

**SIZE DOESN'T MATTER**  
**Fertility & Wagyu Bulls**  
*By Heather Smith-Thomas*

As a growing number of American breeders are attracted to the Japanese Wagyu because of their superior carcass traits, there is more interest in this unique type of cattle, and more Wagyu bulls are being used. These cattle are unique among U.S. beef breeds, and some of these differences are not well understood, including the reproductive traits and fertility of these animals. An emerging problem is the misunderstanding of most veterinarians who perform breeding soundness evaluations, regarding the differences between Wagyu and our traditional British and Continental breeds in semen quality and scrotal circumference.

Jerry Reeves, PhD (retired from Washington State University, Animal Sciences Department) is a cattle breeder with a lot of experience with Wagyu. He was one of the first people to visit Japan to evaluate Wagyu cattle, in 1989, and began working with Wagyu when the first ones were imported into the U.S. in 1991. One of the things he has noticed over the years is the difference between Wagyu bulls and other bulls when it comes to breeding soundness evaluation.

“The Wagyu bulls have very good semen, more like a dairy bull, even though they have a smaller scrotal circumference than a beef bull or dairy bull. We have a lot of problems with veterinarians doing breeding soundness examinations on Wagyu bulls and not giving them a passing score because their scrotal circumference is small. Yet when you ask what the semen looks like they’ll say that it looks the best they’ve ever seen—and this is what counts. Wagyu are a little tough to evaluate with the traditional fertility examination, unless you know about these traits,” says Reeves.

Duane Mickelsen, DVM, a cattle breeder near Pullman, Washington (retired from the faculty at Washington State University), has been doing fertility studies in beef cattle for many years, and has done thousands of breeding soundness exams on bulls. He kept records on all the bulls he semen tested at WSU and for another client, and discovered that Wagyu bulls are a lot like Texas Longhorns in that they are slower maturing and have smaller testicles as yearlings than do the British and exotic breeds, but the Wagyu and Longhorn are both very fertile breeds.

“The majority of the other breeds do not have this high quality of sperm when they have smaller testicle size because there will be more numbers of abnormal morphological spermatozoa—which is correlated with infertility. Morphology (looking at the form and structure of sperm and comparing numbers of normal and abnormal sperm) is probably the most important factor associated with fertility that veterinarians can analyze, but when checking semen samples it must be done with a good morphological stain such as eosin-nigrosin, and the sperm examined under oil immersion,” says Mickelsen.

The importance of measuring scrotal circumference in a breeding soundness evaluation stems from the fact that usually the young bulls with larger testicles are the ones that mature early, produce higher quality sperm, and their offspring mature sooner. “Veterinarians are the only people who are allowed to do a qualified breeding soundness evaluation on bulls, but they go by the requirement that no bull can pass if he is under the minimum of 30 centimeter scrotal circumference. I agree that most bulls should not be passed with small testicles because this does effect age of puberty in their heifer offspring, and most of these bulls will not pass anyway because of poor semen quality,” he explains.

“Yet the veterinary profession does not realize that Wagyu are different from our beef breeds, in that they often have high quality semen in spite of smaller testicles. The Society for Theriogenology, and the American College of Theriogenologists (of which I am a retired member in good standing) are firm in their beliefs that all breeds should meet a minimum standard of 30 centimeters scrotal circumference when they are 12 months old, and have a minimum of 70% normal morphology in order to pass their first breeding soundness exam,” says Mickelsen.

These two standards are highly correlated with fertility in beef bulls. “The young Wagyu bulls that I have evaluated tend to meet semen morphology and motility standards but not the scrotal circumference standard until they are a little older. I am among the very few veterinarians who understand this fact about Wagyu. Knowing that the most important aspect of bull fertility is motility and morphology, I pass the young Wagyu bulls that meet those standards, even though their testicle size does not meet the standards set by the Society for Theriogenology. My justification in passing these bulls is that I know they may be fertile, and that smaller testicles is a trait that will only delay the fertility a few months in their heifer (and perhaps male) offspring, because this is a slower-maturing breed.”

Mickelsen has done a lot of research on bull fertility. “There was an article by Sosa and his associates in the Journal of Animal Science in 2002. In their study they checked a large group of Wagyu bulls and found that about 36% would fail on the requirement for scrotal circumference. My smaller study found about 15% that failed. The researchers’ correlation, and I think they are correct, is that scrotal circumference depends a lot on weight and age. Since Wagyu cattle are smaller in weight and structure than the typical British or continental beef animal, this could be a big part of the difference,” he says.

“About 1993 was when the Society for Theriogenology changed their rules for breeding soundness exams and didn’t go so much on age. They added recommendations regarding scrotal circumference; if any bull had less than 30 centimeters circumference in their opinion they didn’t recommend going any further with the evaluation.” In other words, the protocol for a breeding soundness examination was to first check scrotal circumference and if the bull’s testicles were too small, he failed the test.

Bulls are flunked if they fail on any one of three standards—less than 30 centimeters, less than 70% morphologic normal sperm, or less than 30% motility under field circumstances. “A bull failing any one of these three standards is reason to flunk that bull. But in field situations it can sometimes be tricky to accurately check motility.”

“I take a heated box with me when I do these examinations. A lot of veterinarians collect a sample and then run from the chute to their vehicle to evaluate the semen, and if the slides are cold the motility is hindered. So this evaluation may not be accurate, and thus motility is the poorest standard of all to go by,” says Mickelsen.

“Some veterinarians hardly look at morphology and go mainly by motility, yet motility has the poorest correlation with fertility. If they don’t look at morphology (which means counting about 100 sperm and checking the percent of normal compared to percent with abnormalities) and make an assessment from that, they may not get an accurate picture of potential fertility. Motility can be so variable, by contrast, that I don’t pay as much attention to that as I do to morphology. A cold slide or various other factors can kill all the sperm in the sample, whereas morphology is more accurate and useful. I don’t pay any attention to live or dead, just what’s normal,” he says.

“Another study showed that 72% of beef bulls failed to reach satisfactory breeding status and most of those failures were because they had less than 70% morphology. What I have seen in Wagyu bulls is that even though they may have less than 30 centimeters scrotal circumference, more than 70% of those bulls with smaller testicles do have 70% or greater normal morphology,” he says.

“Other studies have shown that when bulls have 70% or greater morphology, you get a 92% or higher calf crop, as long as there is no venereal disease in the herd. This is a very important factor in fertility,” he says.

A study published in the Journal of Animal Science showed that the larger the scrotal circumference the more fertile the bull. Bulls over 32 centimeters sired heifer offspring that matured earlier than average. “This is important in British breeds, but we’ve also found that this can create problems when calves are not weaned early. Some of those heifers start cycling as early as 6 months, while they are still on their mothers.” Even if the bulls have been taken out of the herd by then, early-maturing bull calves may impregnate some of those heifers.

“I have done C-sections on 15-month old heifers, and this is not what we want! Early fertility is important, but we don’t want them maturing this early,” he says. There is actually some advantage to having cattle mature a little later.

“I retired from WSU in 2006, but the WSU Beef Center keeps calling me because the other theriogenologist flunks most of their Wagyu bulls on their first breeding soundness evaluation, going by the standards of the American College of Theriogenologists,” says Mickelsen.

“I get called to do some of the bulls, because I realize that both the Wagyu and the Texas Longhorn can be fertile even if they don’t meet the 30 centimeter standard. With both of these breeds it’s a weight factor more than anything. I pass the ones that have good sperm morphology even if they have small testicles. They’ve sold those bulls and never had a complaint yet about their fertility,” he explains.

“I’ve passed 4 out of 6 that were below standard recommendations at 12 months of age, and had no reservations about doing that after looking at their semen. Most of those bulls went to Agri-Beef and some went to Montana where Bar R was leasing Wagyu bulls. Those bulls sired a high percentage of calves,” he says.

“Coulter (in Canada) in 1987 recommended using different standards for scrotal circumference for different breeds, but the new standards (1993) will probably hold unless enough people mention the difference about Wagyu and Longhorns. There are some people, including the Canadians at Maple Top

(Saskatoon, Saskatchewan) who have stated there are some differences that need to be recognized, but it was 25 years ago when they made that recommendation so it fell by the wayside,” says Mickelsen.

“I have no problem passing a Wagyu bull with small scrotal circumference, as long as I find normal, palpable testicles, with nothing physically wrong with them. And when I look at the sperm I have been amazed at how good the morphology looks. Scrotal circumference and morphology are both important traits, but in Wagyu the morphology is most important,” he says.

### **MORPHOLOGY**

Some sperm abnormalities are more important than others when it comes to fertility. “Primary abnormalities usually involve the head or upper part of the mid-piece. The head may be too large, or have proximal droplets underneath the head, looking like swellings. These defects definitely affect the sperm’s ability to swim and get to the ovum. These are abnormalities that occur in the testicle itself as the sperm cycle through and mature. It takes about 60 days for the 4 different cycles to be completed and the sperm to mature. When we take a collection in mid-March for instance, that sperm started to mature back in January,” says Mickelsen. It is important to realize that sperm could have been adversely affected by what the bull was experiencing weeks earlier.

“I often examine bulls in good weather that have a high percent of primary abnormalities and then we look back to see what the weather was like 2 months earlier. Usually there was some cold weather or mud that had an adverse effect on the testicles,” he says.

“The secondary abnormalities, by contrast, usually consist of bent tails, distal droplets or loose heads and tails, and these defects usually occur in the epididymis. It takes about 10 to 12 days for the sperm to transport through the epididymis. If we’ve had a recent cold snap, this may affect the sperm at that point. Studies in Canada showed this. They had a cold period—wind and low temperatures—and those bulls had a high percentage of secondary abnormalities but they cleared up about 12 days later and the sperm from those bulls were normal. So when I see secondary abnormalities I give that bull a little more leeway because it is probably a temporary problem,” says Mickelsen.

“A lot of time when I am evaluating young bulls at bull test stations, if there is a higher percent of secondary abnormalities I don’t worry about these as much as the primary abnormalities. The bulls with too many primary abnormalities are the ones that I will probably fail. If the bull has a combination of small scrotal circumference and a high number of primaries I usually call them unsatisfactory. If it’s not too bad, then I recommend a deferral and suggest re-checking them one to two months later.”