

Ergonomics and the Farm

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Farm Injury Rates

Farming involves hard physical work

- Every day about 167 agricultural workers suffer a lost-work-time injury
- From 2008-2010 , 50% of all hired crop worker injuries were classified as a sprain or strain
- This may be severely under counting the injury rate
 - UC Davis study showed 77% median underestimate of non fatal farm injuries

Musculoskeletal Disorders (MSDs)

Musculoskeletal Injuries are at near epidemic levels in the agricultural industry

- Back pain prevalence rate in production agriculture is about 1.5 times higher than the average for all U.S. industries (Guo et al, 1999)
- Rates of MSD in agricultural workers are 100x greater than suggested industrial targets by NIOSH (Healthy People, 2000)
- MSDs develop slowly over time due to repeated stresses
- Left unaddressed can result in lifelong pain and permanent disability

Injuries

Negative Impacts

- Disability
- Lost work time
- Increased production costs



Body Regions at Highest Risk

Back Pain

- Stooped postures
- Repeated lifting
- Twisting

Shoulder, Arm and Hand Pain

- Working with arms above shoulder level
- Repeated grasping

Knee Pain

- Kneeling
- Jumping off equipment

Whole Body

- Vibrating Equipment



What is Ergonomics?

Ergonomics is the science of fitting the job to the person

- Goal: Reduce MSDs by redesigning the tools or how the work process is done

In general, any work performed with high force, many repetitions or in awkward positions places you at risk

Principles have been widely adopted in industry but agriculture has lagged behind

Why the lag?

Old habits die hard

Each type of production agriculture has its own unique ergonomic hazards and demands on the workers

- This requires individual attention to each
 - Commodity
 - Geography
 - Season
 - Production Method
- Limited ready, off-shelf tools and technologies

Clearly additional research is needed but general strategies can be applied to reduce risk

Vibration

2 General Types

Arm-Hand Vibration

- Contributing factor to Carpal Tunnel Syndrome
- Injury to fingers and hand
- Affect feeling, dexterity and grip strength

Whole-Body Vibration

- Concern with tractors, fork lifts and other heavy equipment
- Low back pain; neck pain (vision, bladder, digestive problems)

Vibration injures nerve and blood vessels

Vibration

Other risk factors

- Cold, damp environments
- Poor tool maintenance
- Tobacco use

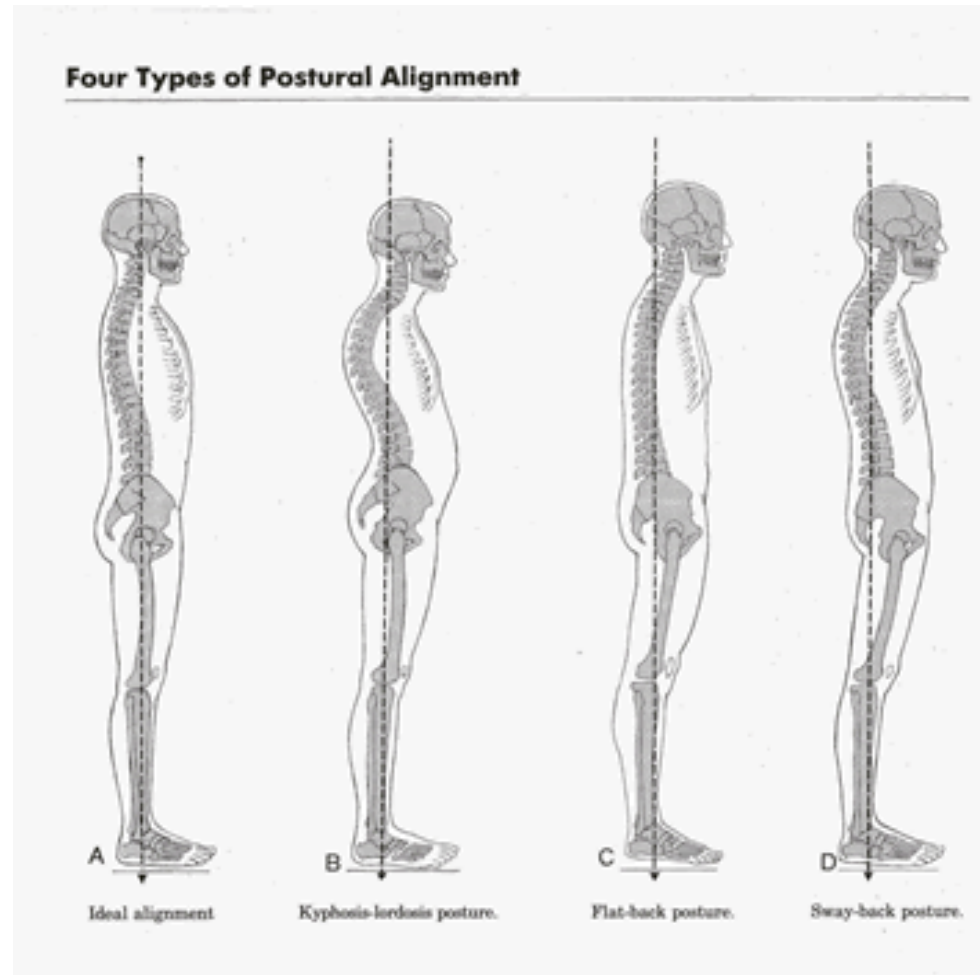
Prevention

- Choose tools that have lower vibration levels
- Reduce exposure (job rotation)
- Keep hands warm and dry
- Allow the tool to do the work (reduce grip and don't force it)
- Consider the tires and suspension on vehicles
- Adjustability of seats on vehicles (damper)
- Fill in Ruts or Potholes; limit speed; consider camber of roads

Back Pain

Posture is key

- Proper alignment of the spine in all positions
- Caution with bending and twisting of the back
- Avoid prolonged periods in any position
- $STRESS = FORCE \times TIME$
- High force short time to injury
- Low force over longer periods can still create injury



Kendall et.al. Muscles: Testing and Function with Posture and Pain

Area Man's Back Aching After Bad Night's Sleep, 58 Continuous Years Of Horrible Posture

NEWS IN BRIEF

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Seated Equipment Usage

Tractors, Mowers or Fork Lifts

- Prolonged sitting is correlated with a high risk of:
 - Back problems
 - Buttocks pain
 - Leg and foot pain
- Sitting position
 - Proper spine alignment
 - Good all around vision
 - Reduced vibration
- Consider taking rest breaks
- Use of Lumbar Roll
- Limit twisting
- Exercise before and after
 - Move into opposite positions



Chair or Tractor- line up is the same



Stooped work

- Redesign the job to avoid
- Alternate with half-kneeling
- Break up the job with other tasks that require walking or sitting
- Move into opposite positions
- Consider longer handles on tools

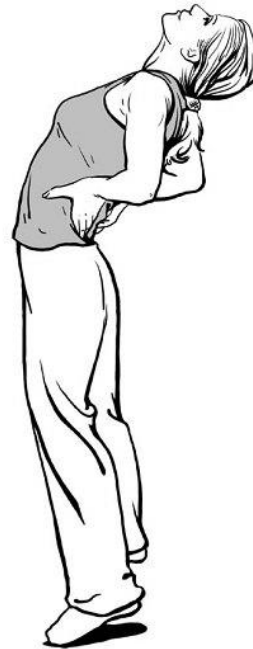


Figure 4 Standing back extension.



<http://www.nycamh.org/media/images/0422/orchardergonomics1.jpg>

Lifting

- Avoid it if you can!
 - Use machines like hand trucks; hoists, utility carts, dollies, roller conveyors, wheel barrows
- Test the weight of the load before you lift
 - If too heavy, ask for help (another person or machine)
 - Break it up into smaller loads
- Try to keep the weight below 50 pounds
- Plan before you lift
 - Clear a path
- Keep lifts between waist and shoulder level
 - Not from the floor or over shoulder height
- Put handles on containers

When lifting

- Feet shoulder-width apart with knees bent
 - Do NOT bend at the waist
- Keep you head up
- Keep the load close to the body
 - Redesign the load if necessary
- Breathe out as you begin to lift – Do NOT hold breath
- Always keep you shoulders in line with your feet
 - Twisting increases risk of injury

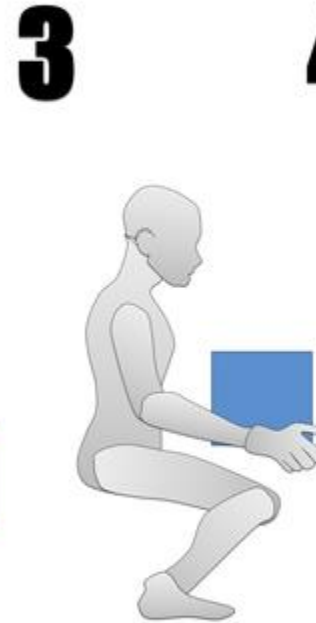
HOW TO LIFT



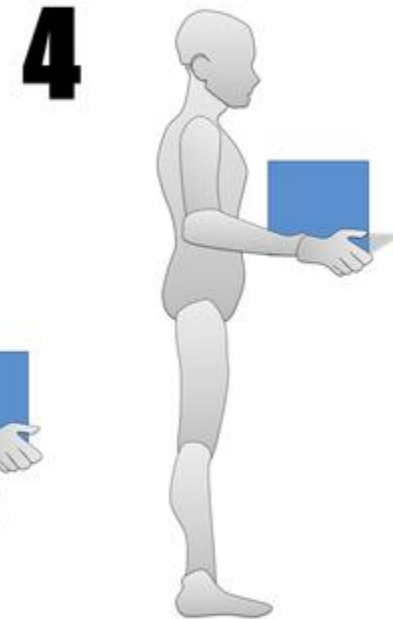
- Get close to the object
- Gloves may improve grip
- Ensure loads are lightweight
- Avoid lifting from the floor



- Bend at the waist
- Use both hands
- Have a good grip



- Keep close to body
- Push up with legs
- Use forearms & thighs to rest load



- Get help, if needed
- Keep it tucked in
- Pivot with your feet, not your back

Shoulder and Arm Strain

- Ergonomically designed tools

- When tools require force, the handle size should allow the worker to grip all the way around the handle
- Handles should be covered with smooth, slip resistant material

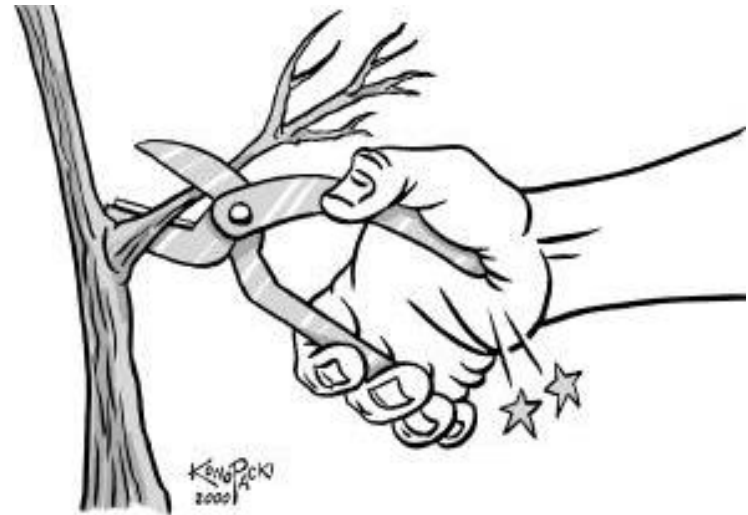
- Proper Maintenance

- Sharp Tools are **safer**.



Dual –Handled Tools (like shears or pliers)

- Length of 4+ inches
- Almost straight with no finger grooves
- Diameter is large enough for small overlap of thumb and fingers
- A spring return to maintain an open position



Pruning

- Task Rotation
 - Alternate between hand saw, chainsaw; hand pruners
- Ergonomic tools
 - As lightweight as possible
 - Consider design that can be used in either hand
 - Allows for rest of the other hand
- Consider Ladder Safety
- Personal Protective Equipment
 - Including hand and eye protection

Knee and Leg Strain

- **Prolonged Standing**
 - Provide floor mats to reduce fatigue
 - Can cause legs to swell
 - Alternate walking or sitting positioning
 - Consider compression stockings
- **Proper footwear**
 - Cushioning
 - Good grip to prevent slip, falls, twisting
- **Kneeling**
 - Use knee pads or cushioning pad
 - Use stools

Avoid Forceful Landings

- **Mounting Equipment**
 - Always maintain 3 points of contact for stability and balance
 - Pull with your hands and step with your feet at the same time while keeping your weight over your feet
- **Avoid Jumping down**
 - Risk of immediate slip and fall
 - Long term damage
 - Force with landing from a Truck
 - From Seat level = 7x or more of body weight
 - From Floor level = 5-6 x body weight
 - From Bottom Step = 1 to 1.5x body weight

http://www.ihsa.ca/pdfs/magazine/volume_13_Issue_2/Dont_jump_down.pdf

Final Thoughts

Consider not just the cost of implementation but the long-term savings, not just financially, but also to your health

Engage farm workers, managers, owners in the process

Use available resources for help

Farm visits available from New York Center for Agricultural Medicine & Health (NYCAMH)

- Phone: 800.343.7527
Fax: 607.547.6087
E-Mail: info@nycamh.org

NYCAMH ongoing studies

Prototype Picking Bucket

- 2 detachable padded bags
- Harness with 2 shoulder straps
- Hip belt for better weight distribution



Additional Resources

CDC Publication- NIOSH- Simple Solutions-
Ergonomics for Farm Workers Available at

<https://www.cdc.gov/niosh/docs/2001-111/pdfs/2001-111.pdf>

Farm Worker Clinical Care Resources

- Downloadable resources for patient prevention and education

<http://farmworkercliniciansmanual.com>