



Repro Tracks

► by **Bill Beal**, Virginia Tech University

The best of ‘Repro Tracks’

Repro Tracks has been a column dedicated to providing answers to questions about reproductive management posed by commercial or purebred cattle breeders. Occasionally the topics have been very scientific, but most columns have provided practical ideas to solve everyday problems, featuring titles like “AI success depends on proper semen handling” (February 2011) or “Little things that take bulls out of sales” (October 2008). This column is a look back at the five “best” questions and answers addressed during the past eight years.

Scrotal circumference and fertility

Breeder’s Question: *My understanding is that a bull’s fertility and the fertility of his daughters are directly related to the size of the bull’s testicles. I can’t understand why breeders use bulls with a small scrotal circumference or bulls that have a negative expected progeny difference (EPD) value for scrotal circumference. Am I missing something, or are these people just crazy?*

Response: First, let’s establish what scrotal circumference *is* and what it *is not*. Scrotal circumference is a measure of the maximum circumference around the testicles of a bull. If the bull is 1-year-old or older, scrotal circumference (SC) is the most easily measured estimate of his daily sperm production. In other words, bulls with larger testicles should be expected to produce more motile, normal sperm cells. Scrotal circumference is not a measurement of how

capable a bull’s sperm cells are of fertilizing the egg ovulated by a cow.

Put another way, SC is not a measure of the bull’s fertility per se; instead it is a measure of how many sperm cells he is likely to get to the site of fertilization. Scrotal circumference is included in a bull breeding soundness examination (sometimes referred to as a BSE) in order to eliminate those bulls whose testicles are so small that they are unlikely to produce enough motile sperm cells to be able to successfully service a normal-size group of cows or heifers.

A secondary trait related to SC or the EPD for SC of a sire is the correlation between yearling SC of a bull and the age of the bull’s daughters when they reach puberty (start cycling). Simply put, bulls with larger testicles tend to sire daughters that reach puberty earlier. However, the magnitude of this effect is rather small. A difference in actual scrotal circumference of 1 centimeter (cm) between two bulls corresponds to less than one day difference in the average age at puberty of their daughters (0.8-0.9 days per cm).

In other words, daughters

of a bull with a 40-cm scrotum would be expected to reach puberty only seven days earlier than daughters of a bull with a 32-cm scrotum. No doubt, reaching puberty earlier is a desirable trait. Unfortunately, big differences in the SC or SC EPDs of bulls don’t translate into big differences in the age at puberty of their daughters, and scrotal circumference of the sire is not related to his daughter’s likelihood of becoming pregnant once she starts cycling.

Scrotal measurements and SC EPDs are

most useful for breeders who wish to increase testicular size of bulls in their herd and thereby reduce the number of bulls that fail the breeding soundness exam because they have small testicles. There is no evidence that the bull with larger testicles is more fertile among a group of bulls that all have adequate-size testicles to pass the breeding soundness exam. However, a fortunate beneficial side

effect is that selection of the bull with larger testicles hastens the onset of puberty in his daughters — a little bit.

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Fig. 1: Recommended technique for measuring scrotal circumference

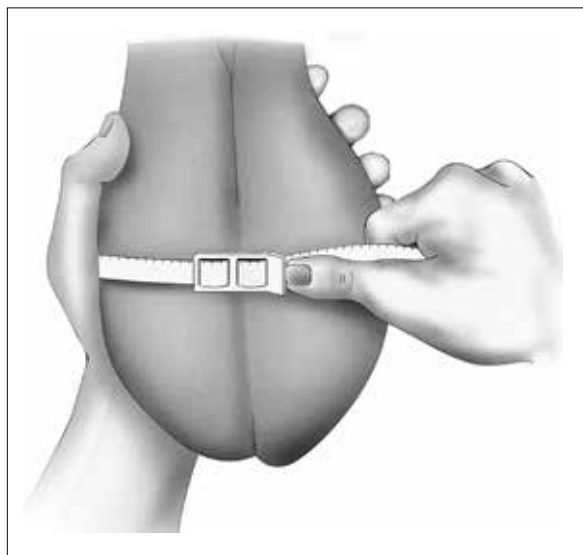


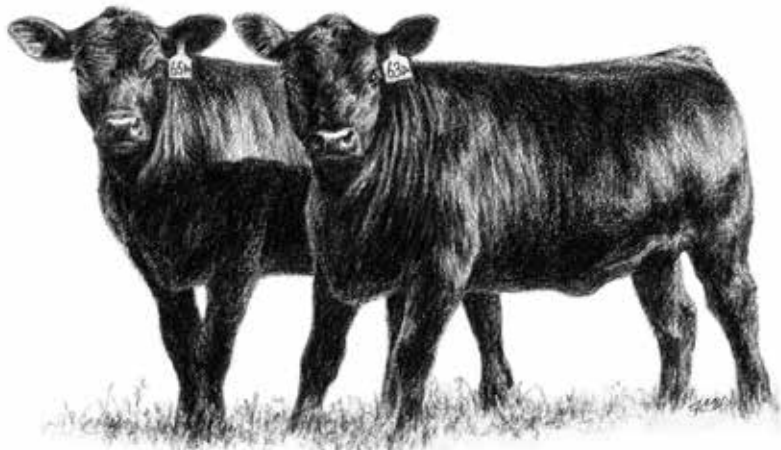
ILLUSTRATION BY CRAIG SIMMONS

Heifer development and puberty

Breeder’s Question: *I read an article in a magazine that claimed replacement heifers reach puberty at lighter weights than in the past, and it recommended feeding replacement heifers less to save money. How much can I cut back the feed on my purebred heifers?*

Response: I read the same article. As I remember, it quoted a ranch manager/researcher who indicated that based on his research, feeding groups of commercial heifers to reach an average of 55% of their mature weight by the beginning of their first breeding season (rather than the traditional recommendation of 60%-65%) could reduce the cost of developing herd replacements.

Feeding heifers to reach a lower average target weight would surely reduce feed costs. However, more heifers in the group may not attain the “threshold weight” needed to begin



cycling prior to the beginning of the breeding season if the target weight is lowered. That could result in more heifers breeding late or not breeding at all in a short breeding season. A higher rate of open heifers is “no big deal” in a commercial herd if more heifers are being retained than are needed as replacements, and if the option of placing open commercial heifers on feed at the end of the breeding season is a lucrative one.

The practice of feeding commercial heifers to a lower average target weight is a good example of developing strategies that optimize production rather than maximize production. In the commercial cattle world, where each replacement heifer has approximately equal value, this is a great idea. Optimizing production recognizes costs and returns rather than just the attempt to increase returns at any cost. However, in a purebred herd, lowering the average target weight for a group of replacement heifers to reduce costs may result in a disproportionate decrease in returns.

Unlike the value of commercial heifers, the value of purebred heifers varies widely based on differences in pedigrees and performances. If reducing the target weight for a group of purebred Angus heifers could result in heifers with more valuable pedigrees or more desirable ultrasound carcass characteristics failing to become pregnant, the returns from the group of purebred heifers may be reduced to a far greater extent than the reduction in feed costs.

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Simply put, all purebred heifers are not created equal, and the disparity in value of an open purebred heifer vs. a pregnant purebred heifer argues that purebred heifers should probably be fed so that a very high percentage ($\geq 90\%$) reach puberty prior to the beginning of the breeding season. In my opinion, feeding groups of heifers to 60% of their mature weight prior to breeding is still the best advice for purebred breeders.

Estrous synchronization and timed breeding

Breeder's Question: *Fifteen years ago my dad tried to use timed artificial insemination (AI) on our purebred cows. He remembers that we only got about one-third of the cows pregnant to the AI breeding, and we had more cows open at the end of the year than ever before. I am trying to interest him in trying timed AI again, but I am having trouble convincing him we will do better this time. What can I say to convince him?*

Response: The last time I tried to answer a “My dad says” question, I nearly lost a friend. So, I should begin by telling you that your father is a very wise man. With that said, remind your father that things change — remember the size of the first cell phones? I know we have better tools for

estrous synchronization and timed AI now than we did a decade ago. Specifically, what we know about the growth of the follicle that will ovulate and release an egg (ova) for fertilization is much greater today than it was 15 years ago. In fact, most estrous-synchronization programs recommended for use with timed AI force the development of a new ovulatory follicle during treatment. Controlling the growth of the follicle, and thereby the timing of ovulation, is the key to why timed AI today should be much more successful than it was 15 years ago.

Caution: the estrous-synchronization treatments recommended to be used with timed AI and the timing of insemination are different for cows and heifers. If you choose to try synchronization and timed breeding, it would be an excellent idea to discuss your plans with your veterinarian, an AI professional or an extension specialist. Recommended plans for synchronization and timed AI of cows and heifers is also available online at <http://bit.ly/128r9zk>.

Checking semen quality

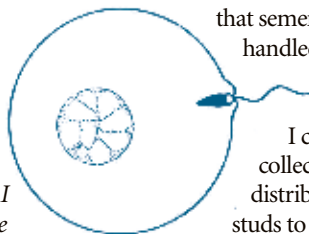
Breeder's Question: *We synchronize and AI all our heifers. Last year our AI take rate was horrible, but this year it improved greatly, to about 70%. We didn't change anything other than the semen we used. I always wondered if the semen we were using the first year was “bad.” How can we check the quality of the semen we use?*

Response: Evaluation of semen after it has been purchased and handled on the farm is a very sensitive subject with AI studs, custom semen-collection services and semen distributors. Once the semen has left the facility where it is collected and frozen, the supplier or distributor has no control over how it is handled or stored. Hence, every stud or semen service is rightfully concerned that semen re-evaluated after being

handled and stored on-farm may not be reflective of the quality of the semen when it left their facility.

I contacted two custom semen-collection services, one semen distributor and one of the major AI studs to get their input on how they prefer to deal with customer concerns about semen quality. Two reactions were consistent among all the semen providers:

1. Each indicated its No. 1 priority was to satisfy the customer; and
2. Each indicated that the best evaluation could be done by comparing the quality of the unused semen left on-farm with the semen



evaluation performed immediately after freezing and thawing at the collection facility.

In fact, both semen distributors indicated that they advise customers to return unused semen directly to the stud or semen service where it was originally collected to be re-evaluated.

One practice the bull studs warned against was asking a local veterinarian with limited experience and less sophisticated microscopy equipment to re-evaluate semen. American Breeders Service (ABS) has published a

report outlining the limitations of field evaluation for semen quality. Available at <http://bit.ly/152bpCj>, that report strongly suggests “that when semen quality is questioned, several unused straws should be returned to the AI center that originally processed the semen.”

If an independent evaluation of frozen semen is desired, there are several labs around the country that will evaluate samples and provide a report on sperm concentration and quality of frozen semen (see Table 1).

I contacted three labs that routinely evaluate semen that had been collected,

processed and frozen by other semen providers. Each was willing to provide an independent evaluation of sperm concentration, motility and morphology on semen samples submitted by breeders. Two of the independent labs indicated that they would only re-evaluate the semen if the breeder submitting the semen allowed them to contact the organization that collected and

froze the semen originally. They claimed this practice was more likely to lead to an accurate assessment of the semen quality over time and result in an amicable solution to customer’s complaints.

Frankly, unacceptable pregnancy rates following AI are most often due to something other than semen quality. However, if semen quality is suspect, re-evaluation of unused semen samples by the stud or semen service where it was originally collected or by an independent laboratory may aid in identifying the cause of a poor AI pregnancy rate.

Heritability of reproductive traits

Breeder’s Question: *I have had problems getting 2- and 3-year-old cows in my herd rebred. Recently, another Angus breeder suggested that I could improve my reproductive efficiency by only selecting replacement heifers*

from older cows that have always calved in the first three weeks of my calving season. Would this reduce my breed-back failures?

Response: The ability of a cow to become pregnant again after calving is certainly controlled in part by genetics. However, the heritability reported for calving interval (the ability to calve early each year) is typically less than 5%. This suggests that even if you identify cows in your herd that have consistently calved early in the calving season, only 5% of that advantage will be passed on to their female offspring. Hence, this will not ensure that the daughters of early-calving

cows will calve early themselves.

Another way to view the control of rebreeding is to consider that if the genetic component is only 5%, the role of the “environment” (everything other than genetics) accounts for 95% of the factors controlling when (or if) a cow rebreeds. This is where factors such as body condition score at calving, the time of

calving relative to the beginning of the next breeding season, nutrient availability during the breeding season and other man-made variables come into play. Because they exert such a large effect on rebreeding success, managing to optimize those variables may improve your rebreeding success more than placing heavy selection pressure on early calving of the dams of your replacement heifers.



Editor’s Note: *Bill Beal is a beef cattle reproductive physiologist and professor emeritus at Virginia Tech. For the past 8 years he has authored the column entitled “Repro Tracks” to provide answers to questions about reproductive management commonly posed by commercial and purebred breeders. This is his final column. However, if you have questions related to the reproductive management he can still be contacted at wbeal@vt.edu.*

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Table 1: Independent laboratories providing analysis of frozen semen¹

Semen evaluation lab	Website	Telephone
Elgin Breeding Service	www.elginbreeding.com	800-654-2503
North American Breeders		540-955-3647
Reproduction Enterprises	www.reproductionenterprises.com	866-734-2855

¹Listed in alphabetical order. The use of a firm or corporation in this publication is for the information and convenience of the reader. Such use does not constitute an endorsement or approval to the exclusion of others.