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Ergonomic Regulations in the Meatpacking Industry

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Abstract

For over a century, meatpacking has been one of the most dangerous jobs in the United States. Currently, hundreds of workers are injured each year despite increased government oversight and regulation. In 1993, OSHA drafted *Ergonomic Program Management Guidelines for Meatpacking Plants*, however industry compliance with these guidelines is voluntary. This letter is being sent to you to propose that adherence to OSHA's Ergonomic Guidelines should be mandatory for all meatpacking employers in an effort to reduce the current high rate of worker injury.

Injuries in the Meatpacking Industry

There are nearly 150,000 meat packing workers in the United States and every year approximately one in four suffers a workplace injury that requires them to miss one or more days of work (Campbell 352). In fact, workers in meatpacking can expect to be injured at a rate of 27.6 per 100 workers which is more than double the 12.2 per 100 workers in all manufacturing industries (Campbell 352). Meat processing changed dramatically when the industry itself underwent a technological revolution in the 1960's. At that time, IBP, one of the largest meat processing companies in the United States, reorganized its production line to eliminate the need for skilled labor. This "de-skilling" of the line meant that meat packing companies were essentially free to slash wages and speed up the production line or chain (Olsson). Novek et al in 1990 studied the changes that mechanization made to the meatpacking industry using a "before and after" methodology (Blank 222). Not surprisingly they found that increased production output resulted in a rise in the rates of injury, particularly in the upper extremities. Their conclusion: The intensification of production by technological means is liable to produce more accidents where the work demands more repetitive tasks (Blank 226).

While IBP set the trend, other meat processing companies followed, incorporating new technology into their meat packing processes. Since few skills are needed, workers have become expendable resources and therefore exposed to many health hazards (Campbell 365). Since profit margins are much slimmer in the meatpacking industry than in other manufacturing sectors, the companies are especially intent on keeping labor costs as low as possible and volume as high as possible (Olsson).

The primary health hazard in the meatpacking industry is musculoskeletal trauma both acute and cumulative with the largest proportion of injuries involving knives and saws. In his article "The Chain Never Stops", author Eric Schlosser writes that the most dangerous plants are the ones where cattle are

slaughtered because of the enormous size variance of the cows and, while poultry processing has been largely mechanized, most of the work at a modern beef plant is still done by hand and the most important tool is a well-sharpened knife (2).

Sprains and strains resulting from the use of knives and saws account for 31.1 percent of injuries while cuts and lacerations comprise 30.5 percent (Campbell 352-353). Schlosser again details the regimented processing in which workers engage which means making the same knife cut 10,000 times in a shift or lifting the same weight every few seconds (3). Other injuries result from close contact with animal carcasses since workers are frequently in close physical contact with and therefore exposed to aerosols of many animals tissues and organs (Campbell 355). There are also a number of what Campbell calls general environmental problems which are defined as environmental stressors and these include exposure to cold, heat, noise, chemicals, explosions and fires (Campbell 362). Ergonomic solutions are feasible for each of these stressors but require employer commitment.

The Science of Ergonomics

Ergonomics is the study of the interaction between people and machines and the factors that affect that interaction (Bridger 1). Ergonomics focuses on systems management and as such, views injury and high levels of human error as systems problems rather than people problems (Bridger 2). Appendix 1 shows a model of systems in ergonomics and it is important to note that individual behavior is inseparable from physical ergonomics. By viewing the human operator as part of the system, ergonomics endeavors to incorporate human operators in this system at the design stage by creating work processes which address multiple levels of compatibility: biomechanical, anatomical, physiological and cognitive (Bridger 3).

The U.S. Department of Labor identified the meatpacking industry as being at the highest levels of risk for worker contraction of carpal tunnel syndrome and other cumulative trauma disorders or CTD's (Litvan). Although ergonomic hazards are not confined to the meatpacking industry, the high incidence and severity of workplace injuries demanded implementation of effective programs to help mitigate these risks. In OSHA's own words, the goal of any safety program is to prevent injuries and illnesses by removing their causes and for ergonomic hazards, this goal is achieved through taking steps to eliminate or reduce worker exposure to conditions that lead to CTDs and related injuries and illnesses. However OSHA is not the only organization to make the link between ergonomics and musculoskeletal disorders, which include CTDs.

Writing in the journal Occupational Medicine, Dr. Peter Buckle, an ergonomicist, states that there is an understanding between workers, employers and the government that a definitive relationship exists between the working environment and the development of musculoskeletal disorders resulting in worker sickness and absences (Buckle 164). He goes on to say that the high prevalence of musculoskeletal disorders within an industry is a symptom of system failure and should be rectified through the continuous improvement of work systems, organizational design and the use of technology (166). In other words, human requirements are system requirements and should therefore be fully integrated into the interface to ensure worker safety and compatibility (Bridger 3).

Compliance with Ergonomic Guidelines

In 1987, the magazine Applied Ergonomics published an article entitled "Investigation of optimal table height and surface angle in meatcutting" which was written by Dr. M. Magnusson, a Swedish doctor, and R. Örtengren, an ergonomicist. Butchers, like meatpacking workers, suffer from CTDs caused variously by resistance when cutting, inappropriate work postures and material handling (146). Their study concluded that the working height of the table must be adjustable based both on the individual and the task (150). Their recommended range was seventeen to twenty-two centimeters below elbow height with

a further recommendation that the table height be altered within this range throughout the day to unload the work related strain on the shoulders and back (151). Although not the first journal article published on ergonomics, this particular study made specific recommendations relevant to reducing CTD injuries in the meatpacking industry. Six years later, OSHA's *Ergonomic Program Management Guidelines for Meatpacking Plants* was released.

Robert Reich was the Secretary of the Department of Labor in 1993 and in the introduction to the guidelines he writes that finding solutions to problems posed by ergonomic hazards may well be the most significant workplace safety and health issue of the 1990s (2). Secretary Reich goes on to say that OSHA expects employers to implement effective ergonomics programs and that they have targeted the meatpacking industry because the severity of CTDs and other injuries demands that effective programs be implemented to protect workers. However, Secretary Reich concedes that compliance is not mandatory nor is it regulated and thus OSHA can only seek the cooperation and commitment of employers in implementing ergonomics programs (3).

At the top of OSHA's list of priorities for establishing effective ergonomics programs is the visible involvement of top management and the guidelines provide information on the program elements needed to ensure successful implementation. These include worksite analysis to identify ergonomic hazards, hazard control design measures to mitigate risk as well as training to ensure that employees are informed about potential ergonomic hazards (5-10). The guidelines go even further, citing specific measures of hazard prevention and control. For example, to reduce awkward postures, workstations and delivery bins that can accommodate the heights and reach limitations of various sized workers are recommended (12, 13). Comprehensive medical management programs to prevent and/or treat CTDs are also detailed, as this ability underscores the success of any ergonomics program (14).

The *Ergonomic Program Management Guidelines for Meatpacking Plants* was drafted in response to the high rate of worker injury in the industry over a prolonged period. However, making compliance with the ergonomic guidelines voluntary negates the array of valuable information they contain that can benefit workers on a daily basis and it is for this reason that this letter advocates mandatory compliance for all meatpacking employers.

Implementation of Mandatory Ergonomics Guidelines

In order to ensure compliance with ergonomic guidelines, a regulatory body or oversight organization must be responsible for enforcement. There are two options to enable this enforcement: OSHA can oversee and coordinate employer compliance or a new agency can be created to accomplish this task. Given OSHA's proven track record in conducting workplace hazard inspections and its success in enforcing worker safety regulations, it should be OSHA who ensures employers comply with *Ergonomic Program Management Guidelines for Meatpacking Plants*.

Don J. Lofgren was an OSHA health inspector in California in the mid-1980's and in his book Dangerous Premises he details his experiences as an inspector. OSHA inspections are initiated in response to an employee complaint about unsafe working conditions or if there is a workplace accident involving personal injury. When the inspector arrives at the employer premises, an initial interview is conducted, then a walk around occurs to permit the inspector first hand observation of any hazards. This is followed by a formal report and if necessary, citations for unsafe working conditions (2, 3).

Although not part of his OSHA inspection checklist, Lofgren made note of ergonomic deficiencies on several occasions, in particular on one inspection in a furniture manufacturing plant. He felt compelled to note the high noise levels on his checklist but was unable to cite the employer "…without complaints

from the workforce and particularly without any definite OSHA regulations addressing such problems" (104). Lofgren concedes that OSHA's effect may be minimal given the hundreds of thousands of employers in the United States but he says that even small decreases in injury rates amount to thousands of injuries prevented. OSHA is a powerful force in the regulation of workplace safety and Lofgren goes so far as to say that where OSHA uses its authority to set new limits or standards, the result can be protection for workers where none existed before (199).

It is this authority that makes OSHA the best suited to oversee and regulate compliance with ergonomic guidelines. In its inspections, OSHA already assesses engineering controls for workplace hazards. These controls comprise measures taken to eliminate hazards through physical means and this assessment could be expanded to include ergonomic hazards such as the provision of improper tools or task overload in a particular job. A sample ergonomic assessment checklist from Vern Putz-Anderson's book Cumulative trauma disorders: A manual for musculoskeletal diseases of the upper limbs can be found in Appendix 2.

Proposal Feasibility

An infeasible proposal is at best an exercise in futility. Thankfully, cases studies and statistics demonstrate that ergonomics is a proven, cost effective strategy to reduce worker injury. Further, making adherence to *Ergonomic Program Management Guidelines for Meatpacking Plants* mandatory is possible given OSHA's current mandate and regulatory role.

The Cost of Worker Injury

Arguably one of the most difficult figures to obtain, the financial cost of injured workers in the meatpacking industry is a critical component of this proposal's feasibility. A number of variables contribute to the complexity of obtaining these statistics. In the 1990s, meatpacking companies began keeping injured workers on the job in less physically challenging roles which had the effect of reducing the reported number of injuries and compensation claims (Horowitz). Additionally, the Bureau of Labor Statistics (BLS) changed its rules for reporting injuries that result from ongoing activity; carpal tunnel syndrome for example. Previously, any injury, even if it resulted from an earlier condition, was reportable to the BLS. However, after 2001, "repeated trauma disorders" disappeared from BLS statistics, as they are now considered to be part of the original injury case (Horowitz 3). Notwithstanding these challenges, there is a great deal of information available on workers compensation and work related injuries that are integral to the analysis of CTDs and ergonomics.

Workers compensation laws provide money and medical benefits to an employee who has an injury as a result of an accident, injury or occupational disease on the job (Workers Compensation). The Colorado Department of Labor and Employment, Division of Workers Compensation Annual Report details the nature of worker injuries as well as claim payout amounts. In 2004, settlements per case submitted to Workers Compensation ranged between $11,944 and $32,767, with an average payout of $27,630 (66). In that same year, 581 cases were settled per month which means that $16,053,030 was paid out in Workers Compensation payouts each month. Obviously, these figures cover all work sectors and not just meatpacking, however meatpacking has a very high rate of injury so some interpolation is possible. Appendix 3 is a reprint of Table 10 of the Colorado Department of Labor and Employment's "Work Related Injuries in Colorado in 2004" publication. Item 311 is the manufacturing sub-sector Food Manufacturing which lists 301 lost time claims or 16.9 percent per 1000 employed workers. Conservatively, if only one-tenth of these workers obtain a settlement because of their injuries, that amounts to $828,900 paid in compensation ($27,630 multiplied by 30). Further, if twenty percent of these lost time settlements could be eliminated through ergonomic intervention, compensation payouts would decrease by $165, 780. It is this money which could be used to offset any costs incurred by ergonomic redesign of production processes.

The Cost of Ergonomic Solutions

In many cases, the cost of ergonomic interventions to prevent injuries is far less that the costs incurred in compensating injured employees. Admittedly, ergonomic solutions vary widely in scope, from replacing an unwieldy knife to complete production process redesign. Appendix 4 is also taken from Vern Putz-Anderson's book and demonstrates how simply changing the shape of a knife handle can eliminate ulnar wrist deviation thereby reducing the likelihood of developing carpal tunnel syndrome (55).

The National Institute for Occupational Health and Safety (NIOSH) completed several three year long demonstrations of participatory approaches to solving ergonomic problems in meatpacking plants and produced very specific statistics on implementation costs and compensation payout reductions (49). Exhibit 4 of their Case Study #1 details the outcome of an ergonomic intervention in the job position entitled lean shank trimmer (64). Essentially, the worker in this position separates shank meat from the bone, removes the 95 percent lean shank from the ham and then places it in a small tub which is then dumped into a large tub when full. The study found six physical stressors including awkward wrist positions, bending forward at the waist and cold. One additional note was added indicating that the knives being used were neither sharp enough nor long enough for the job.

The OSHA Log Incidence History for this position shows four injuries serious enough to seek physician assistance, four lost work days and seven restricted work days. The total direct costs of these injuries were $1,534.30 in workers compensation and medical expenses. The proposed ergonomic solution was to offset the task of trimming the 95 percent lean fat to another job position which had a lower workload. The total cost of this solution was $50 in labor and has resulted in the needed reductions in the lean shank trimmer work cycle time as well as a $14,000 increase in lean shank yield for the company (65).

Counterarguments

Voluntary Guidelines Not Regulations

Despite the quantitative evidence showing the impact ergonomic redesign has on reducing worker injury, adherence to OSHA's Ergonomics Guidelines is not favored by all meatpacking companies or representative agencies. One of the most vocal opponents of the proposed ergonomic policy is the American Meat Institute (AMI) which opposes the creation of an ergonomics standard at all. The American Meat Institute bills itself as the nation's oldest and largest meat and poultry trade association, dedicated to increasing the efficiency, profitability and safety of meat and poultry trade worldwide (MeatAMI.com). In 2002, Dan McCausland, who was the Director of Worker Safety for the AMI, testified that while the AMI supports the practice of ergonomics for safety and productivity improvement, voluntary ergonomics guidelines have worked to reduce ergonomics-related injuries and thus an OSHA ergonomics standard was not needed. Instead, Mr. McCausland on behalf of AMI, supports taking full advantage of ergonomics principles without adding the compliance-related burden of a regulation (McCausland).

In the first portion of Mr. McCausland's testimony he states that although there is little doubt concerning the benefits of ergonomics, the science does not lend itself to a structured regulatory approach. However, in a seemingly contradictory statement on the next page of the transcript, Mr. McCausland states that OSHA's *Ergonomic Program Management Guidelines for Meatpacking Plants* was (and is) based on sound science. Mr. McCausland also admits to being unclear as to why OSHA has only developed ergonomics guidelines for the meatpacking industry "…given that the application of these guidelines has worked, [and] continues to work" (2). Again, he reiterates that all experiences with ergonomics programs in the meatpacking industry have occurred on a voluntary basis. He ties these ergonomic experiences to the successes that the meatpacking industry has had in reducing worker injuries and cites a forty percent

reduction in overall incidents in the period 1991 to 2001. These statistics are suspect however as was cited from Horowitz in the feasibility section of this letter (Horowitz).

Mr. McCausland's final objection enters on the absence of valid objective criteria on which to develop formal regulation. He states that specific cause and effect variables do not exist where ergonomics is concerned and this absence of objective criteria makes setting an ergonomic standard impossible. He pointedly attributes ergonomics related injuries to both the physical condition of the specific worker as well as the specific work requirements. He goes on to say that the aforementioned concerns make an ergonomic standard problematic but do not affect the voluntary application of guidelines. While some of Mr. McCausland's points deserve further investigation, his objection based on the absence of specific cause and effect variables in misguided. The NIOSH Case Study #1 Exhibit 4 discussed in the feasibility section of this proposal is one of a myriad of examples that provides specific cause and effect variables. In our case study, the transfer of a high load task to another job position resulted in a three second reduction in work cycle time which translated to a three second increase in rest cycle time reducing the overall work cycle load of the lean shank trimmers from 96 percent to seventy-nine percent. Other exhibits in subsequent case studies provide the same detailed evaluation of cause and effect variables thus refuting Mr. McCausland's point.

Mr. McCausland's closing testimony advocates the use of voluntary guidelines because this type of compliance facilitates a single purpose, focused strictly on the practice of ergonomics. The logic of this statement is somewhat confusing; if adherence to any policy is voluntary, it is likely not followed to the exclusion of all else. In fact, when subject to budget constraints or time pressures, voluntary compliance very likely becomes a low priority item. As such, the objections Mr. McCausland raises against the creation of an ergonomics regulatory standard are simply outweighed by the enormous benefits that even he concedes are wrought through ergonomic improvements.

Worker Expendability

Not surprisingly, the main focus of any corporation is the bottom line. Since profit margins are much slimmer in the meatpacking industry than in other manufacturing sectors, the companies are especially intent on keeping labor costs as low as possible and volume as high as possible (Olsson). Since there is a seemingly limitless pool of potential employees who choose to work in these conditions, the companies show little concern for the individuals who are so easily replaced when they are injured. The Government Accountability Office (GAO) completed a comprehensive review of conditions inside the meatpacking industry in 2005 and made a number of observations about the composition of its work force. In particular, the racial composition of the workers is disproportionately Hispanic (nearly 42 percent), and foreign born non-citizens are more highly represented within the meat and poultry workforce than in other manufacturing sectors (United States 15). The GAO report also concludes that the increasingly fragmented nature of the tasks in slaughtering and processing has diminished the need for a skilled and more highly paid workforce, a fact that supports the industry's recruitment and employment of unskilled immigrant labor (United States 17).

Implementing employer initiatives to protect workers and to not treat them as expendable assets may well mitigate the current high risk environment. Mandatory compliance with OSHA's *Ergonomic Program Management Guidelines for Meatpacking Plants* is one such initiative that not only protects workers but also can result in increased profits for employers. Again using the NIOSH Case Study 1, Exhibit 3 details an ergonomic intervention in the Kill section of the plant at the hog shackler job position. This extremely physically demanding job includes herding and picking up hogs that have come unshackled from the conveyor chain. The estimated number of task repetitions in one year is 390,000 or once every 4.5 seconds. The potential cost of a single back or face injury ranges from $10,000 to $50,000 yet the

ergonomic intervention costs only $2817.37. The final solution was to shorten the shackle chain which in turn reduces the need to handle and lift the hogs. The workers have experienced a 70 percent reduction in perceived risk, the employers have gained a 70 percent reduction in product value loss and the number of workers in the hog shackler position has been reduced by one. The direct annual cost saving due to this improvement is estimated at $626,000 (NIOSH 63).

It is these types of statistics that will compel employers to see their workers as more than expendable resources. While the hog shackler job could have been left as it was, with its workers being injured and replaced as necessary, by applying an ergonomic solution the company reduced the number of injured workers and saved over half a million dollars a year at the same time. Perhaps these two variables – worker safety and employer profit – cannot be considered as separate entities yet and so the enforcement of compliance with OSHA's *Ergonomic Program Management Guidelines for Meatpacking Plants* is even more critical.

Every year, thousands of meatpacking employees are injured with cumulative trauma disorders due in large part to ergonomically unsound work practices. OSHA's *Ergonomic Program Management Guidelines for Meatpacking Plants* provides timely, comprehensive solutions to many of these processes, however, voluntary compliance means most employers are not integrating these solutions into their plants. OSHA should be given regulatory oversight to assess employer adherence to ergonomic policies in the same way that they assess all other workplace safety hazards during their inspections. Case studies of ergonomic interventions have shown significant reduction in worker injury and have even demonstrated that revenue can be generated when the machine-worker interface is streamlined. It is only if compliance with OSHA's ergonomic guidelines is made mandatory, and if OSHA rigorously enforces that compliance, that the meatpacking industry will relinquish its title of the most dangerous job in America.

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Appendix

Appendix 1

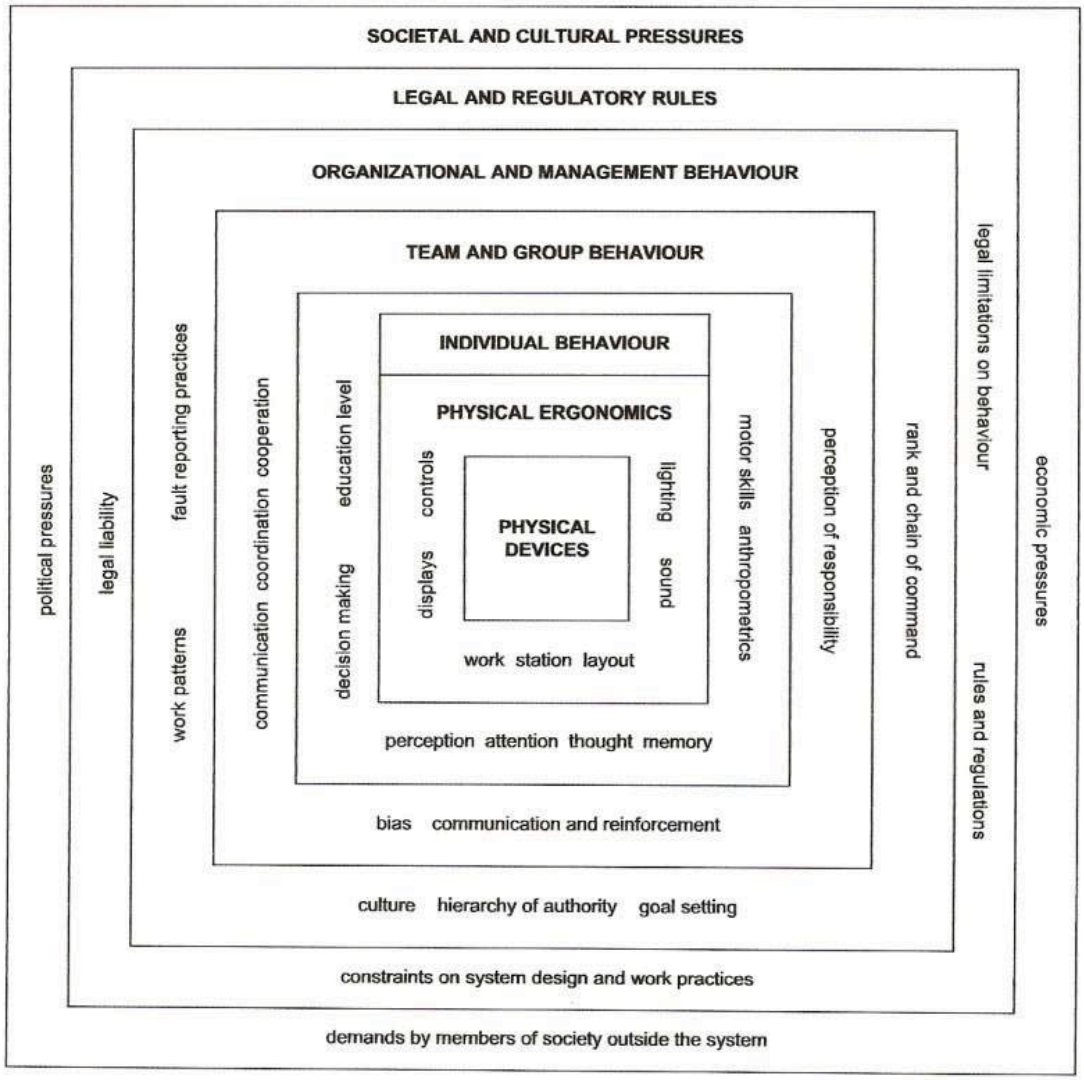

Figure 1. A model of systems in ergonomics [5].

Buckle, Peter. "Ergonomics and musculoskeletal disorders: overview". Occupational Medicine. 55 (2005). Page 165.

Appendix 2

*Table 5. Michigan's checklist for upper extremity cumulative trauma disorders**

Risk factors	No	Yes
1. Physical stress		
1.1 Can the job be done without hand/wrist contact with sharp edges?	[ ]	[ ]
1.2 Is the tool operating without vibration?	[ ]	[ ]
1.3 Are the worker's hands exposed to temperature >21°C (70°F)	[ ]	[ ]
1.4 Can the job be done without using gloves?	[ ]	[ ]
2. Force		
2.1 Does the job require exerting less than 4·5 Kg (10 lbs) of force?	[ ]	[ ]
2.2 Can the job be done without using finger pinch grip?	[ ]	[ ]
3. Posture		
3.1 Can the job be done without flexion or extension of the wrist?	[ ]	[ ]
3.2 Can the tool be used without flexion or extension of the wrist?	[ ]	[ ]
3.3 Can the job be done without deviating the wrist from side to side?	[ ]	[ ]
3.4 Can the tool be used without deviating the wrist from side to side?	[ ]	[ ]
3.5 Can the worker be seated while performing the job?	[ ]	[ ]
3.6 Can the job be done without "clothes wringing" motion?	[ ]	[ ]
4. Workstation hardware		
4.1 Can the orientation of the work surface be adjusted?	[ ]	[ ]
4.2 Can the height of the work surface be adjusted	[ ]	[ ]
4.3 Can the location of the tool be adjusted?	[ ]	[ ]
5. Repetitiveness		
5.1 Is the cycle time longer than 30 seconds?	[ ]	[ ]
6. Tool design		
6.1 Are the thumb and finger slightly overlapped in a closed grip?	[ ]	[ ]
6.2 Is the span of the tool's handle between 5 and 7 cm (2–2¾ inches)?	[ ]	[ ]
6.3 Is the handle of the tool made from material other than metal?	[ ]	[ ]
6.4 Is the weight of the tool below 4 kg (9 lbs)**	[ ]	[ ]
6.5 Is the tool suspended?	[ ]	[ ]

["No" responses are indicative of conditions associated with the risk of CTDs.]

*Lifshitz, Y. and Armstrong, T., 1986, A design checklist for control and prediction of cumulative trauma disorders in hand intensive manual jobs, *Proceedings of the 30th Annual Meeting of Human Factors Society*, 837–841.

**Note exceptions to the rule; see p. 108, first paragraph.

Putz-Anderson, Vern. Cumulative trauma disorders: A manual for musculoskeletal diseases of the upper limbs. NIOSH. Cincinati, OH: Taylor & Francis, 1994. Page 52.

Appendix 3

Distribution of Lost-Time Claims, and Rate of Lost-Time Claims, Ranked, by North American Industry Classification System (NAICS) Sub-Sectors

Date of Injury-Calendar Year 2004
State of Colorado

NAICS Sub-Sectors[1]	Lost-Time Claims		Average Annual Employment[2]	Rate of Lost-Time Claims per 1,000 Employed
	Count	Percent		
MANUFACTURING				
316 Leather & Allied Product Manufacturing	27	0.1	613	44.0
312 Beverage & Tobacco Product Manufacturing	151	0.5	5,883	25.7
337 Furniture & Related Product Manufacturing	134	0.5	6,902	19.4
321 Wood Product Manufacturing	95	0.3	5,060	18.8
327 Nonmetallic Mineral Product Manufacturing	166	0.6	9,176	18.1
333 Machinery Manufacturing	154	0.5	8,661	17.8
313 Textile Mills	3	*	173	17.3
311 Food Manufacturing	301	1.0	17,788	16.9
314 Textile Product Mills	30	0.1	1,883	15.9
332 Fabricated Metal Product Manufacturing	231	0.8	15,539	14.9
331 Primary Metal Manufacturing	28	0.1	1,907	14.7
326 Plastics & Rubber Products Manufacturing	71	0.2	5,120	13.9
336 Transportation Equipment Manufacturing	102	0.3	9,775	10.4
322 Paper Manufacturing	25	0.1	2,467	10.1
339 Miscellaneous Manufacturing	100	0.3	10,542	9.5
323 Printing & Related Support Activities	73	0.2	8,100	9.0
325 Chemical Manufacturing	57	0.2	6,913	8.2
334 Computer & Electronic Product Manufacturing	198	0.7	34,377	5.8
315 Apparel Manufacturing	5	*	972	5.1
335 Electrical Equipment & Appliance Manufacturing	10	*	2,200	4.5

Colorado Department of Labor and Employment. "Work Related Injuries in Colorado in 2004". Denver, Colorado: The Division. 2005. Page 31.

Appendix 4

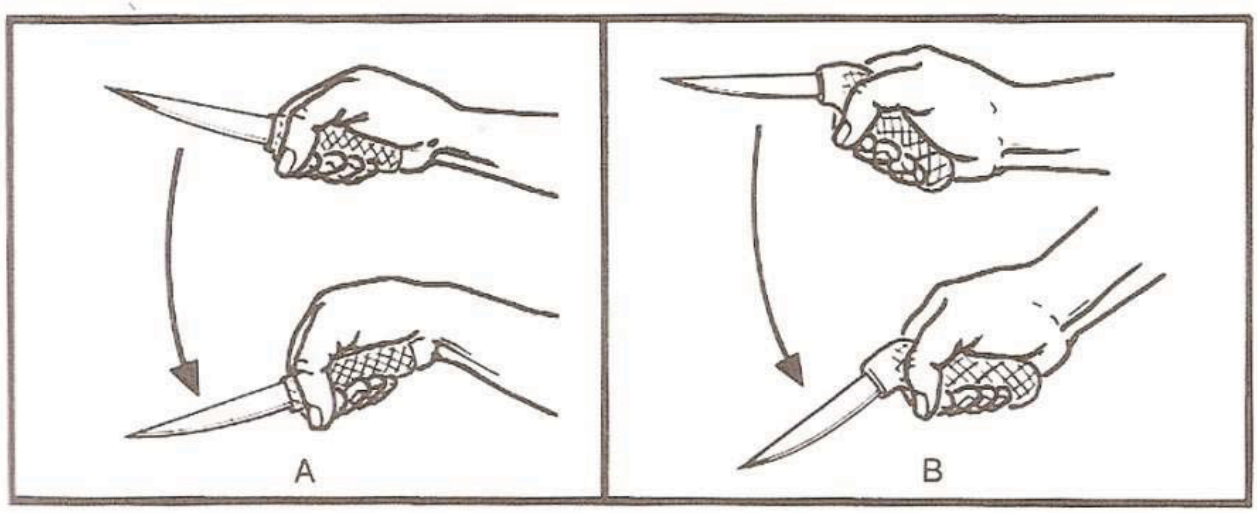

Figure 16(A). Ulnar wrist deviation required to hold knife for boning turkey thighs;
(B) Wrist posture can be controlled by changing shape of handle.

Putz-Anderson, Vern. Cumulative trauma disorders: A manual for musculoskeletal diseases of the upper limbs. NIOSH. Cincinati, OH: Taylor & Francis, 1994. Page 55.