



Don't Doze on the Dangers of Fatigue

Fatigue is a significant hazard facing pilots and other workers in the agricultural aviation industry. Agriculture is a seasonal industry where many operations such as planting, treating and harvesting a crop are time-sensitive. The busy work schedule of an ag pilot, subject to crop conditions, makes it imperative to understand fatigue and devise a fatigue mitigation strategy.

Fatigue frequently is attributed simply to lack of sleep or extended wakefulness without ample recovery sleep, but it is much more complex than that. Research has shown that performance and alertness levels are largely influenced by the complex interaction between sleep and the 24-hour biological clock (circadian rhythm).



People on a normal 24-hour wake/sleep cycle have two periods of maximum sleepiness during which reduced

performance occurs—the first from about 3 to 5 a.m. and the second in the afternoon from about 3 to 5 p.m. This circadian rhythm affects cognitive performance by slowing reaction time and increasing the tendency to have attention lapses known as micro-sleeps.

Adequate sleep is one of the most important factors in preventing fatigue. Experts say the average person needs eight hours of sleep a night. Sleeping for six hours or less can result in impaired performance and alertness.

Serious cumulative performance deficits can occur when sleep is lost over successive days. As sleepiness levels increase, the time it takes to respond to a stimulus increases. Such occurrences also happen more frequently.

Sleepiness causes slowed reaction times, cognitive slowing, loss of situational awareness and impaired short-term memory. None of these are conducive to the safe operation of an ag aircraft.

Research has shown pilots are not capable of accurately judging their own fatigue levels. Many operators have given ground crews the responsibility of monitoring their pilots' condition.



Tips for Restful Sleep

Ensure you get an adequate amount of sleep each day to combat fatigue:

- Wake up and go to bed at the same time every day.
- Use sleeping quarters for sleep only, not for work.
- Establish a bedtime routine.
- Exercise daily but not within two hours of bedtime.
- Keep sleeping quarters cool and dark.
- If you can't go to sleep within 30 minutes, get out of bed and do something relaxing until you feel sleepy.
- Keep the alarm clock out of sight so that you can't be a clock watcher.



Signs of "Skill Fatigue" in Ag Pilots

You may be fatigued if you are experiencing one or more of these symptoms. If so, it may be time to take a break!

- Loss of accuracy and smoothness of control movements
- Under- and over-control movements
- Forgetting side tasks
- Errors of inattention; failure to scan sky; fixed vision
- Preoccupation with one task component to the exclusion of others
- Easily distracted by minor discomfort, aches, pains, noise, etc.
- Degraded performance and, in extreme cases, signs of physical breakdown such as dizziness, fainting, cardiac arrhythmia, etc.
- Larger-than-normal stimuli are required to motivate appropriate responses
- Errors in timing
- Overlooking important elements in a task series

The effects of skill fatigue have been scientifically proven. Experiments were conducted in England in which pilots were tested in simulators. As they grew tired, they began to chase one instrument at a time and forgot to do things like reset controls or even lower the landing gear. It took them longer to interpret instruments and the resulting errors became greater before they took corrective action.

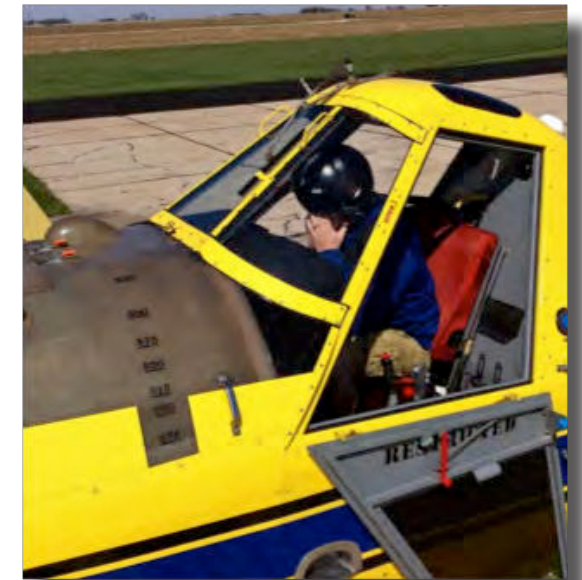
— From "Tired Skills" in *Business Aviation Safety Journal*, Oct. 1995



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Combatting Fatigue in Ag Aviation



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AIR MEDICAL CREDENTIALS

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- Board Certified: Internal Medicine, Pulmonary Diseases, Critical Care and Sleep Medicine
- Chief of Aerospace Medicine, 129th Rescue Wing, California Air National Guard
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- Senior Aviation Medical Examiner
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Doctor's Orders

Keep sleep medicine specialist Dr. Mark Ivey's tips on fighting fatigue in mind during long, busy periods of the application season.



Taking a nap is an important strategy, especially during that 3 p.m. period of maximum sleepiness. Even a 20 to 40-minute nap along with one or two cups of brewed coffee can be very beneficial.



Sleeping eight hours every night and taking naps whenever possible to mitigate fatigue are crucial. The best productivity is found in people who get eight hours of sleep per day.



There is no such thing as an over-the-counter "sleeping pill." Most of these sleep aids use the side effect of a common antihistamine to induce sleepiness and may prevent needed REM sleep. Prescription drugs also have residual drowsiness effects the following day. Both have long periods of effect which may make an ag pilot unsafe and legally ineligible to fly.



The inability to get a quality night's sleep can occur for various reasons.

Chronic pain, restless legs, limb movements, distractions in the form of noise and lights from a TV left on, or sleep apnea may be the cause.



Obstructive Sleep Apnea is estimated to affect between 20 and 40 percent of men. Signs include fatigue, snoring and excessive daytime sleepiness. Sleep apnea is frequently found in people with a body mass index (BMI) greater than 30 or neck size of 16½ inches or greater. The FAA flight physical is putting greater emphasis on diagnosing this potential safety problem.



After 15 hours of continuous wakefulness, many people function at approximately the same level as those who are legally drunk! This sobering fact was determined using a model for measuring performance with fatigue that used alcohol intoxication as a comparison.

NTSB Study Cites Fatigue in Ag Aviation

In 2014 the National Transportation Safety Board (NTSB) released a Special Investigation Report (SIR) on the Safety of Agricultural Aircraft Operations (NTSB/SIR-14/01). The study investigated the details of 78 ag aviation-related accidents between January and October 2013.

The report concluded that "seasonal crop schedules, weather conditions, the potential for crop damage if a job is not completed, competition for contracts, and other factors can influence pilots'

or operators' scheduling practices, creating demanding work schedules that pressure pilots to complete work within a certain period of time. These factors, separately or variously

combined, can contribute to pilot fatigue and other performance-degrading effects." The accidents studied indicated that pilot fatigue played a role in three of the collision accidents and two loss-of-control accidents in 2013.

There is a real risk of the government implementing flight time limits in the agricultural aviation industry if fatigue-related accidents aren't addressed. The NTSB report stated, "Unlike some other civilian and military aviation sectors, no maximum flight time or duty period limitations apply to Part 137 operations." The NTSB went on to recommend that operators develop scheduling practices that take into consideration the limitations that apply to other commercial and military operations. The report suggests that operators and pilots "take measures to reduce the duration of on-duty periods by streamlining administrative tasks such as work-order preparation, record-keeping, and preflight so that a pilot's duty day is not unnecessarily extended."



Fatigue Mitigation Steps

What can operators do to mitigate the effects of fatigue on the safety of their operation?



Allow time for recovery sleep.

It takes about eight hours of sleep to provide for the normal day's wakefulness. When recovering from sleep deficit, it will require additional sleep to satisfy the sleep debt.



Only sleep reverses sleepiness.

For that reason, a nap is an effective physiological strategy to restore alertness. Even short naps of 25 to 30 minutes can have a beneficial effect.



Short activity breaks increase alertness. The physical activity of changing posture and walking and interacting with other people can increase alertness levels, but usually the benefits are short-lived. These short rest breaks are not a substitute for adequate sleep.



Caffeine can be effective in improving alertness and performance.

Caffeine is readily available in coffee, tea and soft drinks. Caffeine takes 15 to 20 minutes to enter the bloodstream, but the effects may last for up to five hours.