DATE: October 5, 2005

FROM: Minnesota Fatality Assessment and Control Evaluation (MN FACE) Program-Minnesota Department of Health

SUBJECT: MN FACE Investigation 05MN036
Farm Youth Dies After Becoming Entangled In the Unloading Beaters of a Forage Wagon

SUMMARY

A 13-year-old farm youth died after he became entangled in the beaters of a forage wagon. On the day of the incident, the victim was helping his cousin feed cattle in a farm pasture. They were using a tractor and a power-take-off (PTO) driven forage wagon to feed hay to the cattle. At the time of the incident, the victim's cousin was operating the tractor and wagon and the victim was on the ground near the wagon.

The forage wagon was connected to the tractor's drawbar and its power-take-off shaft. When the tractor's PTO drive mechanism was engaged, it operated the wagon's unloading mechanism including two unloading beaters mounted across the front of the wagon. The beaters broke apart the forage in the wagon as two "conveyors" apron chains that were also driven by the tractor's PTO shaft moved it to the front of the wagon.

While the victim and his cousin were unloading hay from the wagon, clumps of hay lodged near the front of the wagon. Before the victim's cousin could stop the tractor's PTO, the victim climbed on the front of the wagon to dislodge the clumps of hay. He placed one or both of his legs inside the front end of the wagon in an attempt to kick free the clogged hay. When he did, the legs of his pants became entangled in the beaters.

The tractor operator noticed the victim becoming entangled in the beaters, stopped the tractor's PTO and rushed to the victim. He saw that the victim was caught between the beaters so he ran to others at the farm and notified them of the incident. A 911 call was placed to emergency personnel who soon arrived at the scene. They assisted in removing the victim from the beaters. After the victim was removed, he was taken to a nearby medical facility where he was pronounced dead. MN FACE investigators concluded that, in order to reduce the likelihood of similar occurrences, the following guidelines should be followed:

- Working youth should only be assigned age appropriate tasks.

- Operators should, whenever possible disengage the power-take-off before dismounting from a tractor, and;

• Workers should not wear loose-fitting clothing near or while operating machines.

INTRODUCTION

On September 13, 2005, MN FACE investigators were notified of a farm work-related fatality that occurred on August 17, 2005. The county sheriff's department was contacted and a copy of their report and pictures of the machine involved in this incident was obtained. The report and pictures of the machine provided a detailed description of this incident. A site investigation was not conducted by a MN FACE investigator. During MN FACE investigations, incident information is obtained from a variety of sources such as law enforcement agencies, county coroners and medical examiners, employers, coworkers and family members.

INVESTIGATION

On the day of the incident, a 13-year-old male youth, the victim was working with his cousin doing evening farm chores. The victim and his older sister were from Illinois and were spending time during the summer months at a relative's farm in Minnesota. The victim was helping his 24-year-old cousin feed cattle in a farm pasture. They were using a tractor and a power-take-off (PTO) driven self-unloading forage wagon to feed chopped hay to the cattle. At the time of the incident, the victim's cousin was operating the tractor and wagon and the victim was on the ground near the forage wagon.

The self-unloading wagon was connected to the tractor's drawbar and its power-take-off shaft. When the tractor's PTO drive mechanism was engaged, it operated the wagon's unloading mechanism including two unloading beaters mounted across the front of the wagon. The beaters were positioned in a vertical configuration one above the other and spaced about 12 inches apart. The beaters broke apart the chopped hay as two apron chains that were also driven by the tractor's PTO shaft moved the hay to the front of the wagon. The apron chains moved across the floor of the wagon from the back to the front when the power-take-off was engaged. The chains divided the wagon floor in half along a line extending along the middle of the wagon floor from the front to the back. Each apron chain consisted of two long parallel chains connected by cross bars that were approximately 18 to 20 inches apart.

Each unloading beater consisted of three steel bars mounted to a center shaft and each bar was equipped with tines spaced 10-12 inches apart along the length of each bar. The tines were approximately 5-6 inches long. As the beaters rotated, the tines caused the chopped hay to tumble onto a third apron chain located across the front of the forage box and beneath the unloading beaters. The apron chain located across the front of the box transferred the forage from the wagon as it fell from the unloading beaters.

While the victim and his cousin were unloading hay from the forage wagon, several large clumps of the chopped hay lodged in the area above the apron chain located across the

front of the wagon. The chopped hay was dry and fluffy which probably caused the clumps to become lodged and not fall onto the unloading apron chain. Before the victim's cousin could stop the tractor's PTO, the victim, upon seeing that hay was not coming from the forage wagon climbed on the front of it to dislodge the clumps of hay. He apparently placed one or both of his legs inside the front end of the forage box in an attempt to kick the clogged hay free. When he did, his pant legs became entangled in the tines of the beaters and he was pulled into the rotating beaters.

The tractor operator noticed the victim becoming entangled in the beaters and immediately stopped the tractor's PTO and rushed to the victim. He saw that the victim was caught between the beaters so he ran to others at the farm place and notified them of the incident. A 911 call was immediately placed to emergency personnel. Emergency personnel soon arrived at the scene and assisted in freeing and removing the victim from the beaters. After the victim was freed, he was placed in an ambulance and taken to a nearby medical facility where he was pronounced dead a short time later.

This was the fourth farm work-related fatality involving a forage wagon that has been investigated by the MN FACE program. In each case, the victim became entangled in the rotating beaters of the wagon after entering the forage wagon box while the tractor's power-take-off (PTO) was engaged. This incident involved a 13-year-old male youth while the other incidents, MN FACE Case 96MN004 involved a 30-year-old male farmer, MN FACE Case 96MN039 involved a 50-year-old male farmer and MN FACE Case 05MN010 involved a 17-year-old male youth.

CAUSE OF DEATH

The cause of death on the death certificate was left chest penetration and trauma due to farm accident.

RECOMMENDATIONS/DISCUSSION

Recommendation #1: Working youth should only be assigned age appropriate tasks.

Discussion: Farm youth may often be assigned and perform many different work related tasks at a young age. These tasks can range from simple chores such as providing feed and water to farm animals to the operation of modern farm equipment. During their early teen years, some farm youth often perform tasks such as operating machines similar to those that they are prohibited by government regulations from operating in other industries. This can result in youth being exposed to serious work place hazards at an early age and at times they may even perform tasks that are inappropriate for their age. Compared to adults, youth may lack work experience, physical size, and attention to task. The ability of youth to safely operate farm equipment may be compromised by cognitive abilities that are less well developed than in adults, by diminished visibility from operators' cabs designed for adults, and by control layouts that may not accommodate their reach. Whenever youth are assigned any work task, it is essential that the task is appropriate for the age and maturity of the youth. In addition, youth should always be

trained to safely perform any assigned task and properly supervised by an adult until it is determined that the youth has learned how to safely perform the task.

This recommendation is of additional significance and importance in cases regarding youth from urban communities who may not be familiar with farm machines and the hazards associated with them. In this case, the victim was spending time at a farm and may not have been as aware of the hazards posed by farm machines as youth who live on a farm. In cases like this, it is recommended that youth be made aware of the hazards associated with farm machines and only be assigned tasks that they can safely perform.

Recommendation #2: Operators should, whenever possible disengage the power-take-off before dismounting from a tractor.

Discussion: Entanglements in power-take-off shafts and rotating machinery components can be prevented if a tractor's power-take-off is disengaged before operators dismount from the tractor. Although this may not be possible in certain cases where a tractor is used to power a "stationary" machine, it should always be done when the operator is using portable machines, such as the forage wagon in this incident. The design of forage wagons such as the one involved in this incident requires that the beaters be unguarded such that the forage in the wagon is able to come in direct contact with them as the forage is unloaded. Since it is not possible to guard the beaters without hindering the proper operation of this type of wagon, it is crucial that the tractor's PTO be disengaged whenever it is necessary for someone to enter this type of wagon.

A general safe work practice that operators should follow is to disengage the power-take-off whenever possible before dismounting from a tractor. In addition, if other workers are in the immediate area of a PTO driven machine while the machine is operating, they should be informed to at all times, stay away from any and all operating equipment while it is operating. They should be informed and trained to not approach, enter or climb onto any machine while it is operating and to only do so when the operator has stopped the machine and all moving components have come to a complete stop.

Recommendation #3: Workers should not wear loose-fitting clothing near or while operating machines.

***Discussion*:** The risk of entanglement in rotating shafts and machine components can be reduced if operators do not wear loose fitting clothing. Work clothing should be well-fitting and zippered or buttoned, not open. Frayed or loose fitting clothes, jackets and sweatshirts with drawstrings, and boots or shoes with long shoelaces should not be worn. Although it could not be determined if the victim was wearing loose fitting clothing at the time of the incident, this recommendation is a general safe work practice that should always be followed by operators and others in the area of operating machines whenever the risk of entanglement exists.

George Wahl, M.S.
Safety Investigator 4
MN FACE

Alan Bender, D.V.M., Ph. D., Chief
Chronic Disease & Environmental Epidemiology
MN FACE