Part 3

Solving The Riddle Of Deer Movement

You can't fully understand fall buck movement without knowing when the rut occurs, and to do that requires some interesting research methods. Here's how it's done.

by Dr. James C. Kroll & Ben Koerth

As we scientists search for clues to predicting the fall movement of whitetails — especially mature bucks — we clearly must factor in the effects of the rut. If a hunter does not know when deer in his area will engage in breeding behavior, he will be at a tremendous disadvantage in trying to predict periods of increased daytime activity, and it is during these periods that older bucks are more vulnerable to hunting.

But how do we know when breeding really occurs? Fortunately, as we will show here, timing the rut need not be a matter of guesswork. The rut is internally controlled, the result of many generations of evolution geared toward taking advantage of optimal conditions for fawn survival.

Paleontologists believe the deer family (*Cervidae*) first appeared in the tropical regions of Asia. This part of the world is characterized by having light and dark daily cycles of almost equal length, due to its proximity to the equator. Thus, deer in these areas, such as the muntjac, axis and sambar, are asynchronous breeders, meaning that they can mate at almost any time of year.

But as various deer species evolved and moved into northern Europe and North America (the latter via what was then a land bridge across the Bering Strait), it became critical for them to have distinct breeding seasons. Why? Because in non-tropical regions, it's not a good idea to drop fawns in the middle of winter! Over many generations, whitetails in temperate regions gradually confined their breeding to the fall, with fawning ensuing some 200 days (six to seven months) later. This puts fawns on the ground in spring, a time of plenty. Indeed,



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the entire growth cycle of the fetus(es) is set up to coincide with food availability.

During the harshest time of the year (late fall through winter), there is little net growth in a developing fetus. Yet once spring ensues, growth accelerates dramatically. Birth then occurs at the height of the growing season, to allow the doe to obtain adequate nutrition to nurse her fawns for another 45 to 60 days.

The timing of peak forage conditions, as well as the onset of spring itself, obviously varies somewhat from place to place; thus, the timing of breeding must vary as well. Unfortunately, many past articles and books written on this subject have not taken into account regional differences in breeding dates and thus are not very useful in helping hunters predict rut activity.

PINPOINTING THE RUT

The exact timing of the rut for a given year and geographic area can be determined in several ways. The actual method used falls into one of two categories: indirect or direct.

Indirect methods are less precise, but are useful in *generally* identifying the timing of breeding. The most frequently used indirect method is to observe deer behavior.

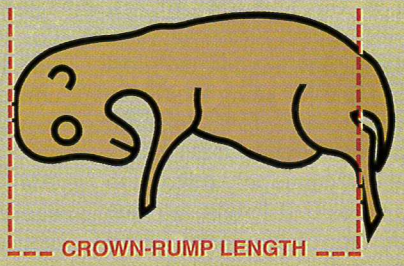
The rut is a frenzied time in regions where there are adequate buck:doe ratios of 1:3 or better — that is, no less than one buck for every three does. By spending every day in the field, biologists are able to observe changes in behavior that indicate the onset of the rut. A sudden increase in overall activity, with numerous sightings of bucks chasing does, is a dead giveaway that the rut is under way. Other indirect cues include agitated movement by lone does and large numbers of fawns being seen without their mothers. The doe becomes very agitated at the onset of estrus and "kicks off" her fawn(s) for the short time she seeks male companionship.

A second, less precise means of indirectly timing the rut involves watching for fawns in the spring and early summer. The general behavior of a doe is to hide each of her fawns in a different place. She returns several times a day to nurse them. A week or two after birth, a fawn begins to travel with its mother. If an observer notes when the number of does with fawns peaks in the area and then backdates a couple of weeks, he can calculate the *approximate* timing of the rut by subtracting 200 days. This method obviously is not very precise and is full of pitfalls, but it can be useful if direct means of timing conception are not feasible.

Direct observation of breeding is determined by examination of fetuses taken from hunter-harvested does or from those acquired through scientific collections made by biologists/managers under permit from the appropriate game agency. Several scientists have conducted studies of penned whitetails in an effort to determine the relationship of the size of a fetus to its age. Most notable among these researchers have been Hamilton, Tobin and Moore, in South Carolina; Armstrong, Cheatum and Morton, in New York; and Short, in Michigan.

The methodology for such studies is quite difficult. It involves using penned does that are bred at known times. Subsequently, the does are euthanized at intervals, and the fetuses are extracted, weighed and measured. (This might sound terrible, but it is the only way we can *(Cont'd)*

BACKDATING THE RUT



Below is a comparison of estimated fetal ages (in days), using four different studies:

C-R Length (mm)	NORTH			SOUTH
	Cheatum-Morton	Armstrong	Short	Hamilton et al.
20	23	42	45	43
30	27	45	48	46
40	30	48	51	50
50	34	51	55	53
60	38	54	57	56
70	42	58	60	59
80	46	61	63	62
90	50	64	66	65
100	54	67	79	69
110	58	70	72	72
120	62	74	74	75
130	66	77	77	78
140	70	80	80	82
150	73	83	83	85
160	77	86	86	88
170	81	90	89	91
180	85	93	92	94
190	89	96	95	98
200	93	99	98	101
210	97	102	101	104
220	101	105	103	107
230	105	109	106	110
240	108	112	109	114
250	112	115	112	117
260	116	118	115	120
270	120	122	118	123
280	124	125	121	126
290	128	128	124	130
300	132	131	127	133
310	136	134	130	136
320	140	138	132	139
330	144	141	135	142
340	147	144	138	146
350	151	147	141	149
360	155	150	144	152
370	159	154	147	155
380	163	157	150	158
390	167	160	153	162
400	171	163	156	165

Four studies (two in New York, one in Michigan, one in South Carolina) have investigated the growth rate of fawns in the womb, using known-age fetuses. In each case, researchers determined an average crown-rump (C-R) length per age, providing a basis for backdating to conception date. (For example, in the South Carolina study, an 80mm fetus was 62 days old.) Biologists can use such information to help them determine rutting dates for a given area. (Note: The Cheatum-Morton study had a small sample size.) Graphic by Allen Hansen.

obtain the information needed to ultimately help us manage the species more effectively.)

Because the weight of an individual whitetail fetus can vary, as it can with any animal, the most reliable method for aging requires a measurement of crown-to-rump length. (See illustration.) This measurement, commonly referred to by scientists as C-R length, is made from the top of the fetus' head (crown) to the base of its tail (rump).

Suppose we have collected a doe with twin fetuses. One fetus has a C-R length of 66 millimeters, the other 64. Obviously, both were conceived at the same time, as we know that conception takes place with a single mating. The difference in lengths could be due to several factors, among them each fetus' sex, individual environment or inherent growth rate. So, we take the average of the two (65mm) for pinpointing their conception date. Using the Hamilton-Tobin-Moore equation, we determine the age of the fetuses to be about 58 days. (While there were differences in length between the two fetuses, we can be reasonably certain that our estimate is within a day or two.)

The final step is to backdate from the time of the collection to determine the conception date. In this example, the doe was harvested on Jan. 12; so, the estimated conception date 58 days earlier was Nov. 15.

At least four studies have used fetal measurements to determine conception dates, and the level of statistical reliability for these studies is very high, at around 99 percent. However, the research indicates that there can be significant differences in the fetal size/growth rate in Northern versus Southern deer. While a 65mm fetus would be aged at 58 days on the basis of the Hamilton-Tobin-Moore South Carolina study, a fetus of that size would be aged at 56 days with the Armstrong New York study, 41 days with the Cheatum-Morton New York study, and 59 days with the Short Michigan study.

Because each study carried a high degree of statistical reliability, experimental design must not be the reason for these differences; they could indeed be due to racial differences in fetal size and growth rates.

AN EAST TEXAS EXAMPLE

As part of a comprehensive study on breeding chronology in the Pineywoods of East Texas, we and our associates collected several hundred bred does during the winter and extracted fetuses. Using the appropriate equation (Hamilton et al.), we carefully reconstructed the rut for several successive years. The accompanying graph illustrates one of the study years.

The rut cycle is presented as the percentage of does bred by week. Notice that the peak of the rut occurred the week of Nov. 1-7. There was an earlier peak the third week of September, probably representing either does in extremely good condition or, because the area was restocked years ago with deer from many sources, racial differences. (We will discuss this in more detail later.) A final peak occurs Dec. 13-19, representing a second or third estrous cycle.

Using data such as these from many areas, it is possible to correlate breeding activity to various environmental factors (moon phase, weather, etc.). That knowledge, in turn, can help us to predict the rut and thus put us into position to take advantage of increased buck movement as hunters.

Next month, we will look at one of the most talked about but least understood factors affecting deer movement: the moon. As every whitetail hunter knows, much has been written on this topic in recent years; however, our research indicates that some of what has been claimed about lunar influences on deer is simply incorrect. In Part 4, we will provide information to help you understand the moon's real effect on deer activity, so you can factor it into your hunting plan.

FOR YOUR INFORMATION

The authors, through their Institute of White-tailed Deer Management and Research, are teaming up with ***WHITETAIL*** to produce a book on the science of predicting deer movement. The hardcover volume is scheduled for release this fall. For information on this book, as well as other Institute publications and videos, contact: Box 6109, Dept. WT, SFA Station, Nacogdoches, TX 75961; (409) 468-200.

