MISSISSIPPI STATE UNIVERSITY EXTENSION

Lunar Legends

Does the Moon Influence Buck Activity?

White-tailed deer, like most animals, are active each day to gather the food they need to maintain their bodies and sustain life. The "holy grail" for deer hunters is finding a pattern with environmental conditions that would predict when deer move relatively more, causing them to be increasingly visible to hunters, and allowing hunters to more effectively schedule when they hunt. There are plenty of candidate theories in popular and scientific articles, attributing peaks in deer movement and sightings to changes in environmental conditions including temperature, barometric pressure, wind speed, and the phase and position of the moon.

Most animals, including humans, have what are called circadian rhythms, which are simply changes in behavior or physiology throughout a 24-hour period caused by some external or internal stimulus. Example stimuli include daylight (external) or hunger (internal). Often, an external stimulus like sunlight, or lack thereof, will trigger an internal biological response as in the release of a hormone to induce and maintain sleep.

Deer and other wildlife are no different—they also respond to external and internal stimuli. Some animals' biological clocks are hardwired to keep them active during daylight hours, called *diurnal activity*. Think of songbirds as a general example of diurnal activity—they are more active early and late in the day and may rest during midday, then roost for the entire night. But some animals are more active at night, called *nocturnal activity*. Think of bats and owls as examples of nocturnal activity. White-tailed deer have an activity pattern that is neither diurnal nor nocturnal. Research has shown repeatedly that deer are most active around sunrise and sunset, which biologists call *crepuscular activity*.

Theories

At least since the 1940s, some hunters have attributed greater deer sightings with the phase or position of the moon. A short social media survey we conducted showed that 83 percent of hunters believe the moon has some influence on deer behavior. But is there any evidence the moon substantively influences deer behavior? Deer researchers have often said there's no evidence or justification of the moon's influence, yet hunters—and some biologists—remain convinced the moon affects deer movement behavior.

There are many theories regarding how the moon influences deer. Some say moon phase (full moon, new moon) and the amount of moonlight is influential, whereas others contend the position of the moon (moon overhead, moon underfoot) or the distance the moon is from Earth (apogee, perigee) and the moon's gravitational pull can cause those bucks to be on their feet and moving.

Our Study

We used 48 white-tailed deer bucks equipped with GPS collars over 2 years in central Mississippi to compare these moon theories with any changes in buck movement behavior. The GPS collars recorded locations every 15 minutes from September through February. We analyzed the buck data using two conditions that should be related to buck movement and, therefore, more visible to hunters. First, we examined bedding time—if a buck is bedded, he's not moving and not visible to hunters. Second, we examined their movement rate when the bucks decided to move. That is, over a standardized period of time, did the buck move 50 yards or 500 yards? The more bucks are moving, the more visible they should be to hunters.

There are other conditions that could also be influencing buck movement behavior, and we had to eliminate those causes to make sure any changes in buck behavior were actually related to the moon. For example, we had to remove the influence of the rut, or the opening day of firearm season, to isolate the moon's influence. We did this by comparing a buck to his individual movement patterns.

In the following pages, we describe each of the moon theories we tested, how we measured change in a buck's movement behavior, and the results. Once you finish reading this publication, ask yourself if you would plan a hunt based solely on the moon.

What do hunters think about the moon's influence on deer activity?

We asked hunters if they thought the position or phase of the moon affected deer activity; 1,439 hunters took our survey, and here's what we found

25% of hunters believe the moon's **phase** affects activity.

13% of hunters believe the moon's **position** affects activity.

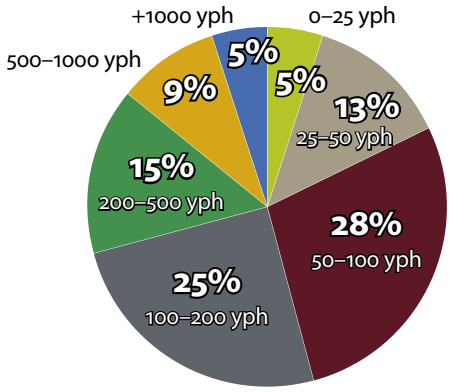
83%
of hunters think the moon has some effect on deer activity.

45% of hunters believe both the moon's **phase and position** affect activity.

50%
of hunters think the moon affects **how far a buck would travel** per hour.

85% of these hunters believe the moon's phase/position can cause bucks **to travel farther**.

Distance people think bucks would move farther (per hour) due to the moon



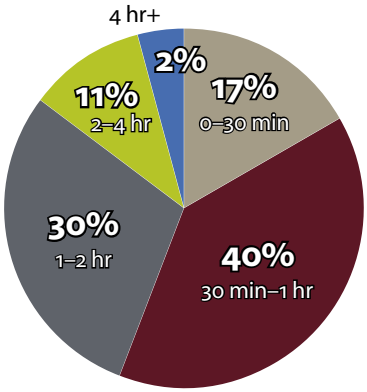
OUTCOME:

Most hunters believe that bucks move between 50 and 200 yards per hour more if the moon is in the right place.

76%
of hunters think the moon affects the **amount of time** a buck spends **bedded.**

55% of these hunters believe the moon's phase/position can make bucks **bed down for less time**.

Decreased buck bedding time people think is due to the moon



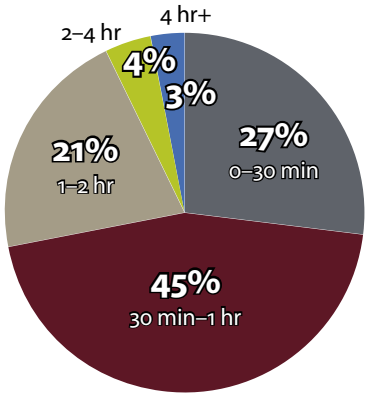
OUTCOME:

Most hunters believe that bucks bed for 30 minutes to an hour less if the moon is in the right place.

81%
of hunters think the moon affects what time a buck leaves its afternoon bed.

69% of the 81% believe the moon's phase/position can make bucks **leave their bed earlier**.

Amount of time people think bucks would leave their beds earlier due to the moon



OUTCOME:

Most hunters believe bucks leave their beds 30 minutes to 1 hour earlier if the moon is in the right place.

What have we found about how buck activity is affected by the moon?

An Overview

We looked at buck activity in daylight hours by calculating …

Yards moved per hour

&

Bedding down and leaving bed times

&

Bedded percentage

We looked at different types of moons and compared deer activity at these types to bucks' usual behavior and we found …

Moon phase has no effect on buck activity.

The moon being full, new, or anything in between does not cause our bucks to become more or less active. This is true for daylight hours but also at night.

Moon position has no effect on buck activity.

The moon changes position over 25 hours—it rises and sets, sometimes it is overhead, and sometimes it is under our feet. Apogee and perigee moons are when the moon is closest or farthest from the earth. We considered all these positions and found that they do not cause our bucks to become more or less active.

Combinations of moon phases and moon positions have no effect on buck activity.

We looked at combinations from popular hunting and fishing calendars, such as the moon being overhead and full or the moon rising and new. Buck activity in these time windows was no different from usual activity.

Moon phase and position have no effect on usual activity at dawn and dusk.

We looked at combinations from popular hunting and fishing calendars of moon phase and dawn and dusk. We found no effect from the moon, but our bucks were moving much more at dawn and dusk in general.

The moon has little effect on buck bedding times.

Generally, the moon has little effect on bucks' bedding down and waking up times. Our data showed that when the moon is rising or setting, our bucks may bed down about 7 minutes later than usual.

The rut affects buck activity much more than the moon.

In the rut, bucks are traveling over 100 yards per hour more than usual with about 10% less bedding time than usual in daylight hours (over 1.25 hours less). This clear effect shows that any slight change in activity due to the moon is not worth planning hunting around, compared to rut dates.

How do we describe buck activity?

Bedded percentage

The recorded locations of our bucks tell us when they are bedded down. We can calculate the percentage of time that bucks spend bedded down in daylight, averaged over the population, where more bedding would mean less active deer.

Movement rate

The distance that bucks travel per hour, averaged over the population, provides a movement rate, where a higher rate means more active deer. We can find this from our tagged bucks by looking at how far they travel between each recorded location in daylight hours.

How active are our bucks in general?

Using all data for all 48 bucks from September 1 to February 28, we calculated the average percentage of daytime spent bedded and the average distance traveled per hour.

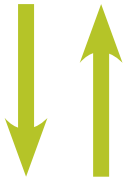
OUTCOME:

In general, bucks bed down around 34% of the time and travel around 269 yards per hour (yph) in the daytime. Keep these figures in mind as you read the results to gauge how much the moon may be affecting buck movement patterns.

How do we describe changes in buck activity?

Increases/decreases in bedding

For example, we may say that bucks bed **1% less** at certain times of day. For a 12-hour day a **1% increase** in bedding would be around 7 minutes more bedded time.



Increases/decreases in movement rate

For example, we may say that bucks move 10 yards per hour **more** at certain times per day.

Survey results show that the majority of hunters believe the moon can change the movement rate of deer by more than 50 yards per hour and cause them to bed down for 30 minutes more.

How do we look for increases or decreases in buck activity?

Buck behavior changes throughout the rut, and bucks have different personalities.

To see if bucks were more active on a given day and time, we compared an individual buck's movements during the moon period to his ***usual movements*** at that same time of day. A buck's ***usual movements*** are his movements at the same time of day within a 2-week window. We then calculated the average of all the individual buck differences for an ***average population response*** to a particular moon theory. Comparing a buck's moon movements to his normal movement pattern accounts for effects of the rut and different personalities.

We looked for changes to the percentage of time bedded and the distance traveled per hour for each buck individually.

For example: *If we wanted to look for increases or decreases in a buck's activity in the time window from 2 p.m. to 3 p.m. on November 10, we would compare movement in this window of time to his usual movements. We would compare the distance he traveled at this time to his average distance traveled from November 3 to November 17 between 2 p.m. and 3 p.m.*

How could the moon affect deer activity?

When we see the moon in the night sky, we can describe it based on how bright it is and its position.

The *phase* of the moon is how full the moon is. You may have heard of descriptions like *waxing crescent* (the moon is between 1% and 49% full) and *waxing gibbous* (the moon is between 51% and 99% full), but here we use the percentages that are used in some hunting and fishing theories.

Alongside moon phase, hunting and fishing theories also use the moon's *position* to estimate the best days to head out. In the next pages, we describe moon phase, moon position, and the theories, and give some results from our data.

1. Moon phase

The phase of the moon relates to how much the moon shines. The moon can be anywhere from 0% to 100% full. A new moon is when the moon is 0% full.

Since the moon phase changes every day, we can rate entire days based on the phase of the moon.

Day rating 4:
99% or more full or 99% or more new moon.

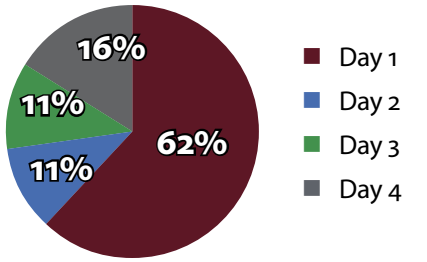
Day rating 3:
95% or more full or 95% or more new moon.

Day rating 2:
90% or more full or 90% or more new moon.

Day rating 1:
Less than 90% full or less than 90% of a new moon.

Where do these day ratings come from? They come from popular hunting theories that we will describe later.

Percentage of day ratings in our data



Days are mostly rated as 1, but 38% of days are close to a new moon or full moon.

For each moon theory, we explain the moon conditions we tested, and how the bucks responded with changes in bedding behavior and distance moved. These changes are the difference from each buck's usual behavior, averaged over the population. We then summarize the data with an **outcome**.

Moon phase results

We show results by reporting the increases/decreases of the percentage of time spent bedded (in daylight) and the yards traveled per hour. Increases are shown with a plus symbol and decreases are shown with a minus symbol.

For example, in our data, on days rated as 4, bucks are bedded down for 0.6% more time than usual, as shown in the diagram below. Also on days rated as 4, bucks are moving 4 yards per hour less than usual. We would not consider these changes large enough to say that moon phase influences deer activity on days rated as 4.

Day rating 1

Day rating 2

Day rating 3

Day rating 4

OUTCOME:

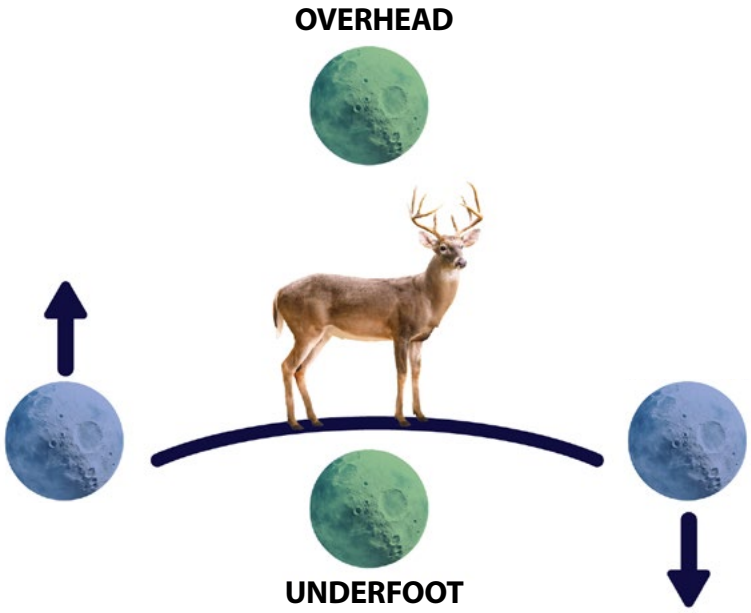
The moon's phase does not influence our bucks' activity. There does not seem to be a meaningful difference in deer activity on different rated days compared to a buck's usual movements.

What about differences with the full moon and new moon? We'll look at these later.

2. Moon position

The position of the moon affects the strength of its gravitational pull on the earth, and some believe this may influence buck activity.

The cycle of the moon rising, being overhead, setting, and being underfoot lasts around 25 hours. That means these times change by approximately an hour each day. For example: If the moon rises at 10 a.m. today, then tomorrow it will rise around 11 a.m.



On the previous page, we could rate days based on the moon's phase; here, we rate times based on the moon's position.

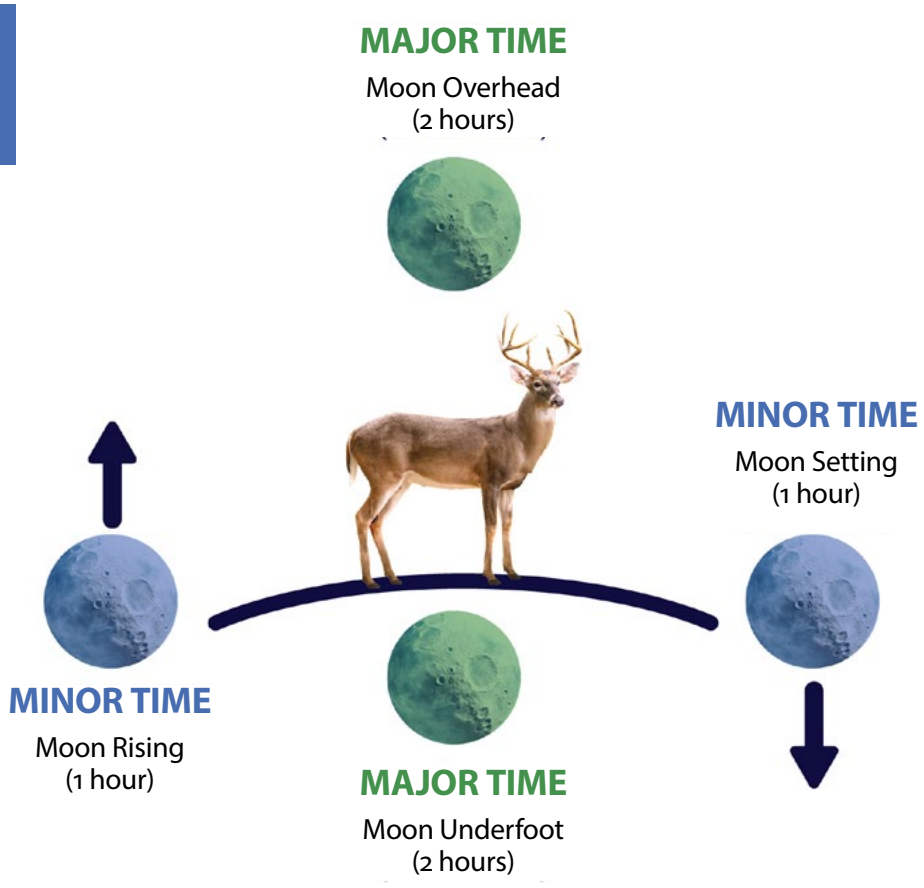
Major times are related to the moon being **overhead** or **underfoot**.

Minor times are related to the moon **rising** or **setting**.

Major windows are 2 hours long and occur twice a day, when the moon is overhead and underfoot.

Minor times are 1 hour long and occur twice a day, when the moon is rising or setting.

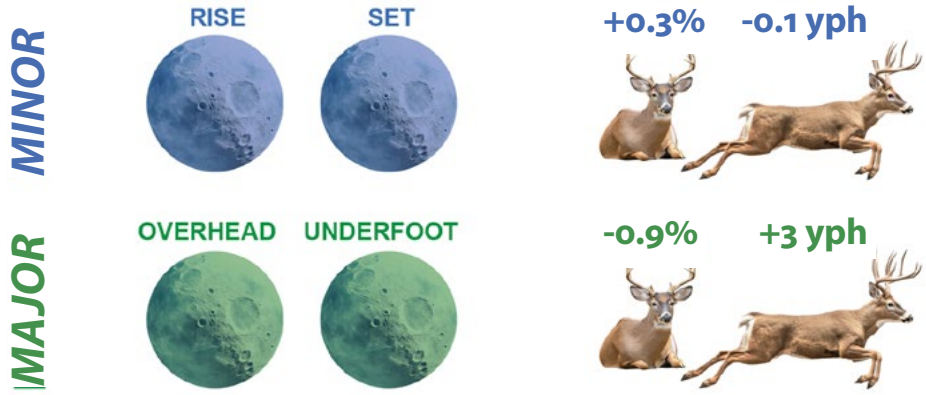
MAJOR TIMES VS. MINOR TIMES



Moon position results

We show results by reporting the increases/decreases of the percentage of time spent bedded and the yards traveled per hour in daylight.

For example, in our data, minor windows mean that bucks are bedded down for 0.3% more time than usual and are moving 0.1 yards per hour less than usual. We would not consider these changes enough to say that minor windows (moon rising or setting) influence deer activity.

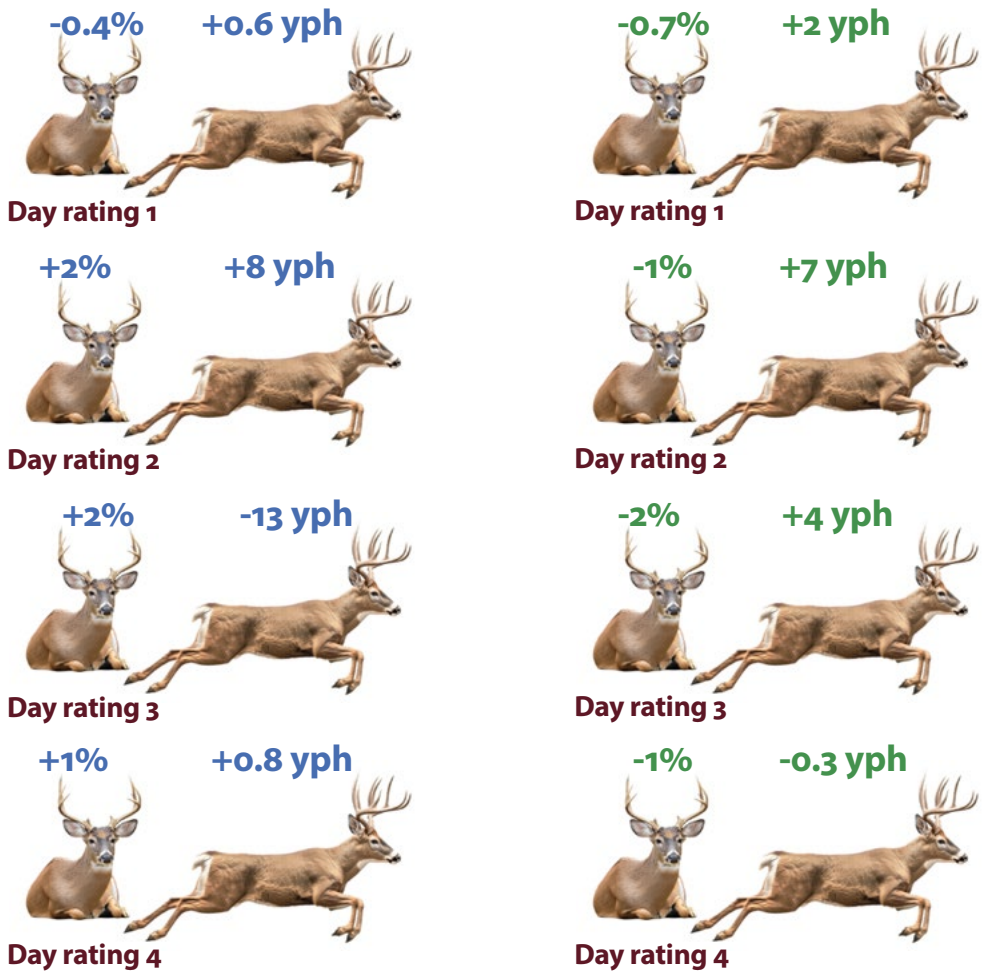


OUTCOME:

The moon position alone does not affect our bucks' activity. There is no meaningful change in the percentage of time spent bedded or the distance traveled per hour here.

Results on moon phase and moon position together

Solunar theory suggests that a higher rated day (moon either full or new) is best for hunting minor and major windows.



OUTCOME:

Windows of time that combine moon phase and moon position do not affect our bucks' activity. There is no meaningful change in movement behavior when minor and major windows are combined with different moon phase days.

Popular theories of how the moon affects deer activity

Next, we cover the two main theories related to changing conditions of the moon that may influence deer and cause bucks to move more, making them more visible to hunters. We describe the solunar and red moon theories and how we measured a buck's potential movement response to changing moon conditions.

Theory 1: Solunar theory

Traditional hunting and fishing calendars are based on the solunar theory. The moon's **phase** provides the **best day** to hunt deer, and the moon's **position** (minor and major windows) provides the **best time of day** to hunt deer.

Below we provide three example days to show how the theory works. Days are rated as 1, 2, 3, and 4 based on the moon's phase, and major and minor windows provide the best times based on the moon's position.

Days rated where the minor or major windows occur at the same time as dawn and dusk are considered the best hunting in the season.

Example day 1

Moon data
Rise: 5:10 a.m.
Set: 8:53 p.m.
Over: 2:07 p.m.
Under: 1:45 a.m.
Sun data
Rise: 6:08 a.m.
Set: 7:50 p.m.
Moon phase: 25% full

Solunar predictions:
Major times
12:45 a.m.–2:45 a.m.
1:07 p.m.–3:07 p.m.
Minor times
6:40 a.m.–7:40 a.m.
8:23 p.m.–9:23 p.m.

Day rating: 1 (moon is not full or new)

This day is rated the lowest as the moon is not close to being full or new, but the position of the moon still provides windows of time that are considered the best to hunt—major and minor times. Major times are 2-hour periods when the moon is overhead or underfoot. Minor times are the 1-hour periods when the moon is rising or setting.

Example day 2

Moon data
Rise: 7:10 a.m.
Set: 8:53 p.m.
Over: 2:07 p.m.
Under: 1:45 a.m.
Sun data
Rise: 6:08 a.m.
Set: 7:50 p.m.
Moon phase: 1% full

Solunar predictions:
Major times
12:45 a.m.–2:45 a.m.
1:07 p.m.–3:07 p.m.
Minor times
6:40 a.m.–7:40 a.m.
8:23 p.m.–9:23 p.m.

Day rating: 4 (moon is full or new)

This day is rated the highest as the moon is 99% new (1% full). The theory states that hunting within the minor and major windows on this day would be much better than example 1 because the day is rated higher.

Example day 3

Moon data
Rise: 7:10 a.m.
Set: 8:53 p.m.
Over: 2:07 p.m.
Under: 1:45 a.m.
Sun data
Rise: 6:50 a.m.
Set: 7:07 p.m.
Moon phase: 99% full

Solunar predictions:
Major times
12:45 a.m.–2:45 a.m.
1:07 p.m.–3:07 p.m.
Minor times
6:40 a.m.–7:40 a.m.
8:23 p.m.–9:23 p.m.

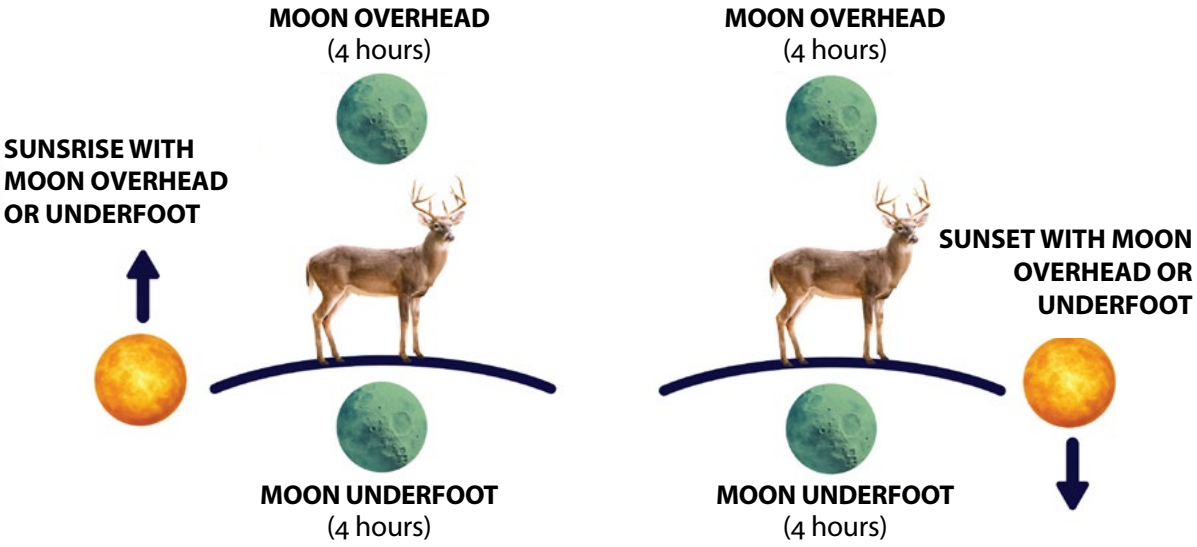
Day rating: 4 (moon is full or new)

This day is rated the highest as the moon is 99% full (1% new). We use a star symbol to indicate that the theory considers this day to be one of the season's best days to hunt, due to the day being rated as 4 and the sun rising within a minor window. The theory states that hunting within the minor and major windows on this day would be a better choice than example 1 because the day is rated higher, but also a better choice than example 2 because the sun rises within a minor window.

Theory 2: Red moon theory

The red moon theory suggests the best days to hunt are when sunrise and sunset coincide with the moon being overhead or underfoot. If the sun rises or sets within the approximate 4-hour window that the moon is either overhead or underfoot, then the day is classified as a red moon. Moon overhead and underfoot times are also reported as being the best times to hunt.

RED MOON TIMES



Note that when the sunrise co-occurs with the moon being overhead, the sunset generally co-occurs with the moon being underfoot, and vice versa.

Here, the 4-hour windows that determine if the day is red are 12:21 a.m.–4:21 a.m. and 12:47 p.m.–4:47 p.m. Since the sun does not rise within these windows, the day is not classified as a red-moon day.

EXAMPLE DAY 1

Moon data

Over: 2:21 a.m.

Under: 2:47 p.m.

Sun data

Rise: 6:49 a.m.

Set: 6:39 p.m.

EXAMPLE DAY 2

Moon data

Over: 5:13 a.m.

Under: 5:39 p.m.

Sun data

Rise: 6:50 a.m.

Set: 6:38 p.m.

Here, the moon is overhead during a 4-hour window from 3:13 a.m. to 7:13 a.m. Since the sun rises within this window, the day is classified as a red-moon day. The red moon theory suggests that hunting around the times that the moon is overhead/underfoot on red-moon days would improve success. This is similar to the major windows in the solunar theory.

Comparing the theories

Solunar and red moon theories are similar. They both suggest hunting is better when the moon is overhead or underfoot, and if these periods occur around dawn and dusk, then it's a very good time to hunt. Solunar theory defines the 2-hour window surrounding the moon being overhead or underfoot as major times. Red moon theory suggests that hunting in major windows that occur at dawn and dusk is best.

Solunar adds an additional time period to hunt, suggesting that the 1-hour windows around the moon rising and setting (defined as minor times) are also good times to hunt.

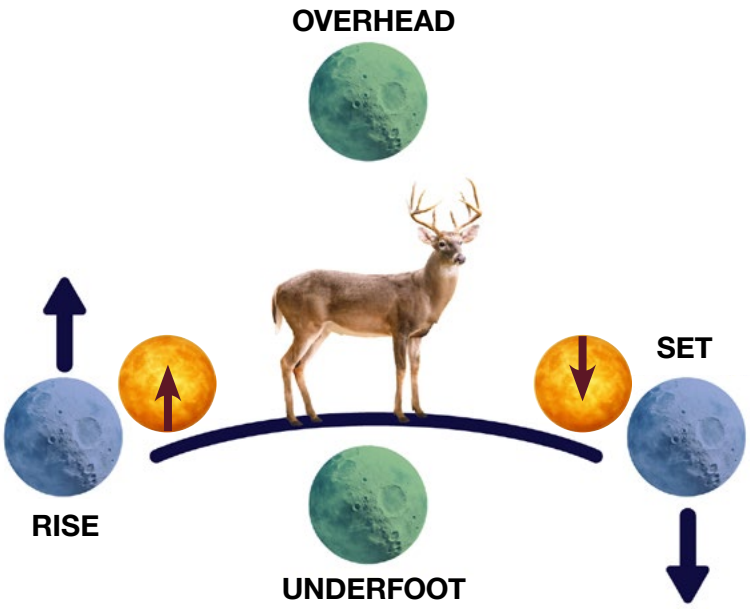
Next, we will investigate the minor and major periods of solunar theory and later look at these compared to usual deer movements at dawn and dusk.

What about changes in buck activity just at dawn and dusk?

Movements of the moon and the sun

It is well known that deer are more active at dawn and dusk (when the sun is rising or setting).

Sometimes the rising and setting of the sun can happen at the same time as the moon rising or setting (minor times) or the moon being overhead or underfoot (major times). Both solunar and red moon theory suggest that deer are even more active than usual when major windows occur at the same time as dawn and dusk.

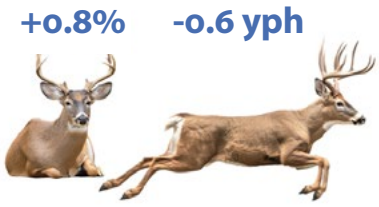


We know deer move more at dawn and dusk.

In these analyses, we only look at movement data within the 2-hour windows around sunset and sunrise and compare data within these windows.

Within 1 hour of dawn or dusk, bucks are bedded down around 21% of the time and travel around 317 yards per hour.

MINOR



MAJOR

OUTCOME:

No meaningful change by comparing these to individual bucks' usual movements at dawn and dusk.

Results for moon position and phase at dawn and dusk

MINOR

+0.9% **+29 yph**

Day rating 1

+2% **-6 yph**

Day rating 2

+1% **-20 yph**

Day rating 3

+0.1% **+0.9 yph**

Day rating 4

MAJOR

-0.3% **+3 yph**

Day rating 1

No Occurrence

Day rating 2

No Occurrence

Day rating 3

No Occurrence

Day rating 4

OUTCOME:

Combinations of moon phase and moon position do not change the activity levels of our bucks at dawn and dusk compared to usual movements at dawn and dusk.

Note that major windows on days rated 2, 3, and 4 do not occur at dawn and dusk, and most (70%) minor windows on days rated as 3 and 4 occur at dawn and dusk. **This may mean hunters see increased activity in minor windows on these days simply due to usual crepuscular movement.**

Could there be a difference between full moon and new moon?

Solunar theory suggests that days when the moon is full or new are the best days to hunt (day ratings of 2, 3, and 4), but is there a difference between deer activity on days with full and new moons?

A full moon here is more than 90% full, and a new moon is less than 10% full.

NEW

+0.37% **+2 yph**

FULL

+0.9% **-3 yph**

OUTCOME:

There is no meaningful change in deer activity.

Results of moon phase separated into new and full moons

We can split the different rated days into new moon or full moon. For example, a day rated 4 and full would mean the moon is 99% full, and new would mean the moon is 1% or less full.

NEW

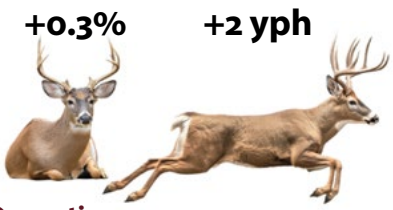
0% **-1 yph**

Day rating 1
(more than 10% full)

+0.2% **+5 yph**

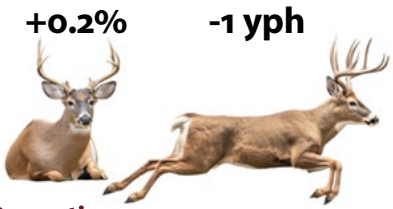
Day rating 2
(less than 10% full)

+0.3% **+2 yph**



Day rating 3
(less than 5% full)

+0.2% **-1 yph**



Day rating 4
(less than 1% full)

FULL

-0.7% **+2 yph**

Day rating 1
(less than 90% full)

0% **+8 yph**

Day rating 2
(more than 90% full)

+0.9% **-3 yph**

Day rating 3
(more than 95% full)

+1% **-6 yph**

Day rating 4
(more than 99% full)

OUTCOME:

No meaningful change in movement behavior on full moon or new moon days.

Results of new moon phase and moon position

We consider only the minor and major periods of the days rated 1–4 as a new moon.

MINOR

Day rating 1

Day rating 2

Day rating 3

Day rating 4

MAJOR

Day rating 1

Day rating 2

Day rating 3

Day rating 4

OUTCOME:

No meaningful change in movement behavior when minor and major windows are combined with different new moon phase days.

Results of full moon phase and moon position

We consider only the minor and major periods of the days rated 1–4 as a full moon.

MINOR

Day rating 1

Day rating 2

Day rating 3

Day rating 4

MAJOR

Day rating 1

Day rating 2

Day rating 3

Day rating 4

OUTCOME:

No meaningful change in movement behavior when minor and major windows are combined with different full moon phase days.

What about the full moon at night?

Hunting is only allowed in daylight hours in most of the U.S., which is why our analyses are focused only on these times, but what about deer activity at night? Are bucks more or less active because of the light of the full moon?

Results of new and full moons at night

A full moon here is more than 90% full, and a new moon is less than 10% full.

NEW

+0.4% **-1 yph**

FULL

-0.1% **+4 yph**

OUTCOME:

No meaningful change in movement behavior on full moon or new moon nights.

Results of moon phase separated into new and full moons at night

We can split the different rated days into new moon or full moon. For example, a night rated 4 and full would mean the moon is 99% or more full, and a night rated 4 and new would mean the moon is 1% or less full.

NEW

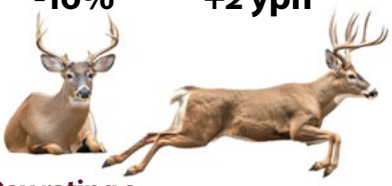
+0.4% **-1 yph**

Day rating 1
(more than 10% full)

-1% **+5 yph**

Day rating 2
(less than 10% full)

-10% **+2 yph**



Day rating 3
(less than 5% full)

-6% **-1 yph**

Day rating 4
(less than 1% full)

FULL

-0.4% **+2 yph**

Day rating 1
(less than 90% full)

+5% **+8 yph**

Day rating 2
(more than 90% full)

0% **-3 yph**

Day rating 3
(more than 95% full)

+5% **-6 yph**

Day rating 4
(more than 99% full)

OUTCOME:

No meaningful change in movement behavior on full moon or new moon nights.

Could there be an effect of the moon's distance to Earth?

Around once a month, the moon is at its closest point to Earth in its orbit; this is called the ***perigee***. The moon's ***apogee*** is when it is farthest from Earth.

Data within 48 hours of a perigee or apogee moon.

PERIGEE

+0.1% **+3 yph**

APOGEE

-0.3% **-4 yph**

OUTCOME:

No meaningful change in buck activity when the moon is in apogee or perigee.

Results of moon phase at perigee and apogee moons

We consider perigee and apogee moons on different rated days (moon phases).

PERIGEE

-0.6% **-3 yph**

Day rating 1
(more than 10% full)

-2% **+8 yph**

Day rating 2
(less than 10% full)

+1% **-8 yph**

Day rating 3
(less than 5% full)

+1% **-9 yph**

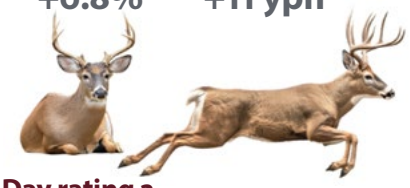
Day rating 4
(less than 1% full)

APOGEE

-0.6% **+5 yph**

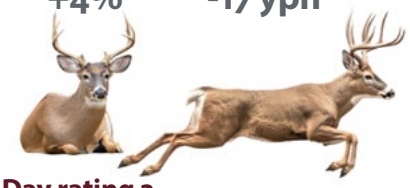
Day rating 1
(less than 90% full)

+0.8% **+11 yph**



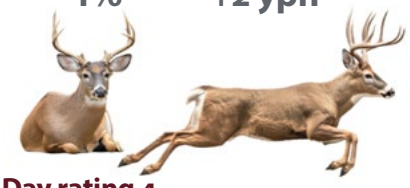
Day rating 2
(more than 90% full)

+4% **-17 yph**



Day rating 3
(more than 95% full)

-1% **+2 yph**



Day rating 4
(more than 99% full)

OUTCOME:

No meaningful change in buck activity on perigee moon or apogee moon days combined with full or new moons.

Results of perigee moons with moon phase and position

We consider only the minor and major periods of the days rated 1–4 as a perigee moon.

MINOR

Day rating 1

Day rating 2

Day rating 3

Day rating 4

MAJOR

Day rating 1

Day rating 2

Day rating 3

Day rating 4

OUTCOME:

Very little change in movement behavior when minor and major windows are combined with different perigee moon phase days, and no apparent pattern.

Results of apogee moons with moon phase and position

We consider only the minor and major periods of the days rated 1–4 as an apogee moon.

MINOR

Day rating 1

Day rating 2

Day rating 3

Day rating 4

MAJOR

Day rating 1

Day rating 2

Day rating 3

Day rating 4

OUTCOME:

Very little change in movement behavior when minor and major windows are combined with different apogee moon phase days, and no apparent pattern.

How often and when do bucks bed down during daylight hours?

The general pattern: bucks' first daylight bedding is around 2.9 hours after sunrise from September to February. Similarly, they leave their last daytime bed around 2.7 hours before sunset. On average, bucks bed 2.6 times during daylight hours, but this changes during the rut, which is defined as 3 weeks before and after peak breeding (December 11–January 21).

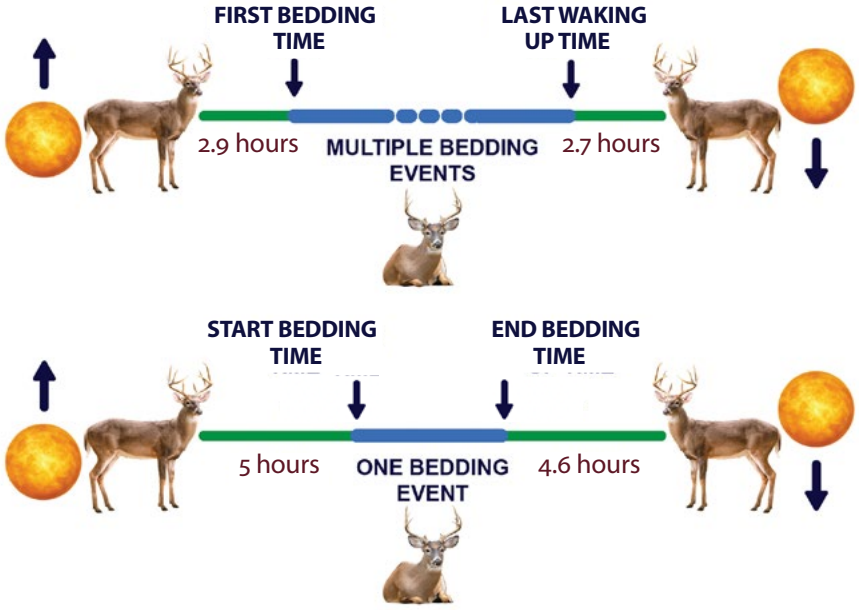
Mississippi rut dates

Pre-rut: Nov. 27 • Early rut: Dec. 11 • Peak rut: Dec. 25 • Late rut: Jan. 8 • Post-rut: Jan 22

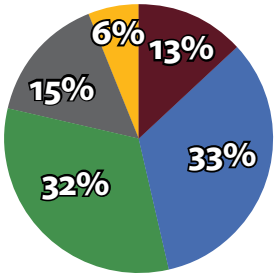
Bucks bed down multiple times in daylight hours on most days (top timeline). The first bedding event occurs about 2.9 hours after sunrise, and bucks leave their last bed about 2.7 hours before sunset.

Sometimes bucks bed down only once per day (bottom timeline); when this happens, they generally bed down around 5 hours after sunrise and leave their bed around 4.6 hours before sunset.

Bedding down only once per day is more common in the rut. In the early rut, peak rut, and late rut, bucks bed down 1.7 times per day on average. Outside the rut, from September to February, bucks bed down 2.6 times a day on average.

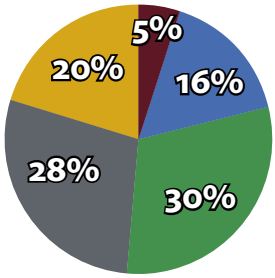


The charts below show bedding events in daylight hours during the rut and not.



Rut

- 0 bedding events
- 1 bedding event
- 2 bedding events
- 3 bedding events
- 4+ bedding events



Non-rut

- 0 bedding events
- 1 bedding event
- 2 bedding events
- 3 bedding events
- 4+ bedding events

Results of bedding down and leaving bed times in major and minor windows

Bedded down time

2.9 hours after legal shooting begins

Leaving bed time

2.7 hours before legal shooting ends

In general, bucks bed down 2 hours and 54 minutes after legal shooting begins and leave their last daytime bed 2 hours and 36 minutes before legal shooting ends.

Here, we consider the difference in bucks' bedding down and leaving bed times when they coincide with a minor or major window.

OUTCOME:

There is no meaningful difference in the bucks' waking up and bedding down times within minor or major windows.

How are bucks more active around the rut?

We know bucks are more active in peak rut; let's see how our measures of deer activity in the minor and major windows change over the rut. In previous calculations, we compared the individual bucks' usual movements to the surrounding 2-week period. Here, we instead compare their movements at one rut phase to the rest of the hunting season.

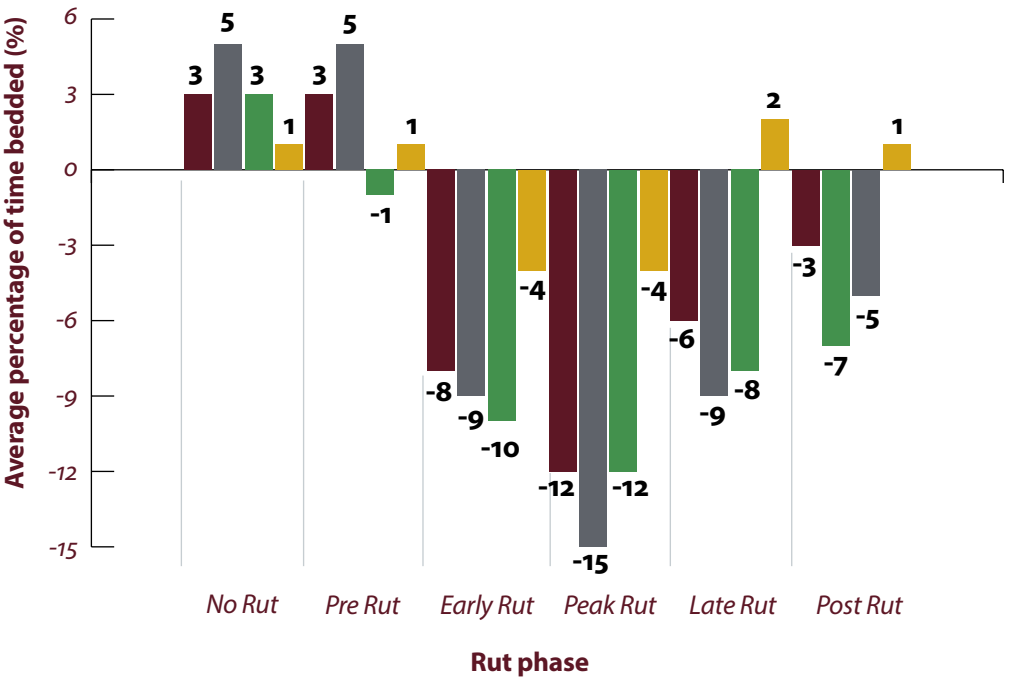
In peak rut, bucks are bedding 22% of the daytime and moving around 409 yards per hour.

OUTCOME:

Bucks bed much less (the whole season is 34%) and travel more yards per hour (the whole season is 269 yards per hour) in peak rut.

The moon does not affect buck activity, but the rut does

This graph shows the difference in the mean percentage spent bedded in the daytime for different phases of the rut compared to the whole season. **For example,** in peak rut, bucks are bedded 12% less when compared to their bedding in the rest of the season. Different colored bars represent a different time period. The values for minor, major, and dawn/dusk show the difference between the bedding at each rut phase and the same time period for the whole season.

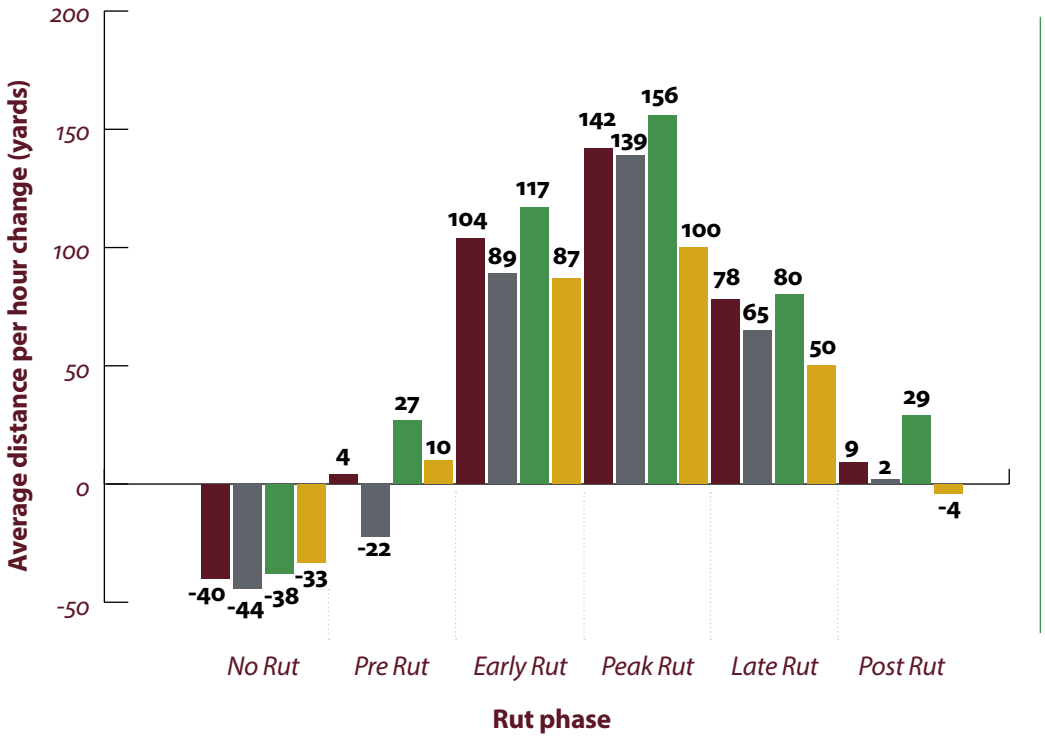


OUTCOME:

Bucks are bedded down 12% less than the rest of the season in peak rut, and this is consistent in minor and major windows, too. A difference of 10% is equal to 72 minutes for 12 hours of daylight. At dawn and dusk, bucks are bedded down less than the rest of the season in early, peak, and late rut.

- All data
- Minor
- Major
- Dawn/Dusk

This graph shows the difference in the distance traveled per hour in the daytime for the population for different phases of the rut compared to the whole season. For example, in peak rut, bucks are traveling 142 yards more when compared to their movements for the rest of the season.



OUTCOME:
Bucks are moving 142 yph faster than the rest of the season in peak rut. This higher rate of movement in peak rut is also consistent within minor, major, and dawn/dusk times.

- All data
- Minor
- Major
- Dawn/Dusk

What have we found?

The position of the moon does not influence our bucks' activity around the hunting season.

Survey results show that hunters believe deer would move around 50–200 yards more and bed for at least 30 minutes less to be considered more active, which our data does not show.

Our survey results also suggest deer would wake up over 30 minutes later, which our data does not show.

Theory 1: Solunar suggests that the best times to hunt are the minor and major windows each day (position of the moon), and this is boosted by higher rated days (phase of the moon). We have shown that these minor and major windows do not mean more buck activity, and the day rating does not have an effect on the bucks in our study.

Theory 2: Red moon suggests that the best time to hunt is when the moon is overhead or underfoot (major windows) during sunrise or sunset (dawn and dusk). Our deer are no more active than usual at dawn and dusk when the moon is overhead or underfoot.

Publication 4068 (POD-05-25)

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Produced by Agricultural Communications.