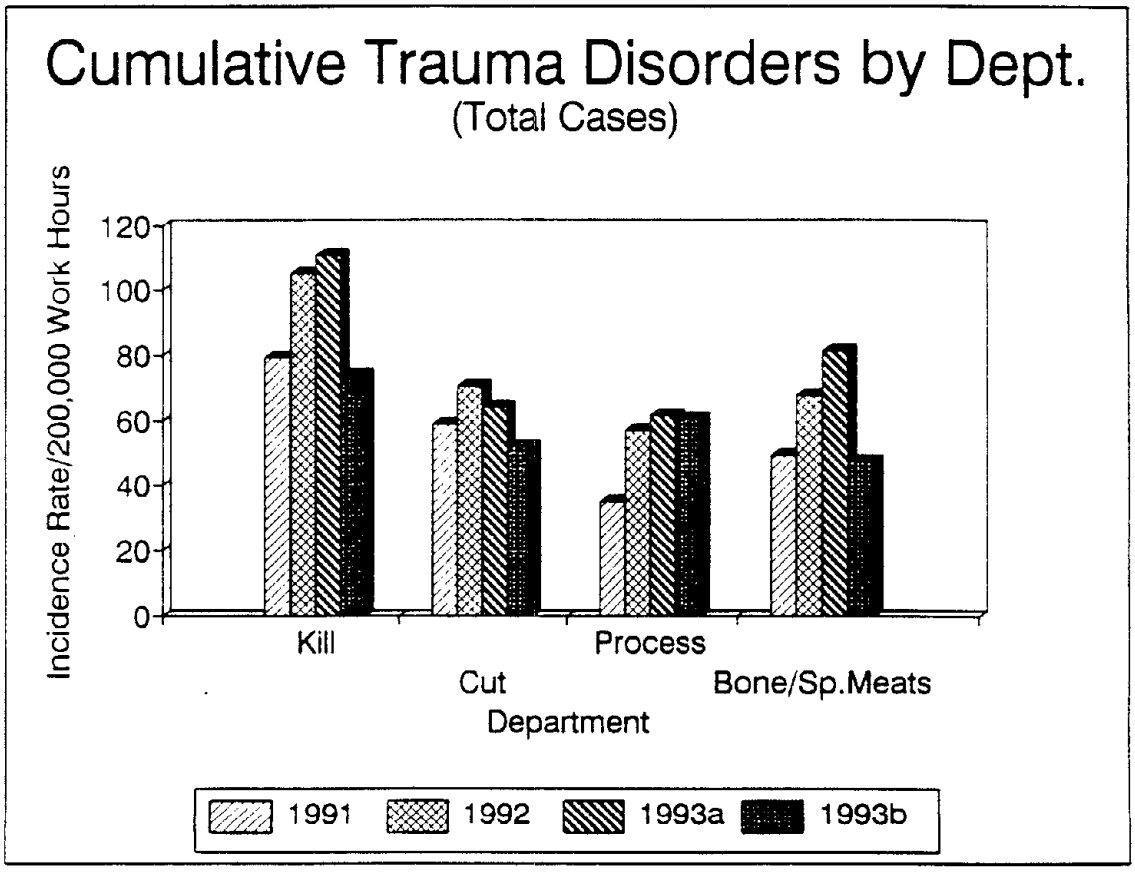

Figure 7. Cumulative Trauma Disorders Incidence Rates by Department

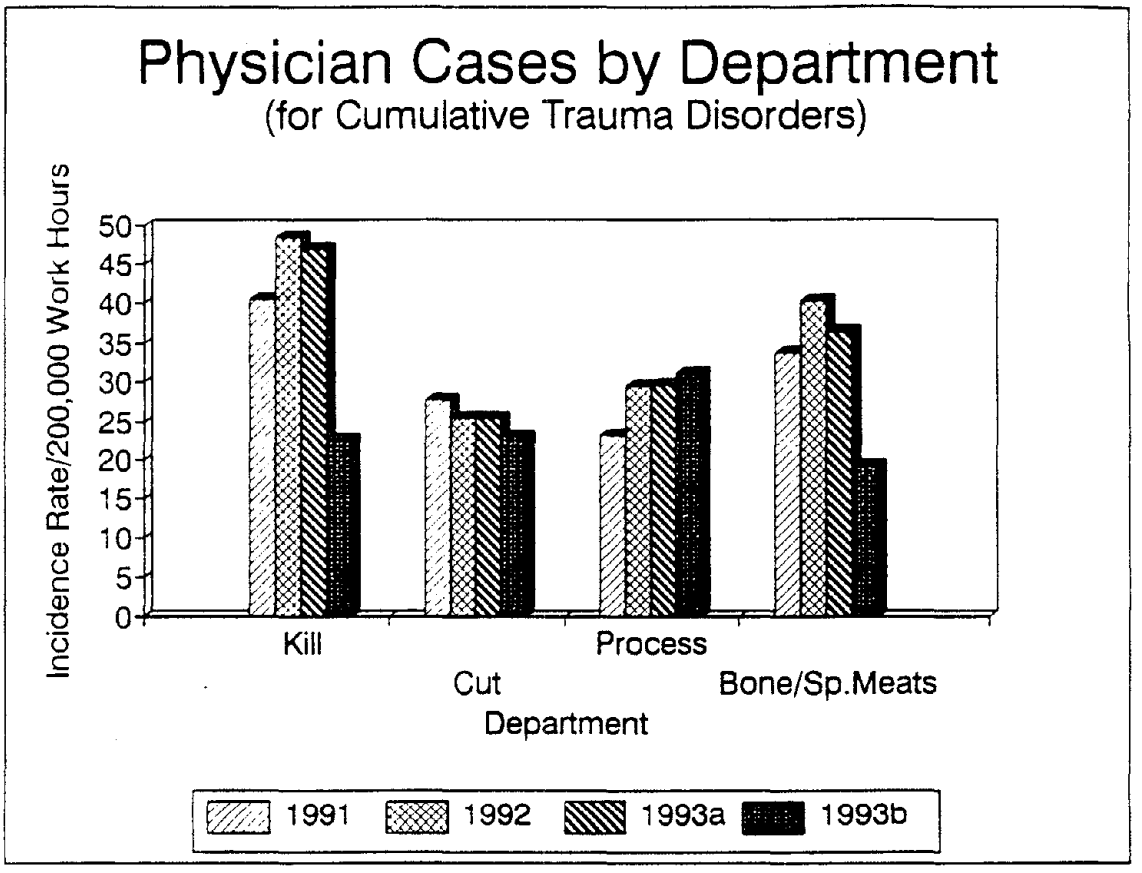

Figure 8. Physician CTD Cases Incidence Rates by Department

Production Days Lost

The production days lost incidence rate across the departmental areas is depicted in Figure 9. The overall trend in the plant toward fewer production days lost since the 1991 benchmark year is reflected in all of the departments except the Cut area. The largest percentage abatements from the first part of 1993 to the latter part of 1993 were again displayed by the Kill and Bone/Special Meats areas which had reductions of 83.9% and 59.2%, respectively. As stated above, these results are likely due to a combination of Farmland's change in policies and the ergonomics program.

Restricted Duty Days

Figure 10 illustrates the restricted duty days for the departments across the four time periods. The plant-wide pattern of an increasing incidence of restricted duty days from 1991 to 1992 and then steadily decreasing figures is best exhibited by both the Cut and Bone/Special Meats areas. Indeed, the percentage decreases from the beginning 6 months of 1993 to the latter portion were 44% and 33% for the Cut and Bone/Special Meats departments, respectively. Contrary to this trend, the Process department had consistent increases in restricted duty days, consistent with the increases in CTD severity for this department discussed above.

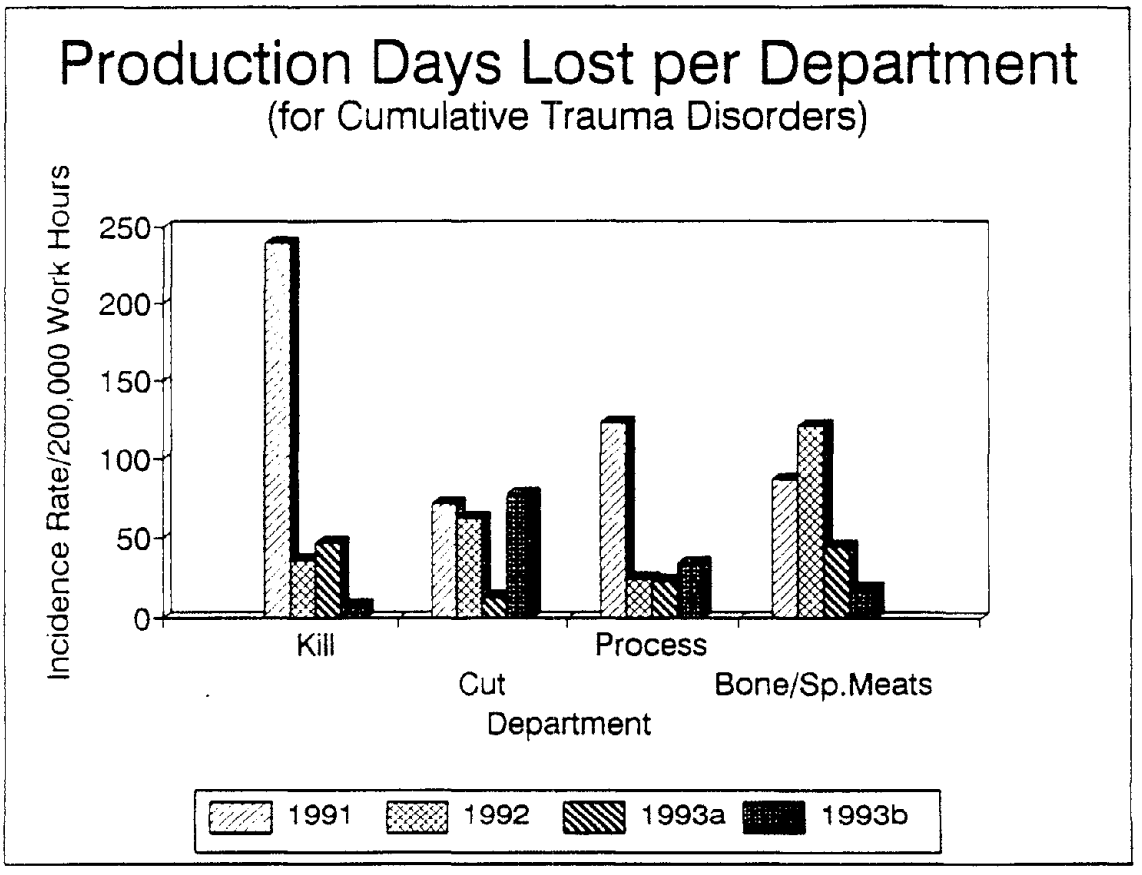

Figure 9. Production Days Lost Incidence Rates by Department

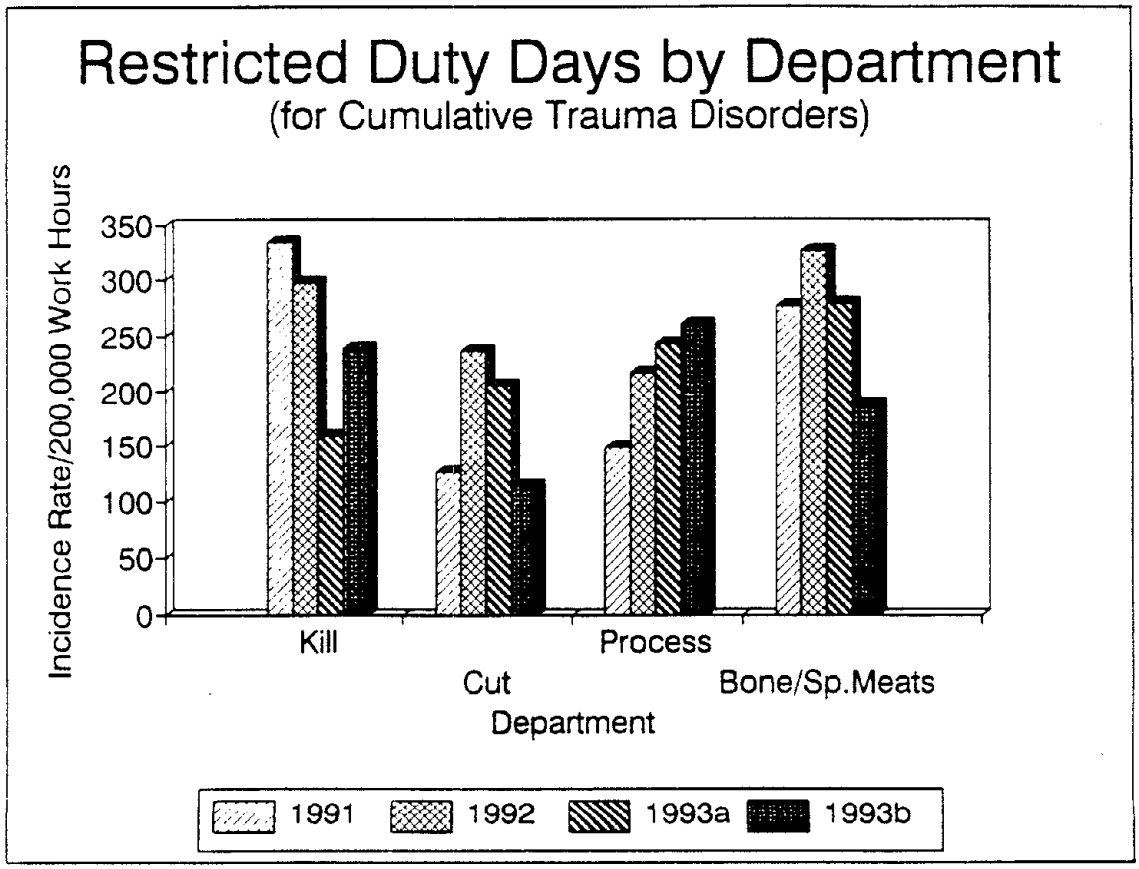

Figure 10. Restricted Duty Days Incidence Rates by Department

Employee Absenteeism

Analyses were also conducted which examined the level of absenteeism per person in each of the departments (see Figure 11). These findings revealed that the Kill and Cut departments appear responsible for the 8.4% plant-wide decrease from 1991 to 1992. However, the effect on the plant-wide absenteeism rate from 1992 to 1993 of the of 10% reduction in the Bone/Special Meats area was generally washed out by increases in the Kill, Process, and Cut areas. Process was the only department with consistent growth in employee absenteeism for the study's time periods.

Employee Turnover

The most notable facts about the departmental turnover data shown in Figure 12 is that employee turnover decreased in 3 of the 4 departments from 1992 to 1993. Kill, Process, and Cut had reductions of 18.7%, 25.3%, and 32.2%, respectively. There was relatively little change in the turnover rate of the Bone/Special Meats area, which maintained a high turnover rate for all three years.

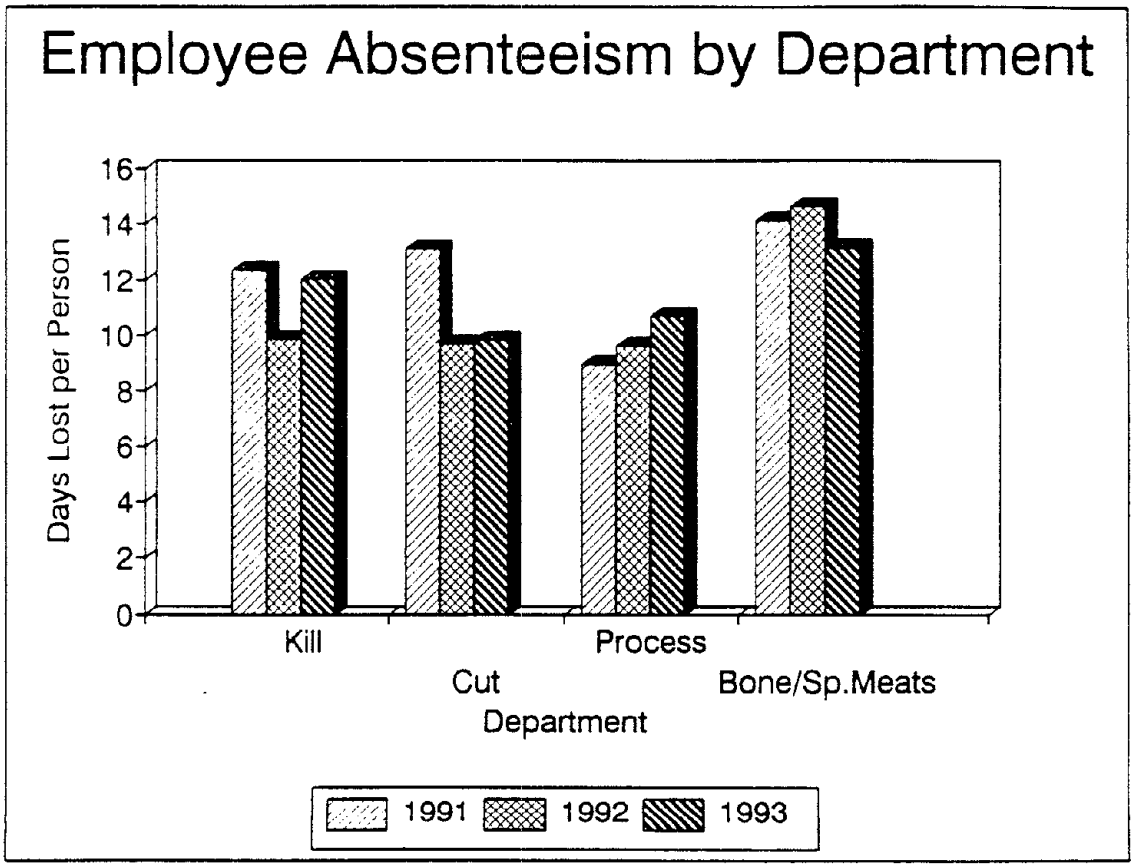

Figure 11. Employee Absenteeism by Department

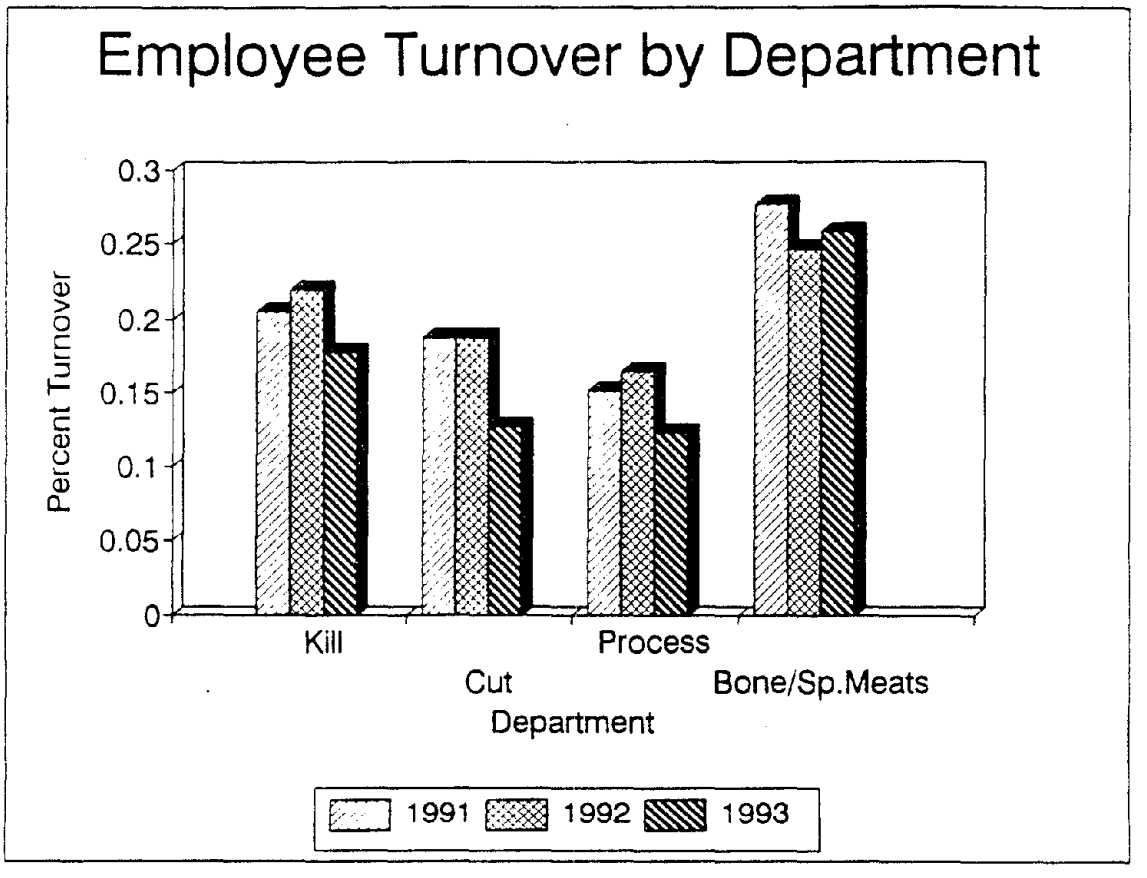

Figure 12. Employee Turnover Percentages by Department

Ergonomics Team Survey - Overall Results

Ergonomics teams were surveyed in December, 1993 to determine their perceptions of team performance and functioning. Thirty team members responded to the survey. Results indicated that team members agreed that their teams had been successful overall in generating ideas for redesigning jobs and in implementing those ergonomic changes (Self-Rated Performance Mean=5.43). This self-rated performance measure and the scales discussed below were measured using a 7 point scale (1=Disagree Strongly, 2=Disagree, 3=Disagree Slightly, 4=Neutral, 5=Agree Slightly, 6=Agree, 7=Agree Strongly). (See Appendix C for Team Survey Scales).

Ergonomics team members also displayed high levels of efficacy beliefs. That is, they viewed their teams as capable of performing their ergonomic redesign assignment (Team Efficacy Mean=5.64). Members generally felt free to communicate with one another (Communication Process Mean=5.97) and expressed satisfaction with their teams (Team Satisfaction Mean=5.83).

Team members were less certain that their groups had good internal work process (i.e., defining goals, developing workable plans, and prioritizing work) (Work Process Mean=5.15) and that they had the necessary information and resources to do their job (Resource Adequacy Mean=5.23). Given additional help in refining their work processes and more resources to do their job, teams should be able to improve their work performance given their overall high commitment to their work on the ergonomic teams (Work Commitment Mean=6.22).

Overall, written responses to open-ended questions in the ergonomics team survey suggested that team members felt that a number of factors contributed to the effectiveness of

the teams. First, many members mentioned that the diversity of the backgrounds of team members helped them perform better. Thus, teams seem to operate better when they have members from all parts of their department and who have experience in multiple jobs within their department. Secondly, members felt that the ability to listen to one another and talk openly helped them perform effectively. Finally, talking with the employees actually doing the jobs in their department also appeared to facilitate their effectiveness as a team.

Written responses to open-ended questions also suggested a number of factors that have prevented the teams from performing optimally. Some groups felt that they did not receive adequate assistance from maintenance personnel in the plant. This was significant since these employees are ultimately responsible for implementing many ergonomic changes. Secondly, there were problems in getting everyone to attend meetings due to production pressures in the plant. Lack of adequate time for team members to work on ergonomics projects was seen as the primary factor inhibiting the teams' productivity on ergonomics. Third, in some groups there is a lack of balance in the workload among members. Some members try to do too much of the work and group members feel that they could accomplish their tasks better if work were better distributed among all members.

Ergonomics Team Survey - Results by Individual Team

Analyses were also conducted on the team survey information to examine the findings by individual ergonomics teams. The graphical representation of these findings and the plant-level means just discussed are shown in Figures 13-19. Overall, the findings of these team-based analyses across the multiple dimensions suggest that three of the teams appear to be functioning relatively well (Kill, Bone/Special Meats, and the Night Shift teams). All of these teams rate their performance, communication process, team satisfaction, and work commitment high (see Figures 13, 15, 16, and 19). Of specific interest within these groups are the perceptions of the members in the Kill team that the work process could use some improvement (see Figure 17) and that the team members' confidence in their ability to do their task could be improved (see Figure 14). Members of the Night shift team could also use greater access to resources to do their job of ergonomic job redesign (see Figure 18).

The ergonomics teams that appear to function less well are the Cut and Process Teams. Team members of these groups rate themselves the lowest of the five teams in terms of self-rated performance and team satisfaction (see Figures 13 and 16). Members of the Cut team also rated the team low in communication and work processes relative to the other teams (see Figures 15 and 17). To gain an appreciation of the dynamics of the different groups, the reader is referred to Appendix C which summarizes the comments that team members made on the open-ended portions of the team survey.

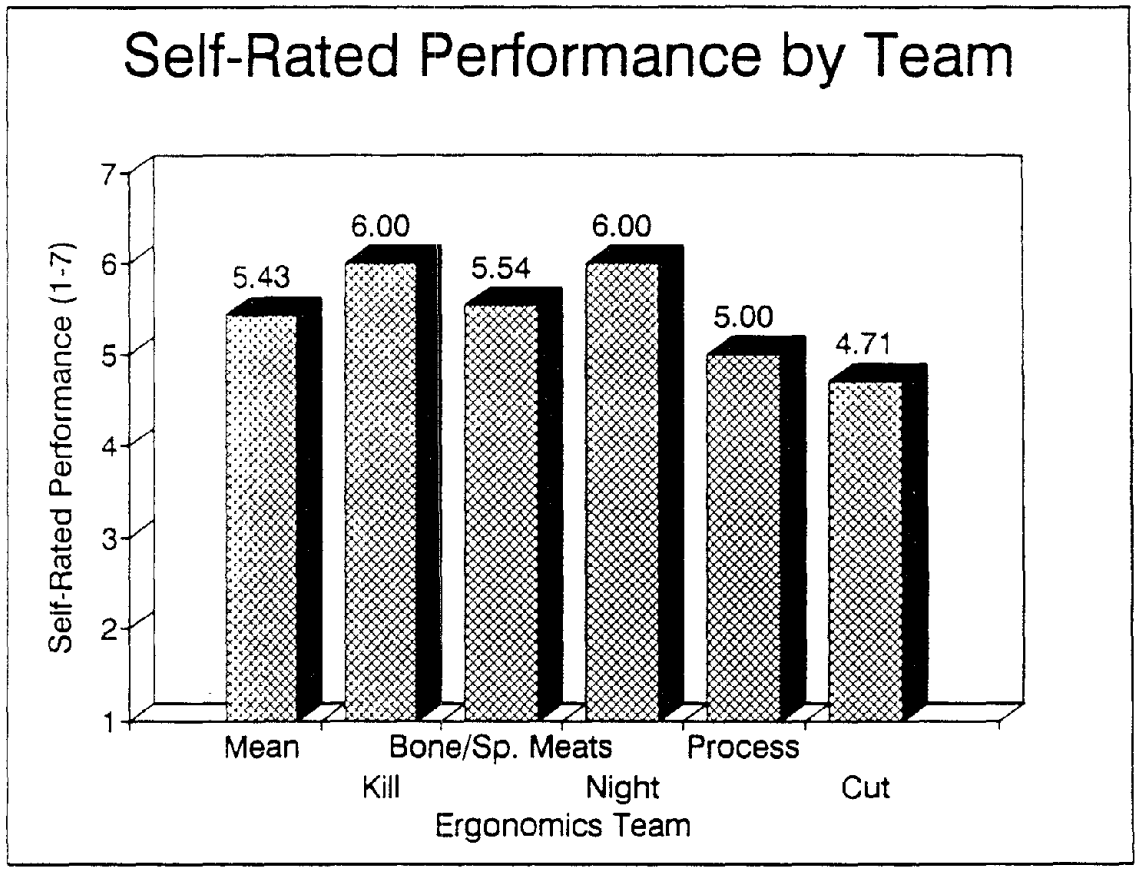

Figure 13. Self-Rated Performance by Team

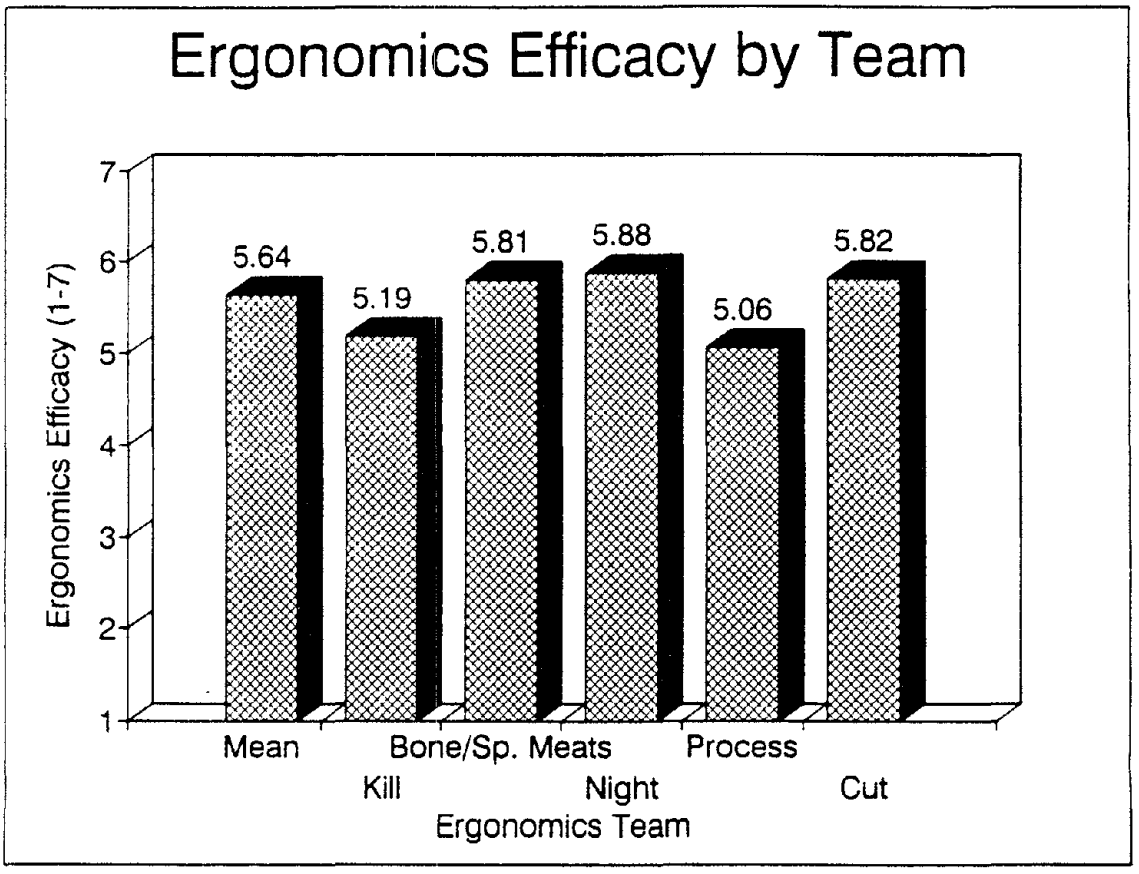

Figure 14. Ergonomics Efficacy by Team

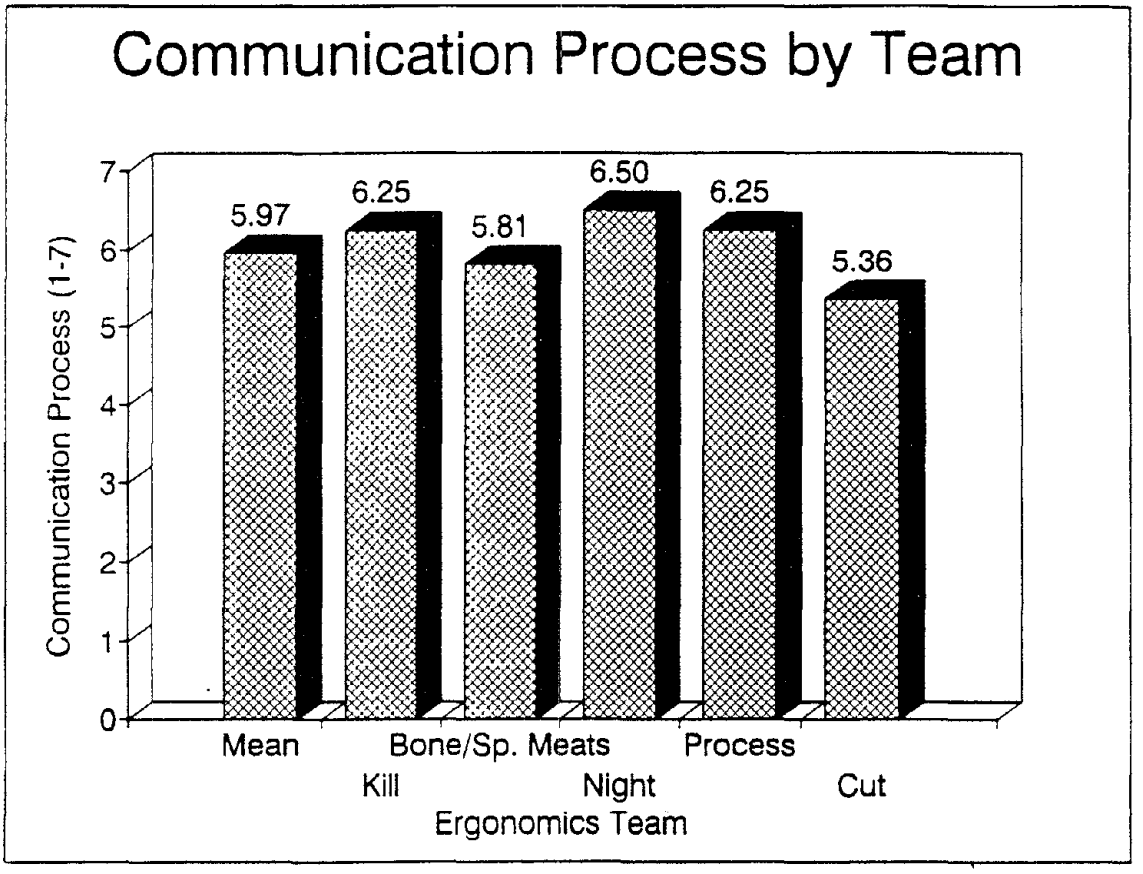

Figure 15. Communication Process by Team

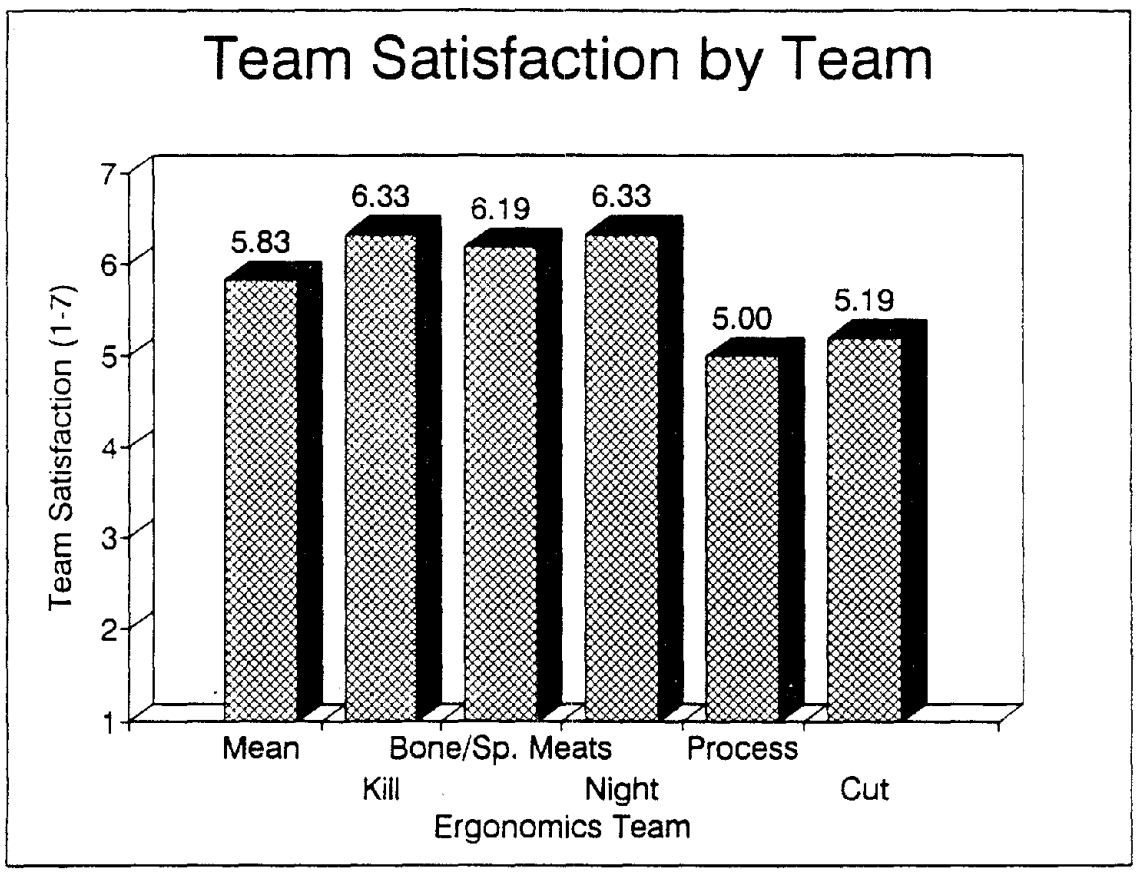

Figure 16. Team Satisfaction by Team

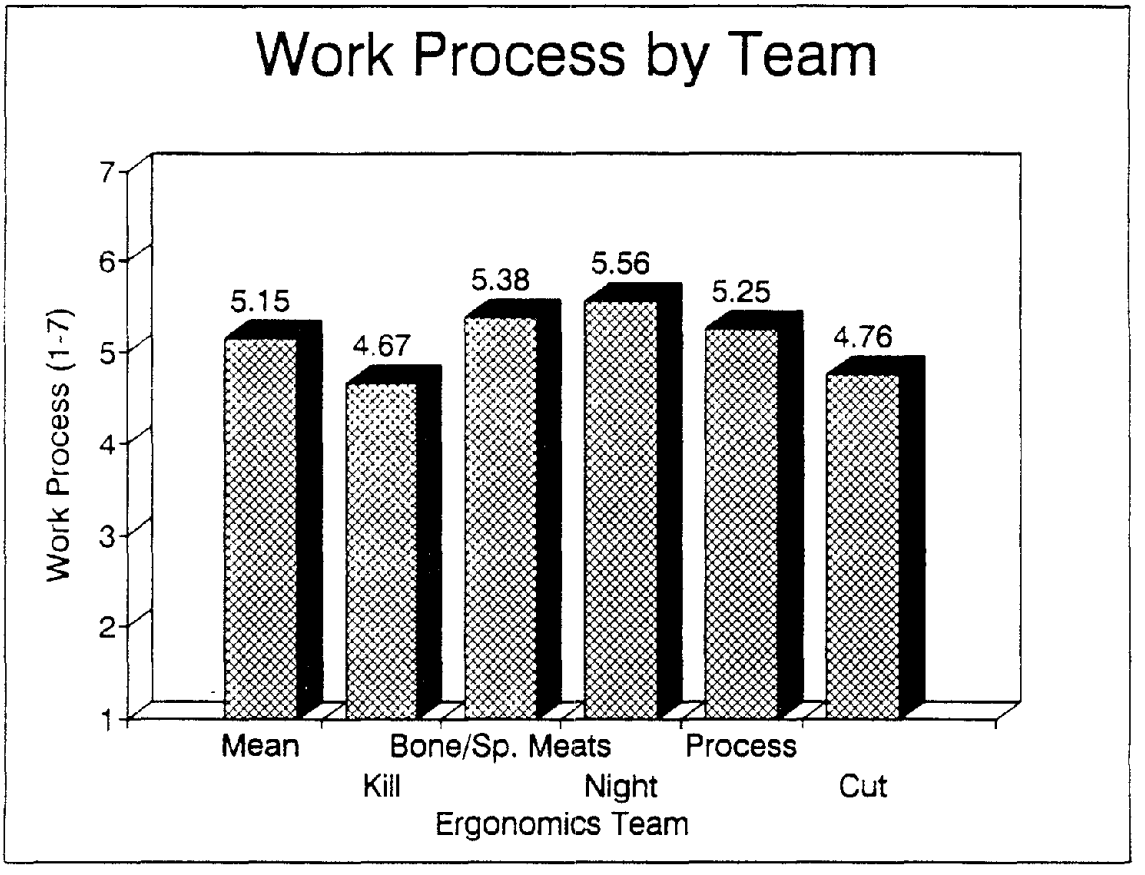

Figure 17. Work Process by Team

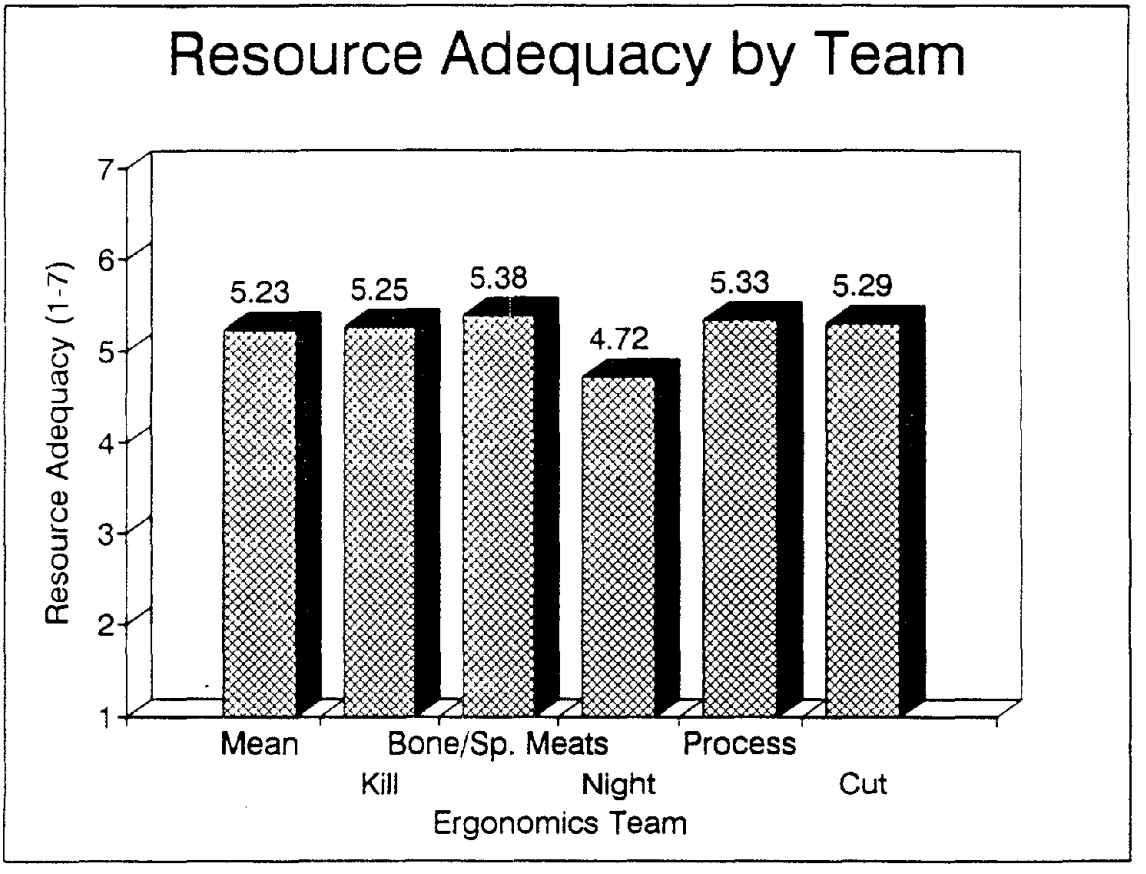

Figure 18. Resource Adequacy by Team

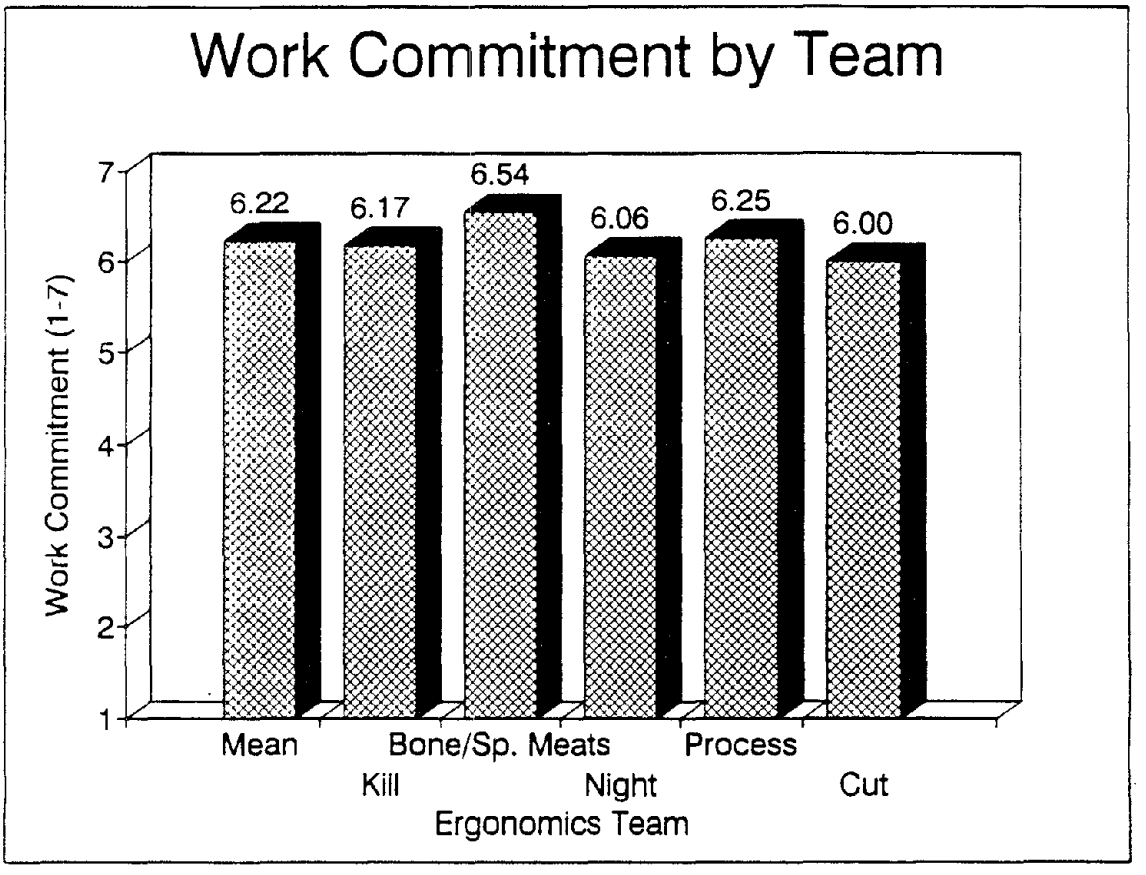

Figure 19. Work Commitment by Team

Ergonomics Team Observation Results

Overall Observations. Members of the University research team involved in the ergonomics intervention program met regularly with the ergonomics teams and observed their activities. These researchers observed the teams for many of the dimensions discussed above, such as the team's task-related processes, leadership issues, intragroup cohesion and conflict, and overall effectiveness. These observations led to the conclusions that the groups that performed best were those that had a strong democratic leader who involved and motivated members to contribute to the decision-making process of analyzing, selecting, and improving jobs. The most effective teams also had more immediate access to information and resources that the team needed to do its job, (e.g., injury and illness data on the most troublesome jobs). Finally, these teams appeared to be more cohesive than teams that were less effective.

Observations for those teams that did not perform as well revealed that there were interpersonal conflicts between members, perhaps due to issues prior to the ergonomics teams formation. These conflicts in viewpoints and personality contributed to less productivity from the groups. There also appeared to be some divisiveness between management and employee representatives on what issues or problems should be addressed in the ergonomics meetings.

Observations by Team. Members of the UNL team of researchers recorded observations of the individual teams during the term of the research study. Conclusions from these observations largely echo the findings of the team surveys. The Bone/Special Meats ergonomics team appeared to be one of the most productive groups, primarily due to an especially strong and highly motivated leader who is clearly an advocate for ergonomic

change in the plant. The Kill group worked well primarily because of the democratic style of decision-making adopted by the leader of this group and the clear access to resources needed by the team. Observations also revealed that the job analysis process in this group was less systematic than it could have been. Instead, this group appeared to work on ergonomics projects based mostly on what items were brought to the team's attention and how easy it would be to implement them, versus a more systematic analysis of injury and illness rates for jobs.

The Night Shift team was seen as being an effective group in terms of democratic leadership, idea generation, and other internal work processes. However, members of the Night Shift team often had complaints about lack of coordination with day shift employees.

The Cut group appeared to have some differences in perspectives of what issues to address and how to prioritize them. These dynamics led the group to perform less than optimally since little agreement could be reached on what ergonomics projects to focus their attention. Some disagreement also appeared to center on the level of effort given to the ergonomics project by either side of employees and management.

The Process team initially had problems establishing their goals and direction regarding ergonomic analyses of the jobs in their area. However, once they systematically went around and videotaped each job in their department and discussed ergonomic-related issues with the employees themselves, the team became much more focused and productive.

Ergonomics Team Performance

One measure of the ergonomic job redesign performance of the individual teams is the number of projects that each ergonomics team *completed* during the intervention project. The University research team collected "Project Status Reports" on the ergonomic projects from each of the plant ergonomics teams (see Appendix C). As demonstrated in Table 1, the Kill team was most productive, yielding 21 completed ergonomic changes; they were followed by the Night Shift team with 15 changes; the Boning/Special Meats team with 13 changes; the Process team with 12 changes; and the Cut team reported 4 completed ergonomic changes. These ergonomic change performance figures largely parallel the results of the team survey data and the University's observations of the teams with the exception of the Process group which may have performed better than originally thought.

Ergonomics Team	Number of Ergonomic Changes Completed
Kill	21
Night Shift	15
Boning/Special Meats	13
Process	12
Cut	4

Table 1. Number of Ergonomic Changes Completed by Team

Employee Survey Results of the Ergonomic Intervention Project

All production employees (approximately 815 employees) were given the opportunity to participate in surveys conducted at two points in time (March, 1993 and January, 1994). These surveys were composed of both employee attitude and pain and discomfort questions. Analyses were conducted that compared participants' responses in March, 1993 with those in January, 1994. 311 employees chose to participate in the first survey (39% response rate), and 202 employees participated in the second survey (25% response rate). The analyses below are based on the 127 employees that responded to both surveys. The specific questions for the scales described below may be found in Appendix D.

Number of Body Areas Affected by Persistent Pain

As part of the employee survey, individuals were asked to fill out a physical symptoms survey adapted from Barbara Silverstein (1989). Employees were asked to indicate if they "had any pain and discomfort that doesn't go away." If so, they were asked to indicate up to two areas of their body where they felt the most pain and then the next most pain. Thus, participants could indicate 0-2 body areas affected by persistent pain. Figure 20 reveals that the mean number of body areas affected by persistent pain decreased significantly from 1.17 prior to the ergonomics project to 0.93 after the ergonomics interventions (t value=2.98, $p<.003$). Frequency analyses of this data revealed that in March, 1993 the number of people reporting 0, 1, and 2 body areas affected by persistent pain were 48, 9, and 70, respectively. While, in January 1994, the number of people reporting 0, 1, and 2 body areas affected by pain were 54, 28, and 45. Thus, fewer people were reporting pain, and of those people that did, fewer were reporting pain in 2 body areas.

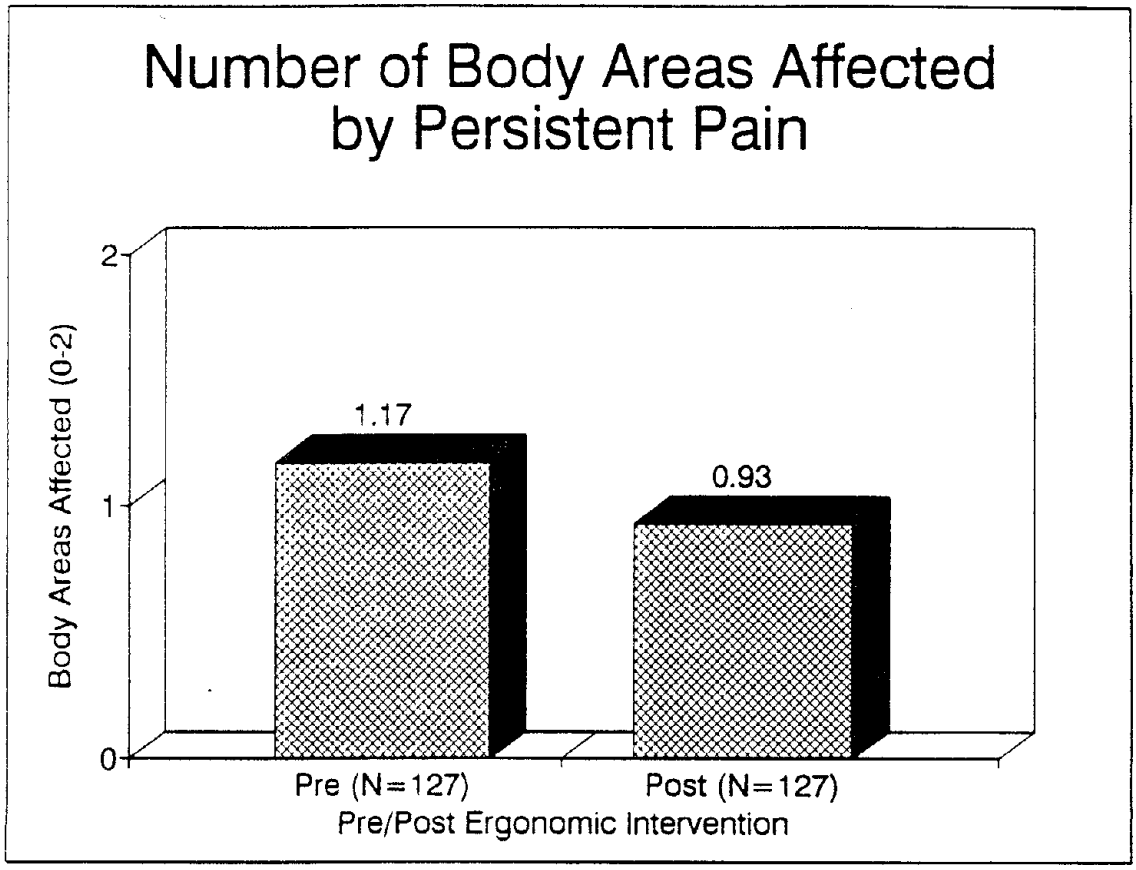

Figure 20. Number of Body Areas Affected by Persistent Pain

Pain Severity

Next, employees were asked to indicate "how well each of the following described their problem: aching, burning, cramping, loss of color, numbness (asleep), pain, swelling, stiffness, tingling, and weakness." Employees responded to these items on a 1-7 scale with 1=Not at all to 7=Very well. Their responses to these 10 items were then summed and the average taken for the body areas affected by persistent pain to create an overall index of the "severity" of the pain experienced. Employee pain severity (shown in Figure 21) was significantly reduced by the ergonomics intervention in the plant, from 4.24 to 2.86 (t value=6.23; $p<.0001$).

Ergonomic Program Attitudes

Employees were also asked to indicate their feelings about the ergonomics program at the plant. They were asked four questions regarding their satisfaction with the program, management's commitment toward the program, and the effects of the program on employees. As shown in Figure 22, employees' attitudes toward the ergonomics program were relatively positive (4.72) in March 1993, yet decreased to 4.11 in January, 1994. This decrease in attitudes related to the ergonomics program probably represents high, unrealistic expectations for the program initially, followed by low satisfaction with it once employees saw that jobs are changed more slowly than they had expected.

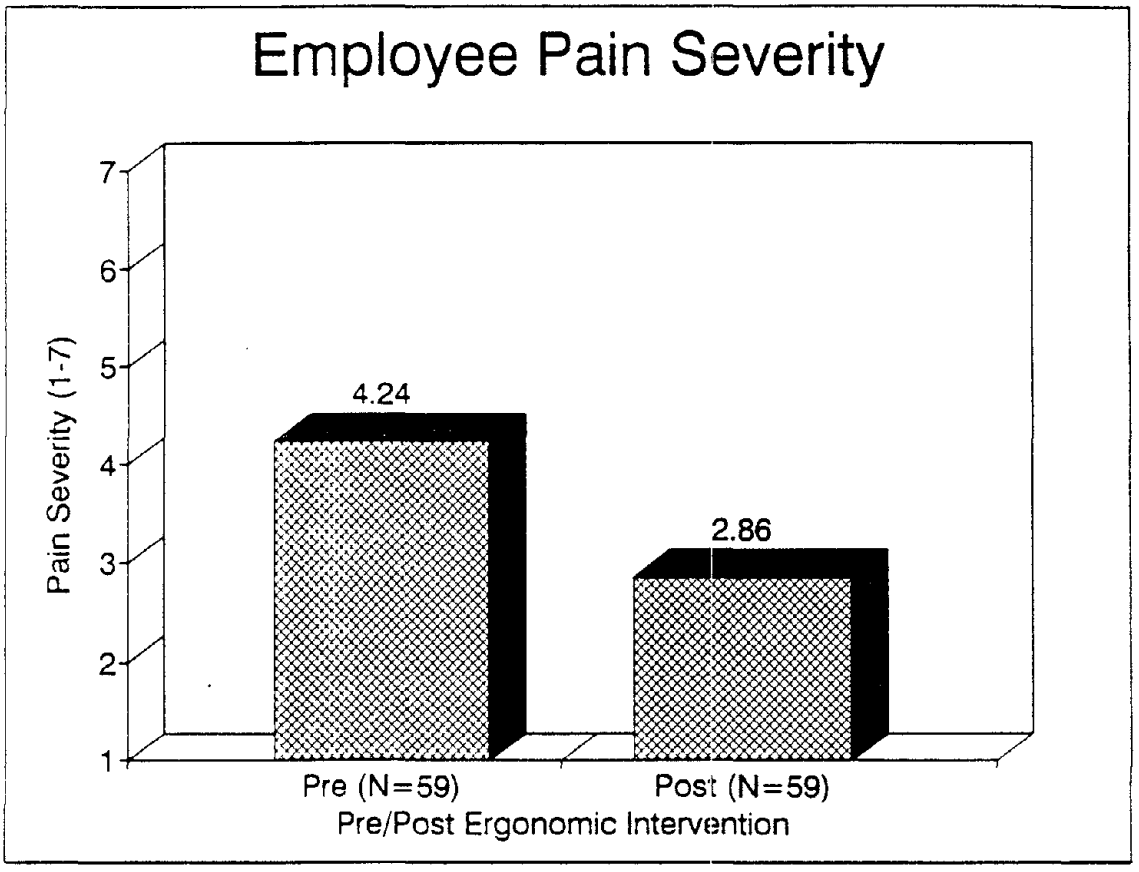

Figure 21. Employee Pain Severity

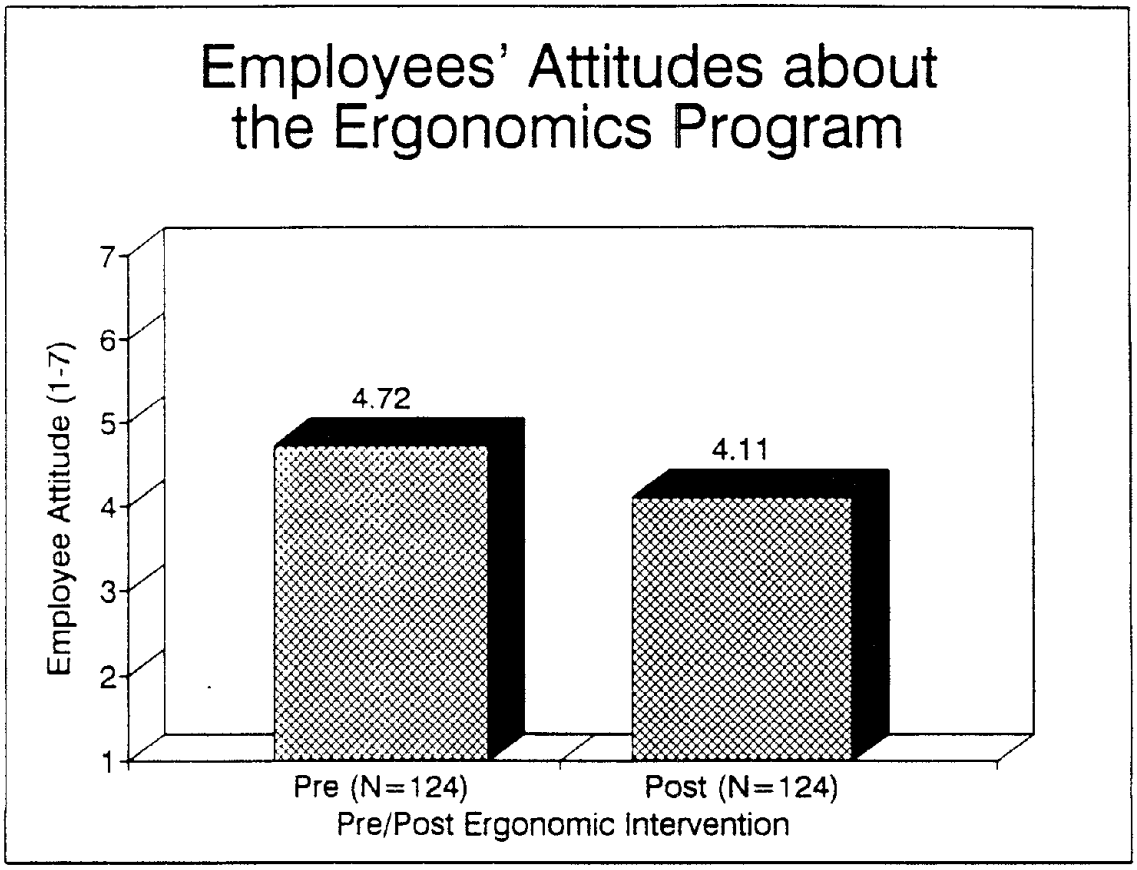

Figure 22. Employees' Attitudes About the Ergonomics Program

Employee Survey Results by Specific Ergonomic Job Changes

Analyses were also conducted to examine the effects of ergonomic job changes on employee attitudes and perceptions of pain. Ergonomics teams informed University researchers of the employee identification numbers for those whose jobs had been changed. A total of 39 of the 127 employees who responded to both surveys had some change in their job, tools, or workstation. Thus, the sample was divided into two groups based on whether their job had been changed (N=39) or not (N=89). First, regression analyses were conducted to determine if the two groups were significantly different based on the particular dependent variable at Time 1 (March, 1993). Since no significant differences emerged between the groups in these analyses, the employees who did not have their jobs changed served as a control group to compare with the job change group's responses.

Pain Severity

We expected that employees who had their jobs changed would have less severe pain overall at Time 2 when compared to those whose jobs remained the same. As shown in Figure 23, pain was significantly lower in the job change group (2.39) than in the no job change group (3.11) ($F=7.920$; $p<.006$).

Attitudes about the Ergonomics Program

We also expected that those individuals who had experienced some form of job change would feel more positively toward the ergonomics program than those who had not experienced a change. Figure 24 illustrates that those who did have a job change maintained a relatively positive attitude toward the ergonomics program (4.46), while those that did not experience a change possessed a less positive attitude (3.96) ($F=3.225$; $p<.075$).

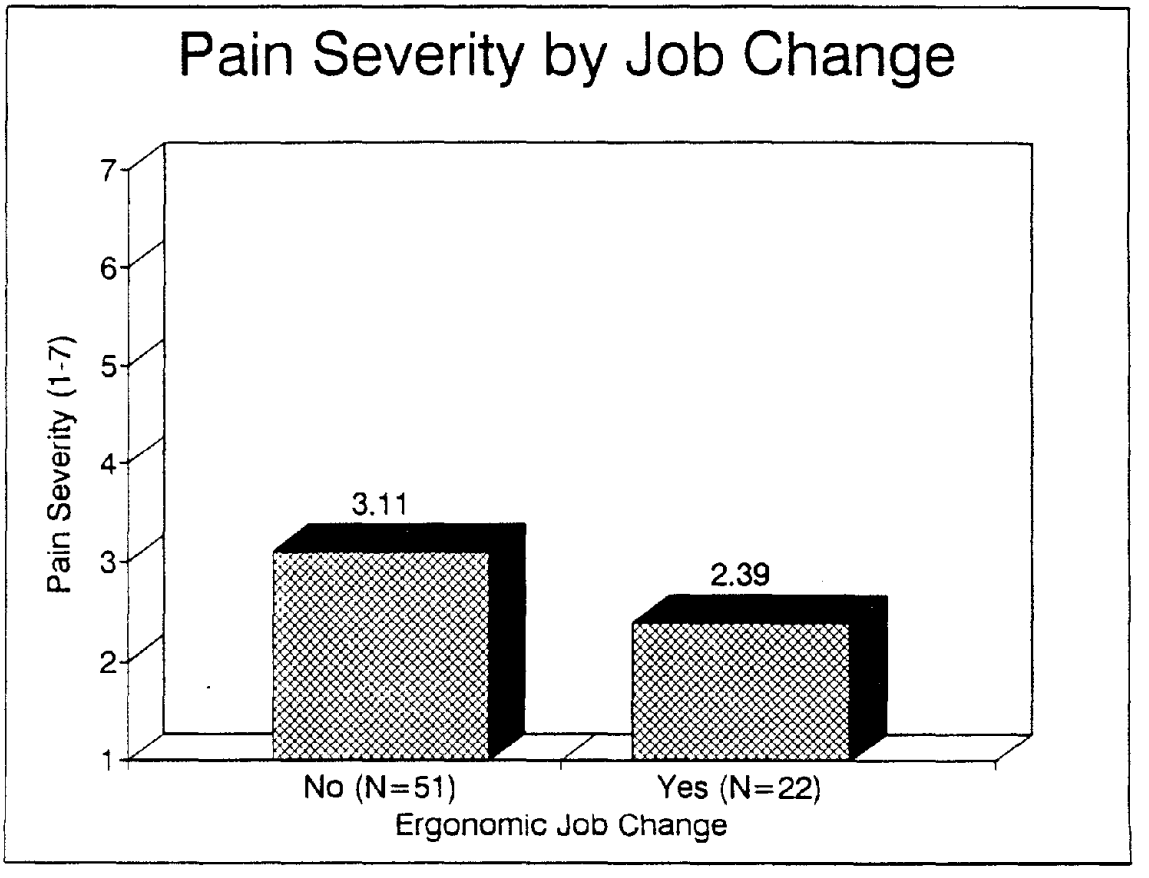

Figure 23. Pain Severity by Job Change

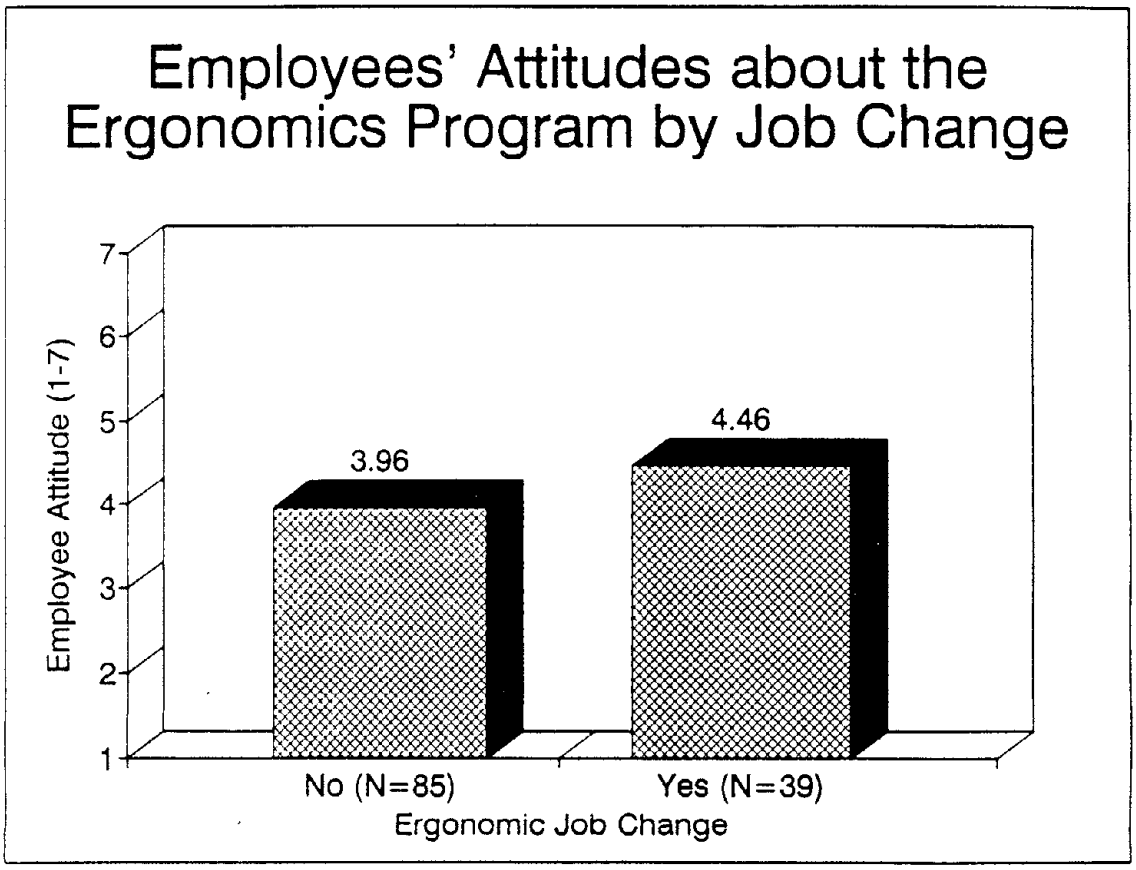

Figure 24. Employees' Attitudes About the Ergonomics Program by Job Change

Turnover Intention

Finally, we also measured employees' intention to turnover on a 1-7 scale with 1=Strongly Disagree to 7=Strongly Agree. Thus, individuals scoring high on this scale desire to leave the company, while those having lower scores are more likely to want to remain. We assessed these turnover intentions based on whether or not they had experienced a job change during the ergonomics program. As Figure 25 shows, those who had experienced a job change had significantly lower intentions to leave the organization (3.10) than those that did not receive some form of job change (3.79) ($F=6.864$; $p<.01$).

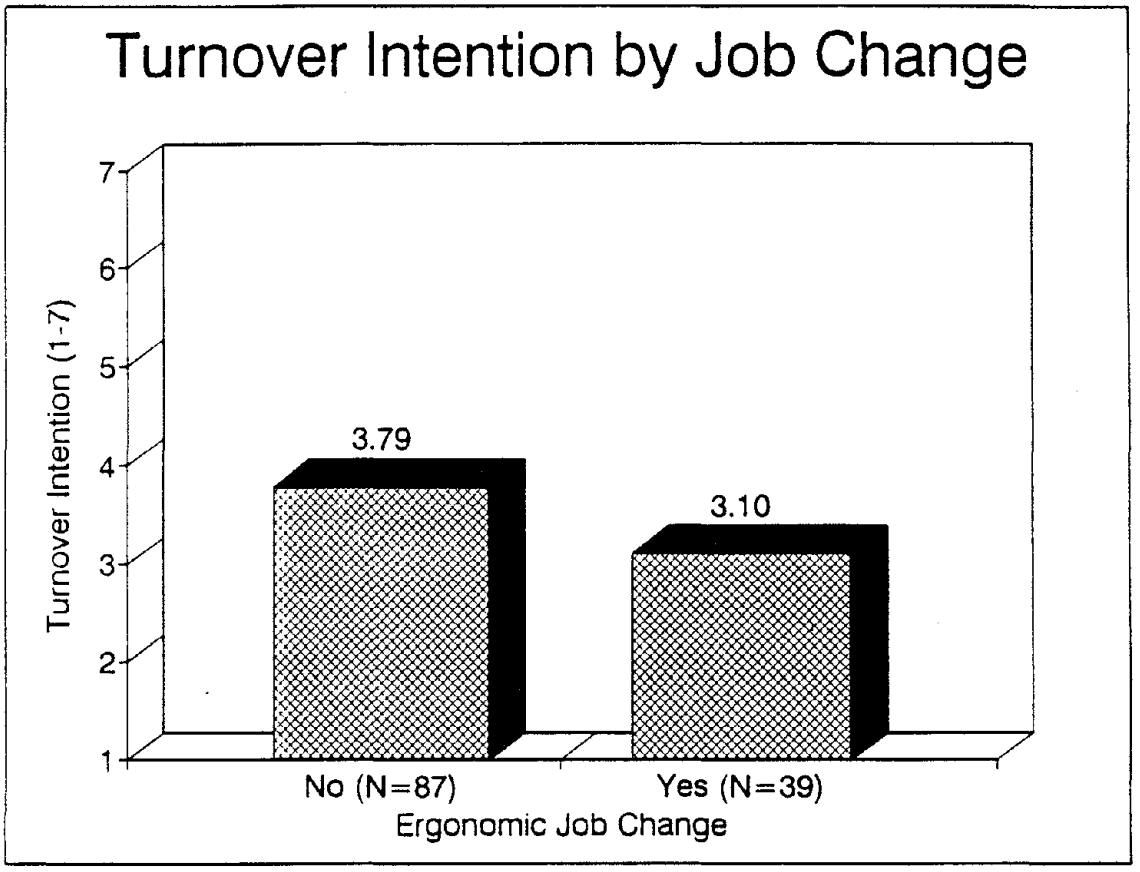

Figure 25. Turnover Intention by Job Change

CONCLUSIONS AND RECOMMENDATIONS

Conclusions from the Ergonomics Intervention Project

Overall, the ergonomics program in this plant was successful in achieving a number of the objectives set forth at the beginning of the program. Based on the information presented here, both the overall incidence rate and the severity of cumulative trauma disorders have decreased in the plant. Because of these reductions, the plant has also seen a decrease in the incidence of restricted duty days. Finally, turnover among plant employees has declined as well. Information gathered in the employee surveys seems to substantiate that employees are feeling less persistent pain in their bodies and that the pain they do have is less severe. Analyses of the employee survey revealed that pain severity decreased particularly among those who had some form of ergonomic job change. These individuals also expressed lower intentions to turnover than those who did not experience some form of ergonomic change. Employees with an ergonomic job change also maintained a more positive attitude toward the ergonomics program than those whose jobs were not changed.

The participatory team approach to ergonomics in the plant was successful in achieving a number of important ergonomics changes within each departmental area. While some teams experienced greater success in the number of changes implemented and the resultant decreases in incidence rates of cumulative trauma disorders and severity of those cases (i.e., Kill and Bone/Special Meats teams), all of the teams experienced success in at least one of the indicators presented here.

Recommendations based on the Ergonomics Intervention Project

Specific recommendations for organizations emerged from the ergonomic job redesign practice in the current organization:

1. **Team Composition, Reporting Structure, and Leadership**

The ergonomic team composition and leadership are extremely important in establishing effective patterns of member interaction and task processes in the group. The operation of the teams in this research suggested that the inclusion of both top management and labor representatives may make interaction difficult. Teams composed of employees, medical staff, and maintenance personnel, with management support, may be more effective than teams that actually include both upper levels of management and employee representatives. Instead, teams should report through the plant ergonomist to the top plant management.

The employee representatives on the team should come from a diverse background of jobs in the department with different levels of experience. Experienced members can discuss what it is like to work in a given job, while relatively new personnel can add fresh insight to job analyses. Finally, teams should be allowed to choose their own leaders from among the employees on the team.

2. **Maintenance Personnel Involvement**

As stated above, having maintenance personnel on the teams should be stressed to any organization implementing the team approach since it is the

maintenance personnel that implement almost all of the ergonomic changes. Optimally, maintenance personnel should be given blocks of time that they can dedicate to making ergonomics changes at times when the plant is not in full operation (e.g., weekends or evenings).

3. **Smaller Teams with More Ergonomics Expertise**

Employee involvement efforts such as the one here should also consider narrowing the number members on each team to approximately 5 so that fewer members can develop greater expertise in the area of ergonomics and be able to discern differences between safety risks and ergonomics risk factors in the plant. Task and social interaction would also be more easily facilitated within these smaller teams. Night shift team members should also be merged with day shift teams to facilitate communication and ideas between the two shifts.

4. **Continual Training**

In order to facilitate the effective team interaction and ergonomic expertise of team members, continual training should be stressed for team members. Our observations here suggest that additional team-building processes and ergonomics training are likely to benefit team members after initial training in these areas.

5. **Broad-Based Involvement of Plant Employees**

Although the team approach provides representative input, participation should include a broader base of employees in order to identify problem areas and increase the likelihood of acceptance of solutions. Team members

indicated informally that their success depended greatly on fellow employees. Indeed, Caplan (1990) has suggested that focus groups of employees be used to get feedback on ergonomic changes before implementation. The lower overall attitudes toward the ergonomics project from the second survey also suggests that employees' expectations for the program were not met. Greater levels of communication with employees should be implemented in order to avoid unrealistic expectations at the beginning of a project and then maintained consistently throughout so that employees are informed of progress on different projects.

6. **Team Accountability/Communication with Plant Employees**

Mechanisms should also be in place which allow plant employees to review the teams' ergonomics projects and the current status on those projects. Thus, the teams become accountable to the employees in their department for making progress on specific ergonomics projects. As such, projects should be posted by priority with anticipated dates of completion.

7. **Team Autonomy**

Given this increased accountability to employees, ergonomic teams should also be given greater authority to make ergonomic changes within specific budgetary constraints. Important resources and information should also be accessible to the team. Experienced team employees can particularly help with these issues.

8. **Team Functioning**

Teams should be trained and monitored regarding their internal task-based processes discussed above: goal setting, prioritizing projects, and developing workable solutions to problems. Team meeting agendas should be formulated and distributed in advance of the meeting.

9. **Ergonomic Project Documentation**

Plant management should ensure that ergonomics teams are continually documenting their ergonomic project activities through the following means: written documents, videotapes (before and after), slides, and employee testimonials. This documentation process should be systematic and have a uniform format so that projects and their outcomes can be compared objectively.

10. **Release Time and Overtime**

Team members should be formally released at times from other duties to focus solely on ergonomics issues. They should also be given overtime to do some work, since psychological pressures from co-workers exist when members are released from their normal duties to work on "special" projects.

11. **More Systematic Job Analysis Needed as Teams Develop**

While at first teams should focus on the identification and implementation of relatively easy ergonomic changes in order to build team efficacy, this activity should not undermine efforts to systematically analyze work conditions and undertake large scale change.

12. **Address Existing Problems, Then Preventive Measures for CTDs**

Ergonomic interventions should follow the two-stage approach advocated by Adams (1993). The first priority should be to address existing problems with ergonomic solutions. This process should begin with a systematic job analysis process that reviews the stressors present and prioritizes the problems for implementation. Attempts should then be made to prevent CTDs by effectively designing future tools, equipment, and workstations. Employee-driven ergonomics provides a solid base for both stages of ergonomic improvement.

13. **Full-time Plant Ergonomist**

The organization's practice described here also suggests that a full-time plant ergonomist is needed to assist in coordinating the efforts of the ergonomics teams and in developing engineering solutions to designated problems. Without such an internal advocate, many important projects are either never pursued or are dropped due to lack of ergonomics expertise.

14. **Management Information System**

Finally, any effective employee involvement ergonomics effort should provide on-going feedback and information to the teams responsible for the ergonomics changes and to the top plant management. Such information is vital to the detection of worksite hazards and the development of viable solutions to ergonomic-related problems. The teams in the current plant received much of this information from the medical management staff and

university researchers regarding incidence of CTDs by type of job and tool used. Efforts must be made to establish an effective management information system that employees can easily learn how to use to gather information when they need it about ergonomic-related issues.

In conclusion, the ergonomics intervention project described in this report was an extensive effort initiated by both plant management and University faculty. As evidenced here, the project has been a success in many ways and we hope that the recommendations made here will serve to improve the process of employee involvement, job analysis, and ergonomic change in the future. The result of this process should be significant reductions in workplace illness and injuries.

REFERENCES

Adams, E. (1993, January). Second-stage: Using macro-ergonomics to "design-out" cumulative trauma risk. Occupational Health and Safety, 62, 40-45.

Alexander, D. C. (1986). The practice and management of industrial ergonomics. Englewood Cliffs, NJ: Prentice-Hall, Inc.

Caplan, S. (1990). Using focus group methodology for ergonomic design. Ergonomics, 33, 527-533.

Dyer, W. G. (1987). Team building: Issues and alternatives (2nd Ed.). Reading, MA: Addison-Wesley.

Labar, G. (1992, April). Succeeding with ergonomics. Occupational Hazards, 54, 29-33.

Noro, K., & Imada, A. S. (Eds.), Participatory ergonomics. London: Taylor & Francis.

Parker, G. M. (1991). Team players and teamwork: The new competitive business strategy. San Francisco, CA: Jossey-Bass.

Pulat, B. M., & Alexander, D. C. (Eds.). (1991). Industrial ergonomics: Case studies. New York: McGraw-Hill.

Putz-Anderson, V. (Ed.). (1988). Cumulative trauma disorders: A manual for musculoskeletal disease of the upper limb. London: Taylor and Francis, Ltd.

Regensburg, R. E., & Van der Veen, F. (1990). Marketing ergonomics within multi-disciplinary project teams. Ergonomics, 33, 553-556.

Wilson, J.R. (1991). Participation --- A framework and a foundation for ergonomics? Journal of Occupational Psychology, 64, 67-80.

APPENDIX A

FARMLAND FOODS ERGONOMIC PROGRAM MANAGEMENT GUIDELINES

Farmland Foods

Ergonomics Program

Management Guideline

Denison, Iowa

1993

FARMLAND FOODS ERGONOMIC PROGRAM MANAGEMENT GUIDELINE
DENISON, IOWA

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January 1, 1993

To all employees:

It is the policy of Farmland Foods, Inc. to maintain and preserve a safe and healthy working environment. To further these efforts the Ergonomics Committee was created and trained. I endorse and fully support the efforts of the Ergonomics Committee to identify, and eliminate ergonomic hazards that may cause unnecessary physical stress and potentially cause injury to any employee.

All managers, supervisors, employees and support staff will work together to identify, review, revise and/or establish safe, ergonomic work methods, procedures, equipment and work stations. This effort shares priority with cost reduction, productivity and quality assurance efforts and will enhance many of our existing continuous improvement efforts.

I expect and anticipate your full cooperation in these efforts.

Sincerely,

Jerry Behrens
Plant Manager
Farmland Foods, Inc.
Denison, IA

The UFCW Union Local 271 representing workers at Farmland Foods, Denison, Iowa, supports Company efforts to establish and maintain an Ergonomics Program.

Local 271 will cooperate by employee involvement on the Ergonomics Committee and Task Groups, and support Program Elements to conduct worksite analysis, work hazard prevention and control, medical management, training and education, assist with documentation and monitoring of results.

In order for this program to be successful, it will take total commitment from both management and labor.

T. J. Ray
Chief Steward
Local 271

Objective:

In maintaining Farmland Industries' commitment to protect the health of its employees as expressed in its Environment, Health and Safety Program and guided by the Farmland Environmental Health & Safety Philosophy, Farmland Foods strives to protect all employees from ergonomic hazards.

It is the mission of Farmland Foods to provide funding, knowledge and resources for employees to anticipate, recognize, evaluate and control ergonomic stressors in the work place. Ergonomics will be addressed in association with the disciplines of Health, Safety and Quality Performance.

Scope:

All employees and management of Farmland Foods shall support and actively participate in an ergonomics program to prevent disorders associated with ergonomic hazards. The Central Ergonomics Committee in cooperation with the safety staff and Director of Safety (Farmland Foods) will give direction to each task group as hazards are identified and eliminated. All employees, supervisors, managers and staff will be trained in the basic principles of ergonomics, hazard identification, hazard control and early reporting of symptoms of cumulative trauma disorders. All employees, supervisors, managers and staff will work with the Committee to review, revise and/or establish safe, ergonomic work methods, procedures, equipment and work stations. The ergonomics program will be evaluated in association with existing audit processes by the Central Ergonomics Committee.

The program will consist of the following key elements:

1. Worksite Analysis

2. Hazard Prevention and Control
   a. Engineering Controls
   b. Work Practice Controls
   c. Personal Protective Equipment
   d. Administrative Controls

3. Medical Management
   a. Injury/Illness reporting process
   b. Restricted duty program

4. Training and Education
   a. Management Training
   b. Supervisor Training
   c. Training for Engineers and Maintenance Personnel
   d. Team Effectiveness Training (Participatory Ergonomics)
   e. Principles of Ergonomics Training

f. Job-Specific Training
g. New Employee Orientation

Goals:

To implement and maintain an ongoing comprehensive ergonomics program which prevents cumulative trauma disorders and other associated injuries and provides for the comfort, well being and job satisfaction of all employees while maintaining a high quality, cost effective product.

Responsibilities:

It is the responsibility of management to provide an atmosphere that is conducive and supportive of the efforts of employees in eliminating ergonomics hazards. It is the responsibility of all employees to report early symptoms of cumulative trauma disorders, participate in ergonomic activities, and work in a manner consistent with good ergonomic principles. The Central Ergonomics Committee will oversee the implementation of the ergonomics process and will provide necessary expertise to department teams within the organization.

Management Commitment and Employee Involvement:

Farmland Foods, Inc. has committed to a team approach for addressing ergonomic opportunities. This commitment has been demonstrated in the following manner:

1. Personal concern for employee safety and health with priority placed on eliminating ergonomic hazards.

2. A policy that emphasizes safety and health of employees as a corporate objective along with quality, efficiency and productivity.

3. Communication and assignment of responsibility for ergonomics programs to appropriate managers and employees.

4. Provision for authority and resources (including funds) to responsible parties so that ergonomic objectives can be met.

5. Accountability of each responsible party to management for activities.

Written Program:

This written program will be communicated to all employees, supervisors and managers. It establishes clear goals and objectives and provides a framework upon which all departments will base their ergonomic teams. The program establishes a central Ergonomics Committee that will serve as a resource to all department teams. The written program includes implementation dates for each program element.

Structure:

The Ergonomics Committee will provide the technical expertise required by employee teams for implementation of the ergonomics program.

The Central Committee will be composed of the following representatives:

Engineering/Maintenance - Jeff Wood
Health Services/Plant Safety - Mary Daniel
Plant Management - Jim Schaben, Jerry Behrens, Dave Moore, Gary McCue
Corporate/Safety - Ron Gillespie
Union Representative - T. J. Ray
Ergonomist - Regina Neese

Ergonomics Committee members will be responsible for communicating ergonomic principles, assisting with job analyses and job-specific training.

Employee Involvement:

An employee concern program has been established to provide a forum in which all employees can bring concerns to the Ergonomics Committee without fear of reprimand or reprisal. All employees are encouraged to report early symptoms of cumulative trauma disorders (CTDs) so that early intervention might provide an environment free of ergonomic hazards. Health Services will work in cooperation with the Committee to ensure that any reported symptoms will receive follow up investigation. Ergonomic teams will work closely with the Committee to analyze injury and illness trends, identify ergonomic problem areas and offer ergonomic intervention.

Program Elements:

1. Worksite Analysis

Worksite analysis identifies existing hazards and conditions, operations that create hazards and areas where

hazards may develop. This includes close scrutiny and tracking of injury and illness records to identify patterns of traumas or strains that may indicate the development of CTDs. The objectives of worksite analysis, then are to recognize, identify and correct ergonomic hazards. Worksite analysis will be conducted by Department Teams with guidance from the Central Committee.

Hazard Prevention and Control

Once ergonomic hazards are identified through systematic worksite analysis, the next step is design of measures to prevent or control these hazards. Ergonomic hazards are prevented primarily by effective design of the work station, tools, and job. The program will use appropriate engineering and work practice controls, personal protective equipment, and administrative controls to correct or control ergonomic hazards, including those identified in the following sections.

a. Engineering Controls

Engineering techniques, where feasible, are the preferred method of control. The focus of the ergonomics program is to make the job fit the person, not to fit the person to the job. Engineering controls include the following techniques:

(1) Work station design.
(2) Tool and handle design.
(3) Design of work methods.

b. Work Practice Controls

The hazard prevention and control program includes safe and proper work methods that are understood and followed by managers, and employees. Key elements include:

(1) Proper work techniques.
(2) New employee conditioning period.
(3) Periodic review and monitoring.
(4) Adjustments and modifications to existing techniques.
(5) Knife sharpening/steeling skills training.

c. Personal Protective Equipment (PPE)

PPE shall be selected with ergonomic stressors in mind. Appropriate PPE will be provided in a variety of sizes, will accommodate the physical requirements of workers

and the job, and will not contribute to extreme postures and excessive forces. Those involved in the purchase of PPE will be instructed in the selection of this equipment to aid in future purchases.

d. Administrative Controls

Administrative controls that reduce the duration, frequency and severity of exposures to ergonomic stressors will be employed when engineering and work practice controls are not feasible. Administrative controls will include but will not be limited to the following:

(1) Job rotation.
(2) Job enlargement.
(3) Relief personnel.
(4) Working breaks and rest pauses.
(5) Two person lifts.
(6) A preventative maintenance program for hand tools.

3. Medical Management

Proper medical management is necessary to: 1) eliminate or reduce the risk of development of CTD signs and symptoms through early identification and treatment, and 2) to prevent future problems through development of information sources. The medical management program ensures early identification, evaluation and treatment of signs and symptoms of CTDs to aid in their prevention. Health services and all health care providers will be a part of the Committee, interacting and exchanging information routinely in order to prevent and properly treat CTDs. The program will address the following issues:

a. Injury and illness record keeping.
b. Early recognition and reporting.
c. Systematic evaluation and referral of employees
d. Conservative medical treatments.
e. Conservative return to work.
f. Systematic monitoring of injury/illness trends.
g. Objective testing to identify CTD's at early onset.

4. Training and Education

The purpose of training and education is to ensure that employees, supervisors, managers, and health care providers are sufficiently informed about ergonomic hazards. These groups are thus able to participate actively in their own protection and the entire ergonomics program. Individuals who may affect processes (i.e. maintenance personnel,

engineers, and purchasing personnel) shall be trained so that all employees will understand their role in the ergonomics process. The program has been designed with the assistance of an ergonomist and all training will be provided by employee trainers who have been trained and qualified to provide ergonomic guidance to other employees. Training will include but will not be limited to the following:

a. All affected employees.
b. Engineers and maintenance personnel.
c. Supervisors.
d. Managers.
e. Health care providers.

5. Documentation and Monitoring of Results

The Committee will maintain a log of all projects submitted, the expected project completion date and those parties responsible for implementation and tracking. In addition, the Committee will maintain a record of job analyses conducted before and after implementation. The Committee, in conjunction with the maintenance department, will prioritize ergonomic projects and estimate completion dates. Priority will be based on a number of factors including:

a. Cost of the project.
b. Benefit to the involved employees.
c. Number of employees affected by the proposed change.
d. Estimated time required to complete the task.
e. Available in house resources to devote to the project.
f. Impact on the quantity and quality of production.

APPENDICES

A. Glossary

Anthropometry: the study of the size of people: measurement of the body

Carpal Tunnel Syndrome: a disorder of the "wrist tunnel." Symptoms include tingling and numbness of the first three fingers and thumb, loss of sensation in hands, inability to grip. Caused by entrapment of the median nerve at the wrist.

CTD: *see Cumulative Trauma Disorder*

CTS: *see Carpal Tunnel Syndrome*

Cumulative Trauma Disorder: health disorders arising from repeated biomechanical stress due to ergonomic hazards. A class of musculoskeletal disorders involving damage to the tendons, tendon sheaths, synovial lubrication of the tendon sheaths, and the related bones, muscles, and nerves of the hands, wrists, elbows, shoulders neck and back.

Ergonomic hazards: any risk created by factors including posture (both static and dynamic) force, repetition and the work environment.

Ergonomics: from the greek; ergon meaning work and nomos referring to the study of or knowledge of. The study of work; the process of fitting the work environment to individuals.

Ergonomist: a person who possesses a recognized degree or professional credentials in ergonomics or a closely allied field and who has demonstrated, through knowledge and experience, the ability to identify and recommend effective means of correction for ergonomics hazards in the work place.

Strain: injury resulting from use or overuse (generally overuse of muscles or tendons.)

Sprain: an injury to a ligament when the joint is carried through a range of motion greater than normal, but without dislocation or fracture.

Tendonitis: inflammation of a tendon.

Tenosynovitis: inflammation of the synovial sheath surrounding a tendon, often accompanied by *tendonitis.*

B. Time Line for Program Implementation

	MONTH	JAN				FEB				MAR					APR				MAY				JUNE				JULY				AUG				SEP				OCT			
	WEEK	1	2	3	4	1	2	3	4	1	2	3	4	5	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
TASK	RESPONSIBLE PARTY																																								
Written program review	RN,RG	X	X	X	X	X	X	X	X	X	X	X	X	X																												
Employee survey	RN, UNL, RG	X																																							
Statistical Analyses	RN, RG, MD	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
OSHA 200 logs	RN, RG, MD	X	X	X	X	X	X	X																																	
Medical records	MD, RG, RN		X	X	X	X	X	X	X																																
Workers Compensation	RN, RG	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X																				
Training/Education	RN																																								
Team Building	RN		X	X	X	X	X	X	X																																
Ergonomic Principles	RN					X	X	X	X	X	X	X	X	X	X	X	X	X																								
Ergo for Managers	RN						X	X	X	X	X	X	X	X	X	X	X	X																								
Ergo for Engineers/Maint	RN						X	X	X	X	X	X	X	X	X	X	X	X																								
Plant wide Ergo Basics	RN														X	X	X	X	X	X	X	X																			
Worksite Analysis	UNL, RN	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Job Analyses	UNL, RN	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Priority Scheduling	UNL, RN														X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X				
Medical Management	MD, UNL									X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
New Employees	MD, UNL									X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Existing Employees	MD,UNL	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Ergo Committee Meetings	MD,RG,RN,																																								
Employee Concern Program	RG, RN																																								
Work Order Logs	MD,RN																																								
Refresher Training	MD																																								
Pre-Conditioning Program	MD,UNL,RN																																								

C. Ergonomics Committee Members

KILL & RENDERING TEAM:
Jim Schaben (Facilitator), Lonnie Kastner, Rod Koch, Dennis McMains, T.J. Ray, Sean Ernst, Nancy Wiese RN.

CUT & LOADING TEAM:
Jerry Behrens (Facilitator), Dave Blum, Randy Brown, Ron McCoid, Marilyn Borkowski RN, Dennis McFarland, Gaylen Reetz.

PROCESS TEAM:
David Moore (Facilitator), Duane Cato, John Fairchild, Marvin Graeve, Rick Lahr, Stanley Meyer, Dave Swanson.

BONING, SPECIAL MEATS & CASE READY TEAM:
Mary Daniel RN (Co-facilitator), & Terry Orness (Co-facilitator), Ardell Adams, James Beam, Russ Lamaak, Diane Pedersen, Bill Whitenack.

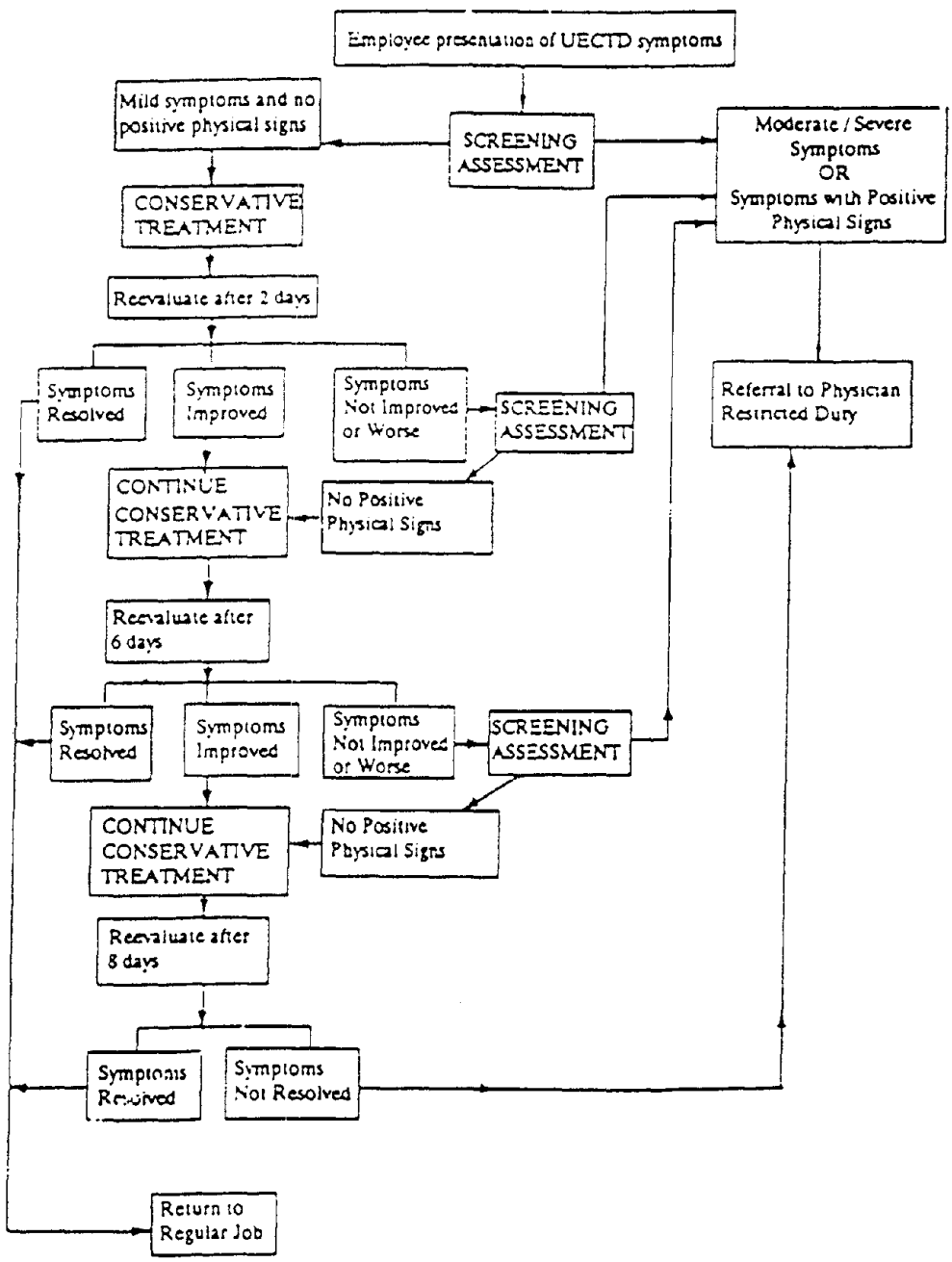
NIGHT SHIFT TEAM:
Gary McCue (Facilitator), Marie Blackman, Robert Fisher, Richard Green, Joel Kluver, Melvin Palmer, Mary Popp, Mary Tigges RN, Dave Wingrove.

ADDITIONAL ERGONOMICS COMMITTEE MEMBERS at PLANT:
Denise Baldwin, Personnel; Dale Carstensen, Supply;
Kevin Schurke, Maintenance; Larry Schwarte, Purchasing;
Larry Stone, Maintenance Superintendent;
Jeff Wood, Maintenance Planner.

ADDITIONAL ERGONOMICS COMMITTEE MEMBERS at CORPORATE:
Ron Gillespie, Director Safety, Farmland Foods, Inc.
Kevin Fisher, Director I.E., Farmland Foods, Inc.
Regina Neese, Ergonomist, Environmental Safety Services,

D. Medical Management Program

Upper Extremity (UE) Cumulative Trauma Disorders (CTDs) Algorithm



APPENDIX B

TEAM TRAINING HANDOUTS

TEAM NAME:_____

Members: _____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

Resources: Regina Neese, ergonomist

Team members:

Team leader : _____

Responsibilities : _____

_____

_____

_____

Scribe: _____

Responsibilities : _____

_____

_____

_____

Other: _____

Responsibilities : _____

_____

_____

_____

General Meeting Guidelines:

- Begin and end on time
- Use agendas
- Have a facilitator/leader
- Take minutes
- Draft next agenda
- Use the "100 mile rule"
- What's said here, stays here

Effective Discussion Skills:

- Listen
- Ask for clarification
- Deal with facts not emotions
- Criticize carefully
- Praise when appropriate
- Participate! Every opinion is valid

Guidelines for Constructive Feedback

- Acknowledge the need for feedback
- Give both positive and negative feedback
- Understand the context in which feedback is given
- Know when to give feedback
- Know how to give feedback
- Know how to receive feedback

When giving feedback:

- *Be sincere*
- *Be descriptive*
- *Don't use labels*
- *Don't exaggerate*
- *Don't be judgemental*
- *Speak for yourself*
- *Use "I" messages*
- *Phrase issues as statements, not questions*
- *Restrict feedback to things you know for certain*
- *Help people accept compliments when giving positive feedback*

When receiving feedback:

- *Breathe*
- *Listen carefully*
- *Ask questions for clarity*
- *Acknowledge the feedback*
- *Acknowledge valid points*
- *Take time to sort out what you've heard*

Project team meeting record

Meeting number:_____ Date:_____

1. MEETING GOAL:

_____

_____

_____

_____

_____

2. ATTENDANCE [(x) indicates present at meeting]:

( )	( )	( )
( )	( )	( )
( )	( )	( )
( )	( )	( )

3. AGENDA:
Enter key words indicating the agenda topics. Check off an item when it is completed. Items you do not complete should be carried over to the next meeting.

( ) 1. Agenda review

( ) 2. _____

( ) 3. _____

( ) 4. _____

( ) 5. Assignment of action items

( ) 6. Set agenda for next meeting

( ) 7. Meeting review

4. BRIEF SUMMARY: summarize topics, decisions or conclusions, action items and next steps.

Topic 1: _____

_____

Main Points: _____

_____

Decisions: _____

_____

Next Steps: _____

_____

Action Items: 1._____ 2._____

3._____ 4._____

Person(s) responsible: _____

Topic 2: _____

_____

Main Points: _____

_____

Decisions: _____

_____

Next Steps: _____

_____

Action Items: 1._____ 2._____

3._____ 4._____

Person(s) responsible: _____

5. FUTURES FILE: items for future consideration but not for the next meeting.

6. MEETING REVIEW: + - (group vote, circle one)

7. NEXT MEETING:

Date:_____ Time:_____ Place:_____

Recorder signature:_____

What Is Consensus?

Any group's goal should be to reach decisions that best reflect the thinking of all group members. We call this "reaching consensus"—a phrase used repeatedly throughout this handbook. It is easy to be confused about what consensus is and isn't, so here are some guidelines:

Consensus is...

- Finding a proposal acceptable enough that all members can support it; no member opposes it.

Is not...

- A unanimous vote—a consensus may not represent everyone's first priorities.
- A majority vote—in a majority vote, only the majority gets something they are happy with; people in the minority may get something they don't want at all, which is not what consensus is all about.
- Everyone totally satisfied.

Requires...

- Time
- Active participation of all group members
- Skills in communication: listening, conflict resolution, discussion facilitation
- Creative thinking and open-mindedness

Aiming for consensus at a meeting requires a much different strategy than if you were just going to keep on arguing until you had a unanimous vote (or even a majority vote). To reach consensus, the team must have each member participate fully in the decision. That probably means going through several rounds of an outlined process. How do you know when you have reached consensus? Probably no one will be completely satisfied with the decision, but everyone can live with it. The decision-making processes described in this chapter can help you reach consensus, particularly when the group is new.

Not every decision need have the support of every member—in fact, it is impossible to have such agreement in any group. Your group should decide ahead of time when you will push for consensus. Decisions that may have a major impact on the direction of a project or conduct of the team—such as which problem to study, or what ground rules to establish—should belong to the whole team and be supported by consensus.

The brainstorming, multivoting, and nominal group technique methods described in this chapter are very structured ways to reach consensus. Other less-formed methods exist, and a team can explore them as members become more relaxed in working with each other.

Team Presentations

Every team, sooner or later, will be asked to make a presentation to mark key milestones in its project. Some examples are when the team has documented the causes of a major quality or productivity problem, when a remedy has been tested and proven successful, or at the conclusion of a project.

These presentations usually take about 30 minutes. They should be self-contained, covering the context, purpose, key activities, and results of the project in a way that is understandable to anyone unfamiliar with the project. Involve every team member in the presentation.

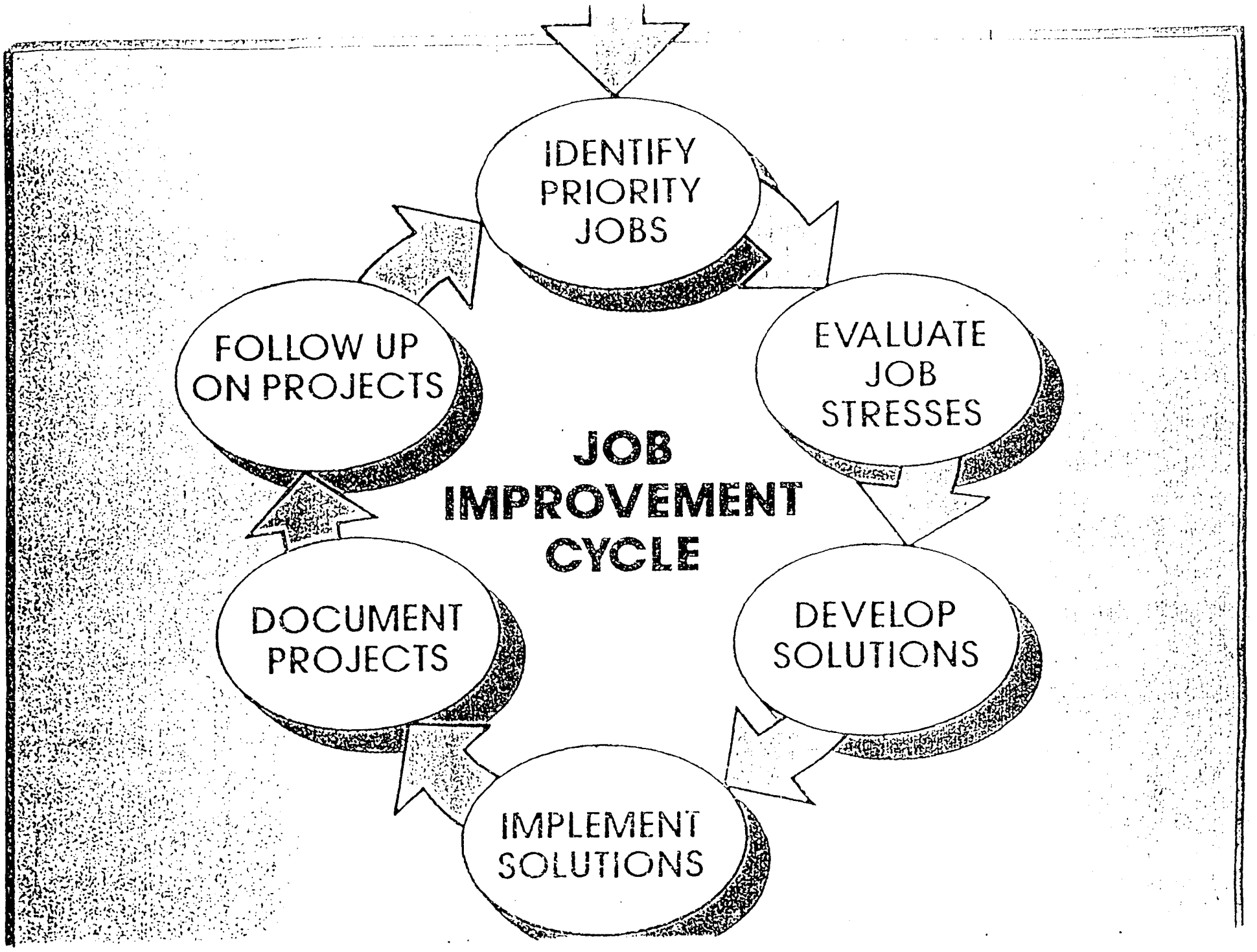
While a guidance team is ordinarily the first audience for such presentations, potential audiences include other employees, the board of directors, suppliers, customers, other local businesses, and professional organizations.

Here's one recommended outline for these presentations:

1. **Introduction**
   - 1.1 Purpose of the project (mission).
   - 1.2 Achievements or major findings.
   - 1.3 Suggested next steps.

2. **Description**
   - 2.1 Main conditions found at outset of project.
   - 2.2 Major experiments/investigations done. Emphasize the purpose rather than detailed descriptions.
   - 2.3 Outcomes of experiments/investigations. Show results and charts. Describe impact and implications of outcomes/problems.
   - 2.4 Repeat steps 2.2 and 2.3 as many times as necessary to get final results. Keep these to a minimum to prevent confusion. Stick to "punch lines."
   - 2.5 Achievements or major findings (a repeat of step 1.2). Show savings/potential savings or potential improvements. If costs or savings in approximate dollars are available, show them. If not, give examples of costs that cannot be quantified.

3. **Conclusions**
   - 3.1 Impact of findings on system being studied.
   - 3.2 Suggestions for future work.
   - 3.3 Suggestions for managers.
   - 3.4 Other recommendations.
   - 3.5 Acknowledgements.


IDENTIFY PRIORITY JOBS
EVALUATE JOB STRESSES
DEVELOP SOLUTIONS
IMPLEMENT SOLUTIONS
DOCUMENT PROJECTS
FOLLOW UP ON PROJECTS
JOB IMPROVEMENT CYCLE

APPENDIX C

ERGONOMICS TEAM PROJECT STATUS REPORTS

ERGONOMIC COMMITTEE PROJECTS - 1993			
DEPARTMENT:	Boning/Special Meats	COMPLETE:	INCOMPLETE:

PROJECTS		DESCRIPTION
1	TITLE	Boning platform stairs
	JOB	all
	JOB PLACEMENT	all
	JOB PURPOSE	remove bone from muscle, trim muscle to specification
	WORKERS	104+
	STRESSORS	unsure footing
	PROJECT STATUS	complete (10-1-92) - built on staircase on south end of catwalk
2	TITLE	incline belt transfer inner shank
	JOB	inner shank trimmer
	JOB PLACEMENT	remove face/membrane skinner
	JOB PURPOSE	remove and trim inner shank meat
	WORKERS	2
	STRESSORS	force(lifting), twisting, dumping over a barrier, psychological (always "catching up.")
	PROJECT STATUS	complete (2-1-93) - built incline belt to crossover line
3	TITLE	Crossover conveyor height
	JOB	final trimmers
	JOB PLACEMENT	cushion final trim/product vat
	JOB PURPOSE	prepare meat to specifications

	WORKERS	4
	STRESSORS	force (perceived weight 3-7#'s), throw product overhead, reaching forward and up
	PROJECT STATUS	complete (1/7/93) - lowered drossover line 6 inches
4	TITLE	Wind socks
	JOB	all boning room
	JOB PLACEMENT	all affected
	JOB PURPOSE	104+, all shifts
	WORKERS	bone and trim hams to specifications
	STRESSORS	cold and drafty
	PROJECT STATUS	complete (9/15/92) - installed wind socks and new cooling units
5	TITLE	Wind sock gap/collars
	JOB	final trimmers
	JOB PLACEMENT	cushion final trim/product vat
	JOB PURPOSE	prepare and trim meat to specs
	WORKERS	4
	STRESSORS	cold and drafty
	PROJECT STATUS	complete (4/1/93) - wind socks did not seal properly to chillers and draft was evident in areas adjacent to the chillers. Collars were purchased to complete the seal and eliminate wind chill.
6	TITLE	Whizard knife safety brake
	JOB	final trimmers and fatters
	JOB PLACEMENT	
	JOB PURPOSE	remove outer fat and trim muscle

	WORKERS	48
	STRESSORS	force, grip, static muscle loading in fingers and hand
	PROJECT STATUS	complete (3/93) - eliminated safety cables
7	TITLE	Knife sharpening-razor's edge and mousetraps
	JOB	boners and trimmers
	JOB PLACEMENT	all knife jobs
	JOB PURPOSE	bone and trim hams
	WORKERS	113
	STRESSORS	human error, force from dull knives, repetition
	PROJECT STATUS	complete (9/15/93) - purchased and installed razor's edge sharpening and mousetrap steeling system
8	TITLE	knife sharpening/steeling training
	JOB	all knife jobs
	JOB PLACEMENT	all jobs
	JOB PURPOSE	bone and trim hams
	WORKERS	213
	STRESSORS	psychological (resistance to change)
	PROJECT STATUS	complete (but on-going for new employees)
9	TITLE	hydraulic vat tipper
	JOB	all departments
	JOB PLACEMENT	all
	JOB PURPOSE	clean and sanitize vats

	WORKERS	4
	STRESSORS	force, static postures, gripping of vat under load, psychological (perceived inability to keep up.)
	PROJECT STATUS	complete (10/1/92) - installed hydraulic vat tippers in washroom
10	TITLE	Membrane skinner-knee pedal adaptation
	JOB	face meat skinners
	JOB PLACEMENT	remove face/cushion final trim
	JOB PURPOSE	remove fat and membrane from face meat
	WORKERS	8
	STRESSORS	awkward postures, force on knee
	PROJECT STATUS	completed (5/8/93) - replaced knee pedal with handle, welded 12" pipe to pedal
11	TITLE	selo machine sit/stand
	JOB	
	JOB PLACEMENT	
	JOB PURPOSE	
	WORKERS	1
	STRESSORS	static posture, fatigue in feet, legs and back
	PROJECT STATUS	completed ( ) - installed sit/lean stand
12	TITLE	selo machine mechanical assist/tub opener
	JOB	
	JOB PLACEMENT	
	JOB PURPOSE	open round tub doors
	WORKERS	1

	STRESSORS	high force, awkward postures
	PROJECT STATUS	complete (4/92) installed hook and chain to wall
13	TITLE	
	JOB	
	JOB PLACEMENT	
	JOB PURPOSE	
	WORKERS	
	STRESSORS	
	PROJECT STATUS	
14	TITLE	Picnic meat dump station
	JOB	bone and trim picnics
	JOB PLACEMENT	product vat/picnic boner
	JOB PURPOSE	bone and trim picnics
	WORKERS	8
	STRESSORS	lifting (over an obstruction), reaching, elbow abduction, shoulder abduction
	PROJECT STATUS	complete (6/10/93) - installed large cutting board at base of dumper
15	TITLE	Loin end conveyor
	JOB	loin end boning
	JOB PLACEMENT	loin end boners/product vat
	JOB PURPOSE	bone and trim loin ends
	WORKERS	4
	STRESSORS	forces: lifting, carrying, dumping of 70 pound tubs

ERGONOMIC COMMITTEE PROJECTS - 1993			
DEPARTMENT: Cut/Loading		COMPLETE:	INCOMPLETE:
PROJECTS		DESCRIPTION	
1	TITLE	Draw knife	
	JOB	Loin pulling	
	JOB PLACEMENT	After cleaning channels/before cut off jowls	
	JOB PURPOSE	Remove loin from side (belly)	
	WORKERS	4	
	STRESSORS		
	PROJECT STATUS		
2	TITLE	Carcass conditioning, hard hogs	
	JOB	Affects all knife jobs	
	JOB PLACEMENT	After coolers	
	JOB PURPOSE		
	WORKERS	Up to 158	
	STRESSORS	Dry hard meat causes drag when using a knife. Increased for to cut meat difficult to drag and position on conveyor.	
	PROJECT STATUS	On-going, warmed cooler 2 degrees, looking to measure temperature humidity *Note: recommend that splitter (or first knife job) keep a tally of time of day and lot # (tag #) of hogs to attempt to identify whether issue is cooler problem or issue with the lot of hogs.	

3	TITLE	Loin end pack off re-design
	JOB	Wrap and box loins
	JOB PLACEMENT	Classifier/mule driver
	JOB PURPOSE	Prepare loin ends for transfer
	WORKERS	4
	STRESSORS	
	PROJECT STATUS	Need to identify stressors and move forward.
4	TITLE	Square cut butts redesign
	JOB	Trim butts
	JOB PLACEMENT	Butt pullers/grade and trim fancy
	JOB PURPOSE	Specific cut to square off butt (picnic/shoulder)
	WORKERS	5
	STRESSORS	Force, hand position (radial/ulnar deviation), increased volume/repetitions, elbow abduction, twisting of torso, forces from upper arm and shoulder forward neck posture.
	PROJECT STATUS	On-going (waiting for changes that are production oriented) consideration given to semi-automation awaiting final approval.
5	TITLE	Boxroom - fatigue mats
	JOB	Box maker
	JOB PLACEMENT	Independent of line, feeds packaging areas through chutes
	JOB PURPOSE	Erect various sized cartons for many product lines
	WORKERS	3
	STRESSORS	Prolonged standing on concrete, static postures

	PROJECT STATUS	10/93
6	TITLE	Fat belts
	JOB	Any trim and saw job
	JOB PLACEMENT	Around trim lines
	JOB PURPOSE	Remove fat away from lines when fat accumulates on line
	WORKERS	One at a time
	STRESSORS	Bending/crawling under line, reaching, pinch grip, exposure to sharp edges
	PROJECT STATUS	Completed 10/93 - purchased and installed 3 floor mats, reduced fatigue.
7	TITLE	Whizard knife
	JOB	Whizard knife jobs
	JOB PLACEMENT	Varies, some trim jobs
	JOB PURPOSE	remove excess fat from finished product
	WORKERS	< 10
	STRESSORS	Wrist postures (flexion, extension, radial and ulnar deviation,) vibration prolonged gripping (precision/power grip), static postures of neck, shoulders, and lower back
	PROJECT STATUS	Abandoned
8	TITLE	Neckbone lifters workbench
	JOB	Neckbone lifters
	JOB PLACEMENT	?/trim neckbones
	JOB PURPOSE	To remove neckbone from shoulder and deliver to neckbone trim
	WORKERS	4

	STRESSORS	Prolonged standing on concrete, one worker standing on incline (upper extremity concerns not considered in this project)
	PROJECT STATUS	Completed (10/93) - removed concrete slab and installed individual adjustable height work stations. Eliminated incline.
9	TITLE	Brick floor
	JOB	All of cut floor
	JOB PLACEMENT	All
	JOB PURPOSE	
	WORKERS	158
	STRESSORS	Uneven and cracked surfaces resulted in unsure footing
	PROJECT STATUS	1/94
10	TITLE	Scribe saw counterbalance
	JOB	Scribe ribs
	JOB PLACEMENT	Position for shoulder knife/hook loins
	JOB PURPOSE	Mark ribs (saw cut down the ribs) to permit pullers to place draw knife
	WORKERS	2
	STRESSORS	repetition, forward reach, static forward extension, vibration, force to support tool, awkward posture (forward bending of back)l Perceived tool weight is 5 pounds.
	PROJECT STATUS	On-going
11	TITLE	Hand warmers
	JOB	
	JOB PLACEMENT	
	JOB PURPOSE	

WORKERS	
STRESSORS	cold
PROJECT STATUS	

12	TITLE	Boxmaker job needs assessment
	JOB	Box maker
	JOB PLACEMENT	Not line dependent, meets packaging demand
	JOB PURPOSE	Erect cases for various types of product
	WORKERS	3
	STRESSORS	Pinch grip, twisting, forces from folding corrugate, prolonged standing, static postures, throwing boxes, forces from tearing defective roll stock bags, shoulder and elbow abduction, erratic work flow due to chutes jamming up
	PROJECT STATUS	On-going (need to review box designed to simplify/work with box and bag manufacturer to improve quality). Will modify chutes as cut floor is re-designed.
13	TITLE	New ultra supreme
	JOB	New ultra supreme product line
	JOB PLACEMENT	N/A
	JOB PURPOSE	to be determined
	WORKERS	to be determined
	STRESSORS	N/A
	PROJECT STATUS	Dependent on installation of new line
14	TITLE	Dock refrigeration
	JOB	All loading dock
	JOB PLACEMENT	Entire area
	JOB PURPOSE	Move finished product into storage racks and/or trucks
	WORKERS	Varies per shift up to 56 on three shifts
	STRESSORS	Noise (resulting in both physical and psychological stressors), draft (cold)

	PROJECT STATUS	On-going
15	TITLE	Mule and rider truck maintenance
	JOB	All
	JOB PLACEMENT	Entire area
	JOB PURPOSE	To transport product into storage racks and/or trucks
	WORKERS	Varies per shift up to 56 on three shifts
	STRESSORS	High pull forces due to low batteries in mule, limited space creating awkward postures, twisting, turning, forces on knees turning corners, poor traction.
	PROJECT STATUS	On-going but 3 new riders on order (not received)
16	TITLE	Palletized fresh pork product
	JOB	All
	JOB PLACEMENT	Entire area
	JOB PURPOSE	
	WORKERS	Varies per shift up to 56 on three shifts
	STRESSORS	Results in higher repetitions, more pounds/forces lifted, bending, twisting, carrying, open grip with force, elbow abduction
	PROJECT STATUS	Complete at this point due to production constraints
17	TITLE	Pallet wrapper needs assessment
	JOB	Cut/ship
	JOB PLACEMENT	Prior to truck loading
	JOB PURPOSE	
	WORKERS	34

	STRESSORS	Psychological - waiting for a process perceived as too slow
	PROJECT STATUS	Complete 11/93 - manufacturer explained the reasons why the machine appeared to be so slow, employee perception changed and psychological stressor was eliminated.
18	TITLE	
	JOB	
	JOB PLACEMENT	
	JOB PURPOSE	
	WORKERS	
	STRESSORS	
	PROJECT STATUS	
19	TITLE	
	JOB	
	JOB PLACEMENT	
	JOB PURPOSE	
	WORKERS	
	STRESSORS	
	PROJECT STATUS	

ERGONOMIC COMMITTEE PROJECTS - 1993			
DEPT: Kill/rendering		COMPLETE:	INCOMPLETE:
PROJECTS		DESCRIPTION	
1	TITLE	Razor's edge, sharpening and steeling	
	JOB	Cheek and heads, trim cheeks, utility, eviscerate, tongue heads, trim tongues, mark temples, remove temple meat, doctor's helper, mark kidneys, remove tenders, round heads, open hogs, shave bellies, shave shoulders, remove eyelids,save skirt meat, save bile, remove hearts, remove lungs, stick holes, notch toes, drop heads, remove shackle mark, shave hams.	
	JOB PLACEMENT	affects all knife jobs	
	JOB PURPOSE	preparing carcasses to specifications	
	WORKERS	59/210	
	STRESSORS	force (proper steeling reduces force required to cut meat, repetition (more repetitions required for conventional steeling.)	
	PROJECT STATUS	complete (3/93)-purchased razor's edge sharpening system, purchased and installed approximately 59 mousetraps.	
2	TITLE	sticker area ventilation	
	JOB	sticker, shackler, stunner, hog drivers	
	JOB PLACEMENT	yards/scald tub	
	JOB PURPOSE	move live animal through process to prepare for shackling	
	WORKERS	5	
	STRESSORS	heat, ammonia odor from urine	
	PROJECT STATUS	complete (5/10/91)-installed outside fans, created more desirable working conditions	

3	TITLE	leaf lard starters
	JOB	leaf lard pullers
	JOB PLACEMENT	pop kidneys/scrape lard
	JOB PURPOSE	removal of lard from rib section of carcass
	WORKERS	5
	STRESSORS	fingernail deterioration, force on fingers and forearms, bending at low back
	PROJECT STATUS	complete (11/4/92)-purchased and installed leaf lard starters, met with initial resistance, which was resolved. no finernail concerns. no doctor cases or lta's in following six months, preciously experienced weekly doctor cases and monthly lta's.
4	TITLE	head dropper sit/lean
	JOB	head dropper
	JOB PLACEMENT	notch toes/dr. helper
	JOB PURPOSE	drop head away from carcass to prepare for inspection and processing
	WORKERS	4
	STRESSORS	fatigue of back, legs, and feet from static postures
	PROJECT STATUS	complete (11/12/91)-sit /lean installed at the workstation

5	TITLE	mouth washer sit/lean
	JOB	mouth washer
	JOB PLACEMENT	shoulder shaver/skinner
	JOB PURPOSE	rinse fecal matter from head and mouth of carcass
	WORKERS	1
	STRESSORS	fatigue of back, legs and feet from static postures
	PROJECT STATUS	complete (2/7/92)-sit/lean installed at the workstation
6	TITLE	gam table ventilation
	JOB	hang off straighten, cut cords
	JOB PLACEMENT	
	JOB PURPOSE	to prepare hog
	WORKERS	5
	STRESSORS	heat, air quality of air
	PROJECT STATUS	complete (7/12/92)-removed bricks from wall which provided circulation and improved employee morale
7	TITLE	Rounding heads equipment re-design
	JOB	rounding heads
	JOB PLACEMENT	head dropper/USDA inspector
	JOB PURPOSE	remove ears & remove hair patches
	WORKERS	2
	STRESSORS	reaching to sterilizer, cuts
	PROJECT STATUS	completed 7/14/92 enlarged work area, installed sink

8	TITLE	Equipment re-design, aorta, gullet, spreaders, kidneys
	JOB	aorta,/gullet, spreaders, popping kidneys
	JOB PLACEMENT	split saw-drs. helper
	JOB PURPOSE	prepare carcass for final inspection
	WORKERS	2
	STRESSORS	cuts, repetition, reaching
	PROJECT STATUS	completed 2/93 enlarged bench area-installed sink
9	TITLE	notching toes: carcass stop
	JOB	notching toes
	JOB PLACEMENT	eyelids/drop head
	JOB PURPOSE	remove skin and hair between toes of carcass
	WORKERS	2
	STRESSORS	psychological fear of being hit by carcass
	PROJECT STATUS	completed 4/4/93-installed sway bar to stop swing of carcasses
10	TITLE	dropping heads handle re-design
	JOB	dropping heads
	JOB PLACEMENT	notch toes/dr. helper
	JOB PURPOSE	to remove head from carcass, but leave attached for further inspection
	WORKERS	4
	STRESSORS	repetitive finger trigger action, forces on fingers
	PROJECT STATUS	completed (5-4-93)-modified trigger on head dropper

11	TITLE	stockyard ventilation
	JOB	hog driver
	JOB PLACEMENT	first/stunner
	JOB PURPOSE	corral/move live animals to stunner
	WORKERS	5
	STRESSORS	temperature: heat/cold, air quality
	PROJECT STATUS	complete (6/24/93)-installed fans
12	TITLE	steel chute remodel
	JOB	rendering
	JOB PLACEMENT	first/grinder
	JOB PURPOSE	move inedible carcasses from floor to grinder
	WORKERS	4-on each shift
	STRESSORS	push/pull forces, reaches, grip, bending
	PROJECT STATUS	complete (8/7/93)-installed roller conveyor to move inedible product
13	TITLE	grinder auger re-design
	JOB	rendering
	JOB PLACEMENT	chute/grinder
	JOB PURPOSE	convey inedibles into grinder
	WORKERS	4 (1 each shift)
	STRESSORS	pushing,pulling,grasping,reaching, psychological fear of getting behind and falling into auger
	PROJECT STATUS	complete (8/14/93)-reversed flow of auger

14	TITLE	shackle table re-design
	JOB	shackler
	JOB PLACEMENT	stunner/sticker
	JOB PURPOSE	place hogs in shackle so they can be lifted onto line
	WORKERS	4
	STRESSORS	awkward postures,forces required to move hog,pulling,reaching,bending,grasping,psychological fear of being kicked
	PROJECT STATUS	complete (9/93)-carcass pulled from table more quickly, improved quality since there is minimal re-hanging of hogs
15	TITLE	hog shower alleyway
	JOB	hog driver
	JOB PLACEMENT	none/stunner
	JOB PURPOSE	move animal from shower to stunner
	WORKERS	5
	STRESSORS	noise,fear of being trampled
	PROJECT STATUS	complete (9/14/93)-re-designed area to eliminate corner. kept hogs from congregating in corner and eliminated need to climb over animals to move them. Eliminated crowding, kept animals calm which in turn improved meat quality

16	TITLE	stick hole station re-design
	JOB	stick hole remover
	JOB PLACEMENT	dr. helper/split saw
	JOB PURPOSE	remove contaminated area from stick area
	WORKERS	1
	STRESSORS	reaching,awkward postures,static postures
	PROJECT STATUS	completed (9/15/93) installed and moved sterilizer closer to worker to eliminate reaching and twisting. wider bench allowed movement and reduced static fatigue.
17	TITLE	skirt meat station re-design
	JOB	skirt meat
	JOB PLACEMENT	remove hang tenders/cooler
	JOB PURPOSE	remove tender meat from carcass
	WORKERS	1
	STRESSORS	overhead reaches, unstable footing, twisting
	PROJECT STATUS	completed (10/93)-built and installed catwlak,improved employee perception of comfort
18	TITLE	head table whizard knife handles
	JOB	trim cheeks,tongue heads,trim tongues,mark temples,remove temples
	JOB PLACEMENT	pull pancreas/variety meat
	JOB PURPOSE	remove meat from skull
	WORKERS	29
	STRESSORS	grip, hand forces, vibration, forward head flexion
	PROJECT STATUS	complete (12/15/93)-left-handed grip purchased for employee,thumb rests installed

19	TITLE	leaf lard starter re-design
	JOB	leaf lard puller
	JOB PLACEMENT	pop kidneys/scrape lard
	JOB PURPOSE	remove leaf lard from rib section of carcass
	WORKERS	4
	STRESSORS	gripping repetitively, wrist deviation
	PROJECT STATUS	on-going
20	TITLE	head table re-design
	JOB	tongue heads,trim tongues,round heads, clean ears,mark temples,chisel heads,feed jaw breaker,remove temple meat,cheek head, frim cheeks, remove head meat, save pits and brains
	JOB PLACEMENT	pull pancreas/variety meat
	JOB PURPOSE	remove edible meat from skull for further processing
	WORKERS	29
	STRESSORS	awkward posture,wrist deviation,static postures,force
	PROJECT STATUS	on-going-investigating automated/mechanized head tables
21	TITLE	work station
	JOB	remove livers
	JOB PLACEMENT	save uteri/remove liver skirt meat
	JOB PURPOSE	to remove the liver from abdominal organs
	WORKERS	1
	STRESSORS	reaching,bending,twisting,unsure footing
	PROJECT STATUS	catwalk completed 10/9/93

22	TITLE	north dress floor-catwalk elevation
	JOB	notch hind toes
	JOB PLACEMENT	feed line/shave hams
	JOB PURPOSE	to remove hair and shackle marks
	WORKERS	1
	STRESSORS	reaching,full body extension
	PROJECT STATUS	completed 1/24/94-elevated stand area
23	TITLE	lard room
	JOB	lard rendering
	JOB PLACEMENT	none
	JOB PURPOSE	to render lard
	WORKERS	2
	STRESSORS	heat,reaching,unsure footing, psychological fear of burns and falls
	PROJECT STATUS	completed (9/10/93) - improved floor, raised platforms to batch cookers, replaced catwalks

24	TITLE	railcar access & work platform
	JOB	lard rendering
	JOB PLACEMENT	none
	JOB PURPOSE	to load railcars with lard for shipment
	WORKERS	1
	STRESSORS	psychological unsure footing
	PROJECT STATUS	in process
25	TITLE	
	JOB	
	JOB PLACEMENT	
	JOB PURPOSE	
	WORKERS	
	STRESSORS	
	PROJECT STATUS	

ERGONOMIC COMMITTEE PROJECTS - 1993

DEPARTMENT: Night Shift	COMPLETE:	INCOMPLETE:

PROJECTS		DESCRIPTION
1	TITLE	Mousetrap
	JOB	boners, trimmers
	JOB PLACEMENT	fatters/final trimmers
	JOB PURPOSE	remove bone and trim muscle to spec
	WORKERS	24
	STRESSORS	wrist deviation, force, elbow and shoulder abduction
	PROJECT STATUS	on-going, purchased razor's edge sharpening equipment with mousetrap, sent hollow grind sharpener back for repair, trained all employees in use of new equipment, still resolving knife room issues.
2	TITLE	boning room stairs
	JOB	boners, trimmer, miscellaneous
	JOB PLACEMENT	skinners/service people
	JOB PURPOSE	removing bone and trimming to spec
	WORKERS	22
	STRESSORS	unsure footing, slippery surfaces
	PROJECT STATUS	completed 9/6/93, installed stairs instead of ladder to platform

3	TITLE	Whizard steel (edge master)
	JOB	fatters and trimmers
	JOB PLACEMENT	skinners/service people
	JOB PURPOSE	to remove fat and trim muscle to spec
	WORKERS	20
	STRESSORS	wrist, elbow and shoulder deviation, proper steeling reduces forces required to trim
	PROJECT STATUS	on-going - brought in an 850, 1000 and 1300 to test. Trials favorable.
4	TITLE	Inner shank belt
	JOB	shank boner
	JOB PLACEMENT	aitch boner/body boner
	JOB PURPOSE	remove shank meat from the bone
	WORKERS	4
	STRESSORS	forces from carrying 75 pounds of meat and dumping into combo
	PROJECT STATUS	completed 1/93 - installed take away conveyor to move product, eliminated carrying and dumping
5	TITLE	lower face belt
	JOB	Final trimmers
	JOB PLACEMENT	trimmer/service people
	JOB PURPOSE	trim face muscle to spec
	WORKERS	4
	STRESSORS	wrist deviation, shoulder abduction, elbow abduction and overhead reach
	PROJECT STATUS	completed 1/93 - lowered face take away conveyor by 12 inches, favorable result - no injuries on night shift attributed to this task.

6	TITLE	Lean shank job moved from boner to trimmer
	JOB	shank boner
	JOB PLACEMENT	aitch boner/body boner
	JOB PURPOSE	removed lean shank portion to trim to spec
	WORKERS	4
	STRESSORS	psychological stress (perceived high workload, measured at 96% of workload), higher forces due to dull knives
	PROJECT STATUS	Completed on night shift 8/93, shift workload from boner to trimmer, reduced perceived workload and actual workload reduced to 79% (trimmer went from 80 to 89%). Save $14,000 in 3 months in yield contributions.
7	TITLE	Stands
	JOB	All
	JOB PLACEMENT	Any
	JOB PURPOSE	Varied
	WORKERS	up to 230
	STRESSORS	Vertically challenged individuals experienced reaching, bending and abduction of shoulder/elbow
	PROJECT STATUS	on-going - built approximately 50 to date and build upon request
8	TITLE	Mousetrap brackets
	JOB	Trimming (95% muscle)
	JOB PLACEMENT	membrane skinner/final trimmer
	JOB PURPOSE	trim muscle to spec
	WORKERS	4
	STRESSORS	wrist, elbow and shoulder deviation, high forces due to dull knife
	PROJECT STATUS	completed (3/93) - installed mousetrap brackets in several additional areas to service 95% muscle trimmers previously required to steel by hand

9	TITLE	Whizard knife cover
	JOB	Trimmers
	JOB PLACEMENT	skinners/service people
	JOB PURPOSE	remove fat and trim muscle to spec
	WORKERS	20
	STRESSORS	dull knife blades resulted in high forces, wrist, elbow and shoulder deviation
	PROJECT STATUS	Completed (12/93) - installed cover on whizard knife cart. *Note - now raised issue with knife room employees who are required to lift the stainless steel lid each time they retrieve knife.
10	TITLE	Picnic pacer platform
	JOB	picnic skinner pacer
	JOB PLACEMENT	service/skinner
	JOB PURPOSE	controls speed of picnic skinners (feeds line)
	WORKERS	1
	STRESSORS	force, repetition, psychological (need to keep up, frustration)
	PROJECT STATUS	Completed (10/93) - added a stationary accumulation area and eliminated moving belt to increase probability of correct first time placement of picnic
11	TITLE	See #7
	JOB	
	JOB PLACEMENT	
	JOB PURPOSE	
	WORKERS	
	STRESSORS	
	PROJECT STATUS	

12	TITLE	Mousetrap bracket additions - picnic boning
	JOB	picnic boners
	JOB PLACEMENT	pacer/service people
	JOB PURPOSE	remove picnic bone (body bone or shank bone) from picnic
	WORKERS	6
	STRESSORS	forces form using dull knives, deviation of wrist, elbow and shoulders
	PROJECT STATUS	Completed (6/93) - installed more brackets to make mousetraps accessible to workers using conventional steel.
13	TITLE	Data print scale rollers
	JOB	data printer operator
	JOB PLACEMENT	packoff/palletize
	JOB PURPOSE	scale individual boxes and place weight ticket on boxes
	WORKERS	1
	STRESSORS	pulling and pushing (encountered drag forces), leaning and reaching
	PROJECT STATUS	completed (9/93) - installed roller balls on scale platform
14	TITLE	Pacing picnic boning
	JOB	picnic boners
	JOB PLACEMENT	pacer/service people
	JOB PURPOSE	remove shank and body bone from picnic
	WORKERS	21
	STRESSORS	psychological (perception that employee was always behind), repetition (required at erratic pace)
	PROJECT STATUS	completed (1/93) - added pacer to line, delivered picnic one at a time to employees. Provided consistent work flow.

15	TITLE	Adjustable tables
	JOB	bone-in injector pump operator
	JOB PLACEMENT	pump operator/service
	JOB PURPOSE	place product on screen in preparation for smoke house trees
	WORKERS	1
	STRESSORS	leaning, reaching, static postures, forward head postures
	PROJECT STATUS	completed (8/93) - modified table legs to provide adjustment (set screw with wing nut provides hand adjustment)
16	TITLE	table glides
	JOB	process kitchen service people
	JOB PLACEMENT	(This is a general utility type of job)
	JOB PURPOSE	set up departments and provide materials to line workers, transport raw and finished product
	WORKERS	6
	STRESSORS	force (push and pull)
	PROJECT STATUS	on-going - 10 completed to date, add more as needed
17	TITLE	stands for BEP combos
	JOB	bacon ends and pieces packoff person
	JOB PLACEMENT	service/slicer
	JOB PURPOSE	dump ends and pieces into ends and pieces combos
	WORKERS	1
	STRESSORS	overhead reaches, forces for lifting (50#'s)
	PROJECT STATUS	completed (9/39) - built one 2-step stand to reduce overhead reach required to dump ends and pieces

18	TITLE	fatigue mats
	JOB	arrangers, scalers and pack-off
	JOB PLACEMENT	slicer/service
	JOB PURPOSE	prepare bacon for packing
	WORKERS	20
	STRESSORS	static postures of legs, lower back, and neck
	PROJECT STATUS	completed (9/93) - purchased 20+ mats *Note: some difficulty after purchase due to sanitation issues.
19	TITLE	none
	JOB	Bacon service person
	JOB PLACEMENT	cvp drops
	JOB PURPOSE	supply lines, transport finished materials, change film, paperwork
	WORKERS	4 on nights, 3 on days
	STRESSORS	bending, lifting (150 - 200 pounds per cylinder)
	PROJECT STATUS	on-going (expected to complete by March 31, 1994)
20	TITLE	50 trim
	JOB	Service people on floor
	JOB PLACEMENT	none
	JOB PURPOSE	transport raw and finished products to belly table
	WORKERS	2 on days, 2 on nights
	STRESSORS	lifting, carrying, reaching 960+ pounds)
	PROJECT STATUS	Complete (12/93) - installed a conveyor to dump trim on to scale instead of carrying and weighing individual boxes.

21	TITLE	Pistol grip style whizard knife
	JOB	belly chipper
	JOB PLACEMENT	skinner operator/belly facer
	JOB PURPOSE	remove skin patches from belly
	WORKERS	2
	STRESSORS	ulnar and radial deviation, elbow abduction, shoulder abduction
	PROJECT STATUS	Complete (8/93) - after adjustments, handles well received
22	TITLE	Shoe inserts
	JOB	service person
	JOB PLACEMENT	n/a
	JOB PURPOSE	transport raw and finished product to the line
	WORKERS	1 (potentially entire department)
	STRESSORS	fatigue in feet, legs and lower back
	PROJECT STATUS	on-going (ordered 3 test pair for evaluation) target completion by March 1, 1994
23	TITLE	
	JOB	
	JOB PLACEMENT	
	JOB PURPOSE	
	WORKERS	
	STRESSORS	
	PROJECT STATUS	

ERGONOMIC COMMITTEE PROJECTS - 1993

DEPARTMENT: Process	COMPLETE: 12	INCOMPLETE: 16

PROJECTS		DESCRIPTION
1	TITLE	Forklift
	JOB	Pickle Maker
	JOB PLACEMENT	Pickle Room
	JOB PURPOSE	Mix ingredients for curing pickle in mixing vat and distribute to proper pumps
	WORKERS	2/day and night
	STRESSORS	excessive bending and lifting below waist level of 50 - 100 lbs.
	PROJECT STATUS	completed 6/4/93- Furnished employee with forklift which he can lift ingredients to elbow height.
2	TITLE	Charsol barrels for swift bellies
	JOB	Pickle Maker
	JOB PLACEMENT	Pickle room
	JOB PURPOSE	remove charsol from 55 gal. barrel into mixing tank
	WORKERS	2/day and night
	STRESSORS	excessive lifting of arm above head with force
	PROJECT STATUS	completed 6/8/93- Furnished employee with air hoist and 55 gal. barrel attachment to lift barrel and gravity flow liquid to tank.

3	TITLE	Honey barrels for honey hams
	JOB	pickle maker
	JOB PLACEMENT	pickle room
	JOB PURPOSE	mix 840 lbs of honey into vat
	WORKERS	2/ day and night
	STRESSORS	Lifting to shoulder height 60 lb. buckets with force
	PROJECT STATUS	Completed 6/8/93- Furnished employee with attachment to lift 600 lb. barrel of honey with forklift
4	TITLE	Mixing tank
	JOB	Pickle Maker
	JOB PLACEMENT	Pickle room
	JOB PURPOSE	Tank which is sued to mix ingredients for curing pickle
	WORKERS	2 day and night
	STRESSORS	tank was installed too high. Excessive lifting to shoulder height
	PROJECT STATUS	Completed 8/6/93- Lowered tank approximately 5 inches, was the most we could under the circumstances.
5	TITLE	Lower tipper-tie
	JOB	Bone-in pump
	JOB PLACEMENT	tipper-tie operator
	JOB PURPOSE	to clip ends of stocking net of bone-in hams
	WORKERS	3
	STRESSORS	had to lift each ham to clip and cut net
	PROJECT STATUS	Completed 8/93- lowered tipper tie so they could clip net without lifting ham

6	TITLE	Air, Water Station
	JOB	Canadian Bacon stuffer
	JOB PLACEMENT	cure area
	JOB PURPOSE	stuff bacon into casings and screen product onto trees
	WORKERS	5
	STRESSORS	
	PROJECT STATUS	Completed 11/93- Installed air/water and electrical station to eliminate hoses and cords laying on the floor to area
7	TITLE	Knife for cutting casings
	JOB	canadian bacon crew
	JOB PLACEMENT	cure area
	JOB PURPOSE	cut tails off stick before screening
	WORKERS	1
	STRESSORS	had to turn each piece before cutting tails
	PROJECT STATUS	completed 8/93- moved knife to opposite side of table so worker does not have to turn product.
8	TITLE	Bagger stand redesign
	JOB	RTE bagger
	JOB PLACEMENT	RTE room
	JOB PURPOSE	Insert boneless ham into bag
	WORKERS	2 day and night
	STRESSORS	fatigue of back legs and feet from static postures
	PROJECT STATUS	completed 2/93- redesigned bagger stand so operator could put feet under stand. Also widened stand to receive boxes of bags from different directions.

9	TITLE	Mousetrap steel
	JOB	RTE clip cutters & belly table side strappers
	JOB PLACEMENT	Cure & RTE room
	JOB PURPOSE	Cut clips from boneless hams & cut fat from sides of bellies
	WORKERS	10
	STRESSORS	excessive force and fatigue from using dull knife
	PROJECT STATUS	completed 3/93- installed 5 mouse trap steels to keep knife sharper
10	TITLE	roller conveyors
	JOB	RTE special cut pack-off
	JOB PLACEMENT	RTE room packoff area
	JOB PURPOSE	too close lids of special cut boxes, strap and stack on pallet also form boxes before they are used.
	WORKERS	2 day and night
	STRESSORS	employee had to carry empty boxes into doorway and carry full boxes back out
	PROJECT STATUS	Completed 1/94- Installed two roller conveyors to roll boxes into and out of room.
11	TITLE	Skid lift
	JOB	grote slicer
	JOB PLACEMENT	bacon area
	JOB PURPOSE	to lift belly from skid and insert it into grote slicer, had to carry belly up stairs
	WORKERS	2 day and night
	STRESSORS	excessive bending, lifting and use of stairs to get belly to slicer
	PROJECT STATUS	completed 1/93- Installed skid lift to bring pressed bellies to waist level of employee

12	TITLE	Adjustable work stations
	JOB	Belly table
	JOB PLACEMENT	8 persons on line
	JOB PURPOSE	N/A
	WORKERS	8
	STRESSORS	Awkward postures, differences between heavy and light forces.
	PROJECT STATUS	Not completed/Construct adj. work stations for each individual to accommodate differences in lift load or work area
13	TITLE	Boneless dumper re-design
	JOB	Boneless pump operator
	JOB PLACEMENT	challenge room
	JOB PURPOSE	to dump meat at pump level without plugging in chute.
	WORKERS	2 day and night
	STRESSORS	reaching, pulling, twisting
	PROJECT STATUS	not completed/redesign dumper so it lifts higher
14	TITLE	Lowerator for screen trees
	JOB	T-sizer screen and spring
	JOB PLACEMENT	cure area
	JOB PURPOSE	to place stuffed product on screen tree
	WORKERS	4/ day and night
	STRESSORS	bending and lifting below knees, reaching and pushing above shoulder.
	PROJECT STATUS	Not completed/ Install lowerator to raise and lower screen trees to keep work area between waist and shoulder area.

15	TITLE	Extended control panel area
	JOB	T-sizer operations
	JOB PLACEMENT	Cure area
	JOB PURPOSE	To be able to control machine from screening area
	WORKERS	4/day and night
	STRESSORS	excessive reaching
	PROJECT STATUS	not completed/Extend control panel arm/eliminate reaching
16	TITLE	Dumper for neckbones
	JOB	screen neckbones
	JOB PLACEMENT	cure area
	JOB PURPOSE	to remove bones from sq. tub and place on screen tree
	WORKERS	2
	STRESSORS	bending, lifting with force, twisting
	PROJECT STATUS	not completed/design dumper to dump bones onto table
17	TITLE	Automated comb puller
	JOB	belly decombing
	JOB PLACEMENT	bacon area
	JOB PURPOSE	to remove comb from belly before pressing
	WORKERS	2 day and night
	STRESSORS	Ulnar and radial deviation. Pronation, supination, grasp with force
	PROJECT STATUS	not completed/study options - develop machine to pull and stack combs

18	TITLE	Lowerator for belly tree
	JOB	hang bellies
	JOB PLACEMENT	cure area
	JOB PURPOSE	lift bellies from combing table then hang onto trees
	WORKERS	2 day and night
	STRESSORS	eliminate lifting bellies above shoulder height
	PROJECT STATUS	not completed/provide lowerator to lower tree approximately 2' also powered rail to roll full trees away
19	TITLE	redesign comb table
	JOB	combing bellies
	JOB PLACEMENT	cure area
	JOB PURPOSE	place comb into flank of belly before handing
	WORKERS	2/day and night
	STRESSORS	
	PROJECT STATUS	not completed/redesign comb table
20	TITLE	catch pans for slicers
	JOB	slicing bellies
	JOB PLACEMENT	bacon area
	JOB PURPOSE	to remove bacon ends and pieces from catch pans under slicer
	WORKERS	10/day and night
	STRESSORS	lifting of pan from slicer to empty. Sometimes up to 80 lbs.
	PROJECT STATUS	not completed/ make hinged doors on pans so it may be emptied without removing pan, pan is over 30 lbs.

21	TITLE	roller stand
	JOB	RTE box maker
	JOB PLACEMENT	smoke meats area
	JOB PURPOSE	make and deliver boxes to RTE boneless lines
	WORKERS	2 day and night
	STRESSORS	have to move boxes into rooms as they need them
	PROJECT STATUS	not completed/replace roller stand with motorized belt and infrared beam to index boxes as needed
22	TITLE	top surface of RTE bagger
	JOB	RTE bagger
	JOB PLACEMENT	smoke meats
	JOB PURPOSE	insert boneless ham into bag
	WORKERS	2/day and night
	STRESSORS	shoulder, arm, wrist, lower back pain
	PROJECT STATUS	not completed/replace top pan with a pan that has rollers on it that enables worker to roll ham any direction.
23	TITLE	Raise lazy susan in RTE room
	JOB	pack meat into boxes, RTE room
	JOB PLACEMENT	smoke meats
	JOB PURPOSE	worker must pick up ham from lazy susan and pack into box with label up
	WORKERS	2/day and night
	STRESSORS	adduction, flexion, pro and Supination, ulnar deviation
	PROJECT STATUS	Not completed/raise lazy susan and remove rail so worker can slide hams into box

24	TITLE	Relocate operators buttons, bacon press
	JOB	bacon press operator
	JOB PLACEMENT	bacon area
	JOB PURPOSE	take belly from decomb belt and insert into bacon press. Lower arms turn hands around and hit 2 buttons, remove belly
	WORKERS	2/day and night
	STRESSORS	pro + supination, extension
	PROJECT STATUS	Not completed/relocate operator's buttons
25	TITLE	Eliminate P-50 hand pump
	JOB	pickle maker
	JOB PLACEMENT	pickle room
	JOB PURPOSE	to transfer P-50 smoke from 55 gal. barrel to 40 lb. jugs
	WORKERS	2/day and night
	STRESSORS	excessive lifting above head with forces
	PROJECT STATUS	not completed/purchase tipping cart with wheels so worker can gravity flow P-50 into jugs
26	TITLE	redesign feed conveyor to 8300 operator
	JOB	8300 operator
	JOB PLACEMENT	RTE room
	JOB PURPOSE	to position bagged product onto plattens of 8300 machine
	WORKERS	2/day and night
	STRESSORS	pinch grip, leg and lower back problems, abduction
	PROJECT STATUS	not completed/redesign feed belt so it is more flat to reduce rolling of product, more time to flatten bag

27	TITLE	area by bacon slicers
	JOB	bacon slicing pressed bacon skids
	JOB PLACEMENT	bacon area, front of line
	JOB PURPOSE	area around pressed skids, no room
	WORKERS	10/day and nights
	STRESSORS	reduced amount of area to work and to walk around skids
	PROJECT STATUS	Not completed/study options
28	TITLE	fatigue mats
	JOB	all areas
	JOB PLACEMENT	all areas
	JOB PURPOSE	to eliminate static effort
	WORKERS	all
	STRESSORS	back legs and feet
	PROJECT STATUS	completed 92/they are available at process department
29	TITLE	
	JOB	
	JOB PLACEMENT	
	JOB PURPOSE	
	WORKERS	
	STRESSORS	
	PROJECT STATUS	

APPENDIX D

ERGONOMICS TEAM SURVEY SCALES

All scales listed below used the following format:

How much do you agree with the statement?

1	2	3	4	5	6	7
Disagree Strongly	Disagree	Disagree Slightly	Neutral	Agree Slightly	Agree	Agree Strongly

SELF-RATED PERFORMANCE

1. My ergonomics team has effectively performed its job of redesigning jobs in our area of the plant.

2. My ergonomics team has come up with many ideas for ergonomic changes in our area of the plant.

3. My ergonomics team has implemented many ergonomic changes in jobs within our area of the plant.

ERGONOMICS TEAM EFFICACY

1. I am confident that my ergonomics team has the ability to perform effectively.

2. I am confident that my ergonomics team is addressing the most important jobs.

3. I believe that my ergonomics team can do its job well.

4. I believe that my team is able to correctly analyze the ergonomic factors in jobs.

5. I believe that my ergonomics team is able to come up with appropriate, workable solutions to the ergonomic problems in our area of the plant.

APPENDIX D (CONTINUED)

COMMUNICATION PROCESS

1. I can say whatever I think to other team members.
2. I can be honest with my team members.
3. I am careful about what I say to other team members.

TEAM SATISFACTION

1. I am satisfied with the friendliness of my team members.
2. I am satisfied with the way my team members are easy to make friends with.
3. Generally speaking, I am very satisfied with my ergonomics team members.
4. I am satisfied with the spirit of cooperation among my team members.
5. I like my ergonomics team as a whole.
6. I am satisfied with the chance to develop close friendships with my team members.
7. I am satisfied with the way my team members get along with each other.

WORK PROCESS

1. My ergonomics team is able to define its' goals.
2. My ergonomics team is able to develop workable plans.
3. My ergonomics team is able to prioritize its work.

APPENDIX D (CONTINUED)

RESOURCE ADEQUACY

1. My ergonomics team has had adequate training in the area of ergonomics.

2. My ergonomics team has access to the resources we need to do our job.

3. My ergonomics team has access to the information we need to analyze and prioritize jobs in terms of ergonomic problems.

4. My ergonomics team members have the proper backgrounds to aid the team in performing effectively.

WORK COMMITMENT

1. I am willing to work hard on our team's assignment of redesigning jobs.

2. I am committed to our team's assignment.

3. I am very task-oriented when I get together with my ergonomics team.

4. I am interested in performing well on my tasks associated with the ergonomics team.

OPEN-ENDED QUESTIONS

1. Describe the factors (inside or outside of the team) that have helped your team work well.

2. Describe the factors (inside or outside of the team) that have prevented your team from working well.

APPENDIX E

EMPLOYEES' COMMENTS ON THE ERGONOMICS TEAM SURVEY

KILL TEAM

1. Describe the factors (inside or outside of the team) that helped your team work well.

(a) Examining jobs together to see what is going on.
(b) We get along well; Not much conflict; We are willing to listen to one another.
(c) We have a well-rounded group - upper management and maintenance are members too. Well-rounded backgrounds in all jobs performed throughout the departments. Good knowledge of our production demands.
(d) Positive response from employees in the dept that individuals represent in terms of follow-up and suggestions.

2. Describe the factors (inside or outside of the team) that have prevented your team from working well.

(a) Maintenance is slow getting things done.
(b) Too much jumping from one thing to another in the team. The team does not analyze jobs, instead it uses a "hit and miss" strategy. Need to set goals for the team.
(c) Problem getting everyone to the meetings while still trying to keep production going in the plant.

APPENDIX E (CONTINUED)

CUT TEAM

1. Describe the factors (inside or outside of the team) that helped your team work well.

(a) Much of the improvements have been management's or maintenance's ideas. The remodelling of the cut department has helped a lot.
(b) Working with everybody on the team so that I know them and they know me.
(c) Team members' familiarity with more than just one department.
(d) Discussing the motions of the jobs with the people who are actually doing the jobs.
(f) Employee involvement in the ergonomics project.

2. Describe the factors (inside or outside of the team) that have prevented your team from working well.

(a) Team members believe it is management's responsibilities to solve all problems, complete projects, etc. Hourly members are not willing to get very involved or committed.
(b) Getting time to go to meeting. Too many other responsibilities.
(c) Most ergonomic changes involve maintenance work and maintenance doesn't make it to the meetings.
(d) Meetings not held often enough. Need one person to track the things that need to be accomplished between meetings.
(e) There appears to be some conflict between members of this team. The ergonomics team does not get enough done according to some members.

APPENDIX E (CONTINUED)

BONE/SPECIAL MEATS/CASE READY TEAM

1. Describe the factors (inside or outside of the team) that helped your team work well.

(a) Team members know the jobs very well throughout the dept.
(b) Team members are able to communicate effectively with one another.
(c) Abilities vary among team members and all contribute to the group.
(d) The training on team building and problem solving helped bring the team together. Prior to the training, the team spent too much time discussing non-relevant topics. More training is needed.
(e) Team members have access to the things the team needs to do its job well.
(f) We can talk about problems as a team and we can listen to each others' problems.
(g) Experienced, determined team members.

2. Describe the factors (inside or outside of the team) that have prevented your team from working well.

(a) One facilitator feels he must take the whole responsibility for the group upon himself.

(b) It is extremely difficult to get time to function as effectively as we would like. Not able to put in enough time to work on much needed projects.
(c) There needs to be an ergonomics team member assigned to this company on a plant level.
(d) We know what the problems are, but management is our drawback. We have to have their okay to start on a problem.

APPENDIX E (CONTINUED)

NIGHT SHIFT TEAM

1. Describe the factors (inside or outside of the team) that helped your team work well.

(a) Diversity among the employees.
(b) The team members all are cross-trained on most of the jobs in their area.
(c) We get along well and are ready to help people to do their job better by making it easier for them.

2. Describe the factors (inside or outside of the team) that have prevented your team from working well.

(a) Not knowing the difference between ergonomics problems and safety problems.
(b) Maintaining production at the same time as working on ergonomic problems.
(c) Contact and communication with day shift.
(d) Money.

APPENDIX E (CONTINUED)

PROCESS TEAM

1. Describe the factors (inside or outside of the team) that helped your team work well.

(a) We have a person from each department in the cure area that has some understanding of a problem we have been working on.
(b) Doing low cost things first and quickly.
(c) Taking a tour of all of our area and talking to the employees individually while noting problems or concerns.

2. Describe the factors (inside or outside of the team) that have prevented your team from working well.

(a) Not everyone puts forth 100% to work on problems.
(b) Not having enough time to do work on ergonomics problems.
(c) Cost.
(d) We need to put in ergonomics solutions on the weekends.

APPENDIX F

EMPLOYEE SURVEY SCALES

BODY AREAS AFFECTED BY PERSISTENT PAIN

1. Have you had pain or discomfort during the last year that doesn't go away?

   a) Yes _____ b) No _____

If YES, please indicate UP TO TWO primary body areas in the following two sections where you experience pain or discomfort that doesn't go away:

BODY AREA #1

Please complete the following questions for the area of the body where you feel the MOST pain and discomfort that doesn't go away.

Please check the affected area (CHECK ONLY ONE):

Neck_____	Shoulder____	Elbow/Forearm_____	
Hand/Wrist_____	Finger____	Upper Back_____	Lower Back _____
Thigh/Knee_____	Lower Leg____	Ankle/Foot_____	

(This question was repeated for BODY AREA #2, where the answered questions relative to the area of the body where they felt the NEXT MOST pain or discomfort.

APPENDIX F (CONTINUED)

PAIN SEVERITY

1. How well does each of the following describe your problem?

1---------2---------3---------4---------5---------6---------7
Not at all Somewhat Very Well

Please place a number beside each of the following words based on the scale above:

____ 1) Aching	____ 5) Numbness	____9) Tingling
____ 2) Burning	____ 6) Pain	____10) Weakness
____ 3) Cramping	____ 7) Swelling	____11) Other
____ 4) Loss of Color	____ 8) Stiffness	(please describe below).

If you checked "other", please briefly describe your problem _____

_____

(This same question was repeated for BODY AREA #2).

APPENDIX F (CONTINUED)

The two scales below used the following format:

How much do you agree with the statement?

1	2	3	4	5	6	7
Disagree Strongly	Disagree	Disagree Slightly	Neutral	Agree Slightly	Agree	Agree Strongly

EMPLOYEES' ATTITUDES TOWARD THE ERGONOMICS PROGRAM

1. I believe that the effort to change jobs in this Farmland plant (i.e., the ergonomics program) will have a positive effect on employees.

2. I am satisfied with the overall program to change jobs in this Farmland plant (i.e., the ergonomics program).

3. I believe that management is committed to the program to change jobs in this plant (i.e., the ergonomics program).

4. I believe that the effort to change jobs (i.e., the ergonomics program) will help employees stay healthier at work.

EMPLOYEE TURNOVER INTENTIONS

1. I am planning to search for a new job outside of Farmland during the next 12 months.

2. I often think about quitting this job.

3. If I have my own way, I will be working for Farmland one year from now (reverse-coded).

4. I expect to spend the rest of my work life with this Farmland plant (reverse-coded).