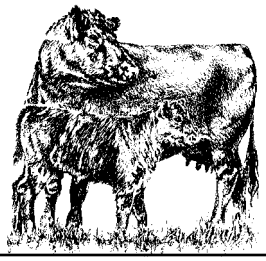

Western Beef Resource Committee *Fourth Edition*

Cattle Producer's Handbook

Reproduction Section 442

Use of Reproductive Tract Scoring in Range Beef Heifers

Tom Geary, USDA-ARS Fort Keogh LARRL
Miles City, Montana

Selection and management of beef replacement heifers involves decisions that affect the future productivity of the entire cowherd. Ideally, replacement heifers would be selected after exposure of all heifers to a short breeding season (natural service or A.I.), but few beef operations have the resources for this luxury. Instead, replacement heifers are generally identified according to size and appearance at weaning, when little is known about their reproductive capabilities. The ability to identify heifers with the greatest reproductive potential at an early age should increase production efficiency of the entire cowherd.

Age at puberty for heifers is defined as the age of first behavioral estrus (heat). Earlier age at puberty is associated with higher pregnancy rates during defined breeding seasons, earlier calving, and heavier calf weaning weights. Early-calving heifers have higher average lifetime productivity than late-calving heifers.

Strategies that assist producers in selecting and developing heifers that will attain puberty before the start of the breeding season and conceive early in the breeding season have been identified. These strategies include using bulls with a large scrotal circumference to produce replacement heifers, selecting replacement heifers based on age, developing heifers to reach a target breeding weight, and the use of reproductive tract scores (RTS) before the start of breeding. This paper will focus on the value of RTS in range beef heifers.

Reproductive Tract Scoring System

Reproductive tract scores are subjective estimates of sexual maturity based on ovarian activity and size of the reproductive tract (primarily uterus and ovaries). The RTS system uses a score of 1 to 5 to estimate pubertal status via rectal palpation of the reproductive tract (Table 1).

An RTS of 1 is assigned to heifers with infantile tracts, as indicated by small, toneless uterine horns and small ovaries that are devoid of significant structures. Heifers assigned an RTS of 1 are likely the furthest away from puberty.

Heifers with an RTS of 2 are generally closer to puberty than those scoring 1, due primarily to larger uterine horns and ovaries with small palpable follicles. An RTS of 3 is assigned to heifers that are on the verge of estrous cyclicity based on uterine size and tone and palpable ovarian follicles. Heifers assigned an RTS score of 4 are considered to be estrous cycling as indicated by

Table 1. Description of reproductive tract scores.[a]

		Ovarian dimensions (mm)			
RTS	**Uterine horns**	**Length**	**Height**	**Width**	**Ovarian structures**
1	Immature, <20 mm diameter, no tone	15	10	8	No palpable follicles
2	20-25 mm diameter, no tone	18	12	10	8 mm follicles
3	25-30 mm diameter, slight tone	22	15	10	8-10 mm follicles
4	30 mm diameter, good tone	30	16	12	10 mm follicles, CL possible
5	>30 mm diameter	>32	20	15	CL present

[a]From Anderson et al. 1991.

uterine size and tone, coiling of the uterine horns, as well as the presence of a palpable pre-ovulatory follicle. These heifers do not have an easily distinguished corpus luteum (CL) because of the stage of their estrous cycle. Heifers with an RTS of 5 are similar to those assigned a RTS of 4 except for the presence of a palpable corpus luteum.

The ability to accurately distinguish between small variations in size of follicles and diameter of the uterine horns requires extensive training. Numerous technicians and practitioners around the country have the skills required to accurately detect these differences, but there are just as many who are still perfecting this skill.

Conducting RTS requires far more training (often several years) than pregnancy diagnosis because the latter usually requires a diagnosis of either open or pregnant. Most veterinarians receive little formal training in rectal palpation of the reproductive tract until they are working in a practice. The meaningfulness of the RTS scores obtained on a group of heifers is only valuable to producers if that information is highly accurate.

Timing and Appropriate Use

The distribution of reproductive tract scores for a group of heifers will depend upon when the heifers are examined. If taken before one year of age, most heifers will not be cycling and will receive an RTS of 1 or 2. If tracts are measured too late, most heifers will be cycling and receive an RTS of 4 or 5. Heifers that have received progesterone and estradiol-containing implants as calves may have smaller and less functional reproductive tracts as adults (Fig. 1). Growth promotants are not recommended for use in replacement heifers before one month of age and are even questionable after this age. The person conducting the RTS should be aware of any prior use of growth promotants.

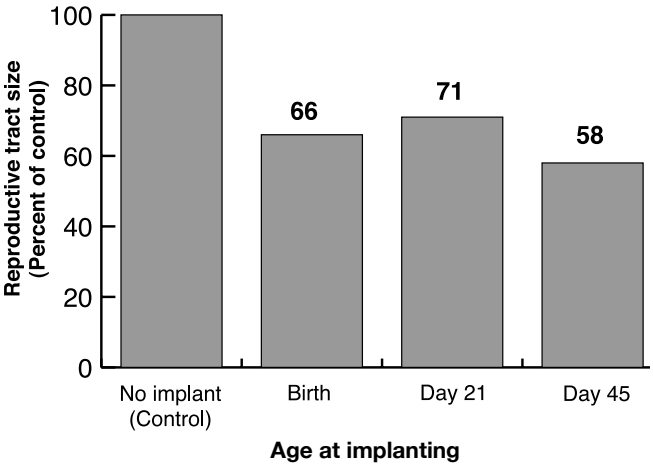

Fig. 1. Effects of calf-hood exposure to progesterone and estradiol growth promotants on reproductive tract development of adult beef heifers (Adapted from Bartol et al. 1995).

Reproductive tract scoring has been used as a last-minute culling tool to identify heifers that are least likely to conceive early in the breeding season, as a measurement of an operation's heifer development program, or to place selection pressure on age of puberty. As a last-minute culling tool, heifers are generally scored about 2 weeks before synchronization with the MGA/PGF protocol (see 405) or about 1 month before the start of the breeding season. The estrous response to synchronization is RTS dependent and increases with increased RTS (Table 2).

Table 2 also shows synchronized conception rate, synchronized pregnancy rate, and breeding season pregnancy rate is lower for RTS 1 heifers than heifers with a higher RTS. In other studies, RTS 1 heifers conceived an average of 10 days later in the breeding season than RTS 3, 4, and 5 heifers. The number of heifers in Table 2 that received a RTS of 1 represents only 2 percent (61/2,664) of the heifers evaluated. Conducting an RTS on a group of heifers to identify the 2 percent of heifers that have just a 34 percent chance of conceiving in the first 5 days of the breeding season (synchronized pregnancy rate, Table 2) may not be practical.

Often times, RTS and pelvic area measurements are recorded simultaneously on heifers that are about one year of age. Some producers believe pelvic areas serve as an accurate predictor of calving difficulty. However, more recent data suggests that RTS and pelvic areas are directly related to age and weight of heifers at the time the exams are conducted (Tables 2 and 3). Thus, selection of replacement heifers at weaning based on age and proper development to reach a targeted 65 percent of mature weight at the start of breeding may be more practical.

Table 2. Prebreeding RTS, weights, pelvic area, and subsequent estrous, conception, and pregnancy response after synchronization of estrus with the MGA/PGF protocol.[a]

RTS	No.	Weight (lb)	Pelvic area (cm^2)	Estrous response (%)	Synchronized conception rate (%)	Synchronized pregnancy rate (%)	Pregnancy rate (%)
1	61	594[b]	152[b]	54[b]	65[b]	34[b]	65[b]
2	278	620[c]	158[b]	66[c]	77[c]	58[c]	91[c]
3	1,103	697[d]	166[c]	76[d]	78[c]	60[c]	93[c]
4	494	733[e]	172[d]	83[e]	79[c]	65[c]	93[c]
5	728	755[e]	172[d]	86[e]	78[c]	66[c]	93[c]

[a]Adapted from Patterson and Bullock 1995.
[bcde]Numbers with different superscripts within each column differ ($P < .05$).

Table 3. Age and weight relationships to RTS and pelvic area in beef heifers.[a]

RTS	No.	Age (days)	Weight (lb)	Pelvic area (cm^2)
1	28	364	623	136
2	193	368	659	155
3	883	374	690	160
4	742	383	736	172
5	556	381	759	176

[a]Adapted from Randle 2000.

For most range beef cattle operations, winter-feeding represents a significant cost to the operation. Typically, these operations identify possible herd replacements during the fall to limit replacement heifer costs. Producers with new heifer development programs may benefit by evaluating RTS of heifers one month before the start of breeding as an early measure of success in developing heifers. Producers who use RTS as a measure of their heifer development programs should be flexible with the start of their breeding season or be able to change nutritional input as a result of scores.

In most cases, knowledge of a heifer's RTS one month before breeding may not offset the cost of providing supplemental winter feed and developing heifers to that point or the cost of an impending synchronization program. Producers may find it more valuable to use earlier pregnancy diagnosis to identify early calving heifers as a better measure of future herd productivity.

Use of RTS to place selection pressure on age of puberty is not very practical. Accurate use as a selection tool to decrease age at puberty would require adjustment factors for age of heifers at the time of scoring. Besides having significant costs associated with developing heifers to an age when RTS would be meaningful, other methods may be more valuable. Heifer age at puberty is highly correlated (-.55 to -1.00) with sire scrotal circumference. Many producers have greatly decreased age of puberty in their heifers by selecting bulls with large scrotal circumference.

Conclusion

In summary, usefulness of reproductive tract scoring depends upon the timing, accuracy, previous selection, and management factors. Higher RTS are associated with response to synchronization, A.I. conception rate, and pregnancy rate. In extreme conditions such as drought, RTS could be used to cull heifers that are less likely to conceive during a short breeding season. However, because such a low percentage of RTS 1 heifers normally exist in a herd, and because the costs associated with developing heifers to that age is high, reproductive tract scoring may not be economical on a routine basis.

Use of bulls with large scrotal circumference, selection of older heifers at weaning, developing heifers to a targeted breeding weight, and earlier pregnancy diagnosis may be more useful. Producers who are evaluating new heifer development programs may benefit from RTS to help pinpoint any weaknesses. Producers who use RTS need to build flexibility in their feeding program and breeding season dates in order to benefit from RTS.

For Further Reading

Anderson, K. J., D. G. Lefever, J. S. Brinks, and K. G. Odde. 1991. The use of reproductive tract scoring in beef heifers. Agri-Practice 12(4):123-128.

Bartol F. F., L. L. Johnson, J. G. Floyd, A. A. Wiley, T. E. Spencer, D. F. Buxton, and D. A. Coleman. 1995. Neonatal exposure to progesterone and estradiol alters uterine morphology and luminal protein content in adult beef heifers. Theriogenology 43:835-844.

Patterson, D. J., and K. D. Bullock. 1995. Using prebreeding weight, reproductive tract score, and pelvic area to evaluate prebreeding development of replacement beef heifers. *In:* Proceedings of Beef Improvement Federation, Sheridan, WY. pp 174-177.

Randle, R. 2000. Show-Me-Select replacement heifer program: Program overview. *In:* Proceedings of Reproductive Management Tools and Techniques II. (2):1-7. Univ. of Missouri, Columbia.

Fourth edition; December 2016 Reprint