Selection and Development of Heifers

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Introduction

One of the most expensive phases of the production cycle is the development of replacement females. Since these animals are not producing a calf, they frequently are not given the management priority required to insure a consistently successful early breeding season, conception, and development into a productive cow.

When you start to reexamine your replacement female program with the goal of improving productivity and profitability, the first question you should ask is *Are my genetics adequate?* Is the fertility high, environmental adaptation adequate, beef type acceptable (as measured by buyer acceptance of the calves)? If *yes* is your answer, then proceed to reexamine your heifer development plans. The next questions to ask yourself: *Is my heifer development program productively and economically successful? Where can I fine-tune to make it better?*

If *no* or *maybe* is your answer to one or more of these points, then you need to consider the possibility of purchasing part or all of your replacement females. I would not consider buying anything but bred replacements from an efficiency perspective. You can replace the heifer calves in development pastures with bred cows so, theoretically, every female on the place will have a calf. You can remove a year of non-productive time from a portion of the females on the ranch and eliminate the development headaches between a weaned calf and a springing heifer. You also eliminate the need for low birth weight, often low-performance, "heifer bulls."

The big headache you get in exchange is finding bred heifers of the quality needed in the quantity required. If the number needed is not excessively large, they can be located. More heifer sales are being held each year and some ranches with good reputations have gone to marketing many of their heifers as bred replacements. If you need several hundred head, then it may be more difficult and volume considerations may improve the economic efficiency of developing your own replacements or contracting out the growth and development.

Assuming you are going to develop your own replacements, the next question is *At what age do I calve them the first time?* In my view this is an economic decision based on the cost of developing the heifers to calve at 2 years of age and keeping them in condition to get them rebred to calve at 3 and 4 years plus the returns from their calves and the culls, versus the cost of developing them to first calve at 3 years and then keeping them in condition to calve at 4 years plus the returns from calves and culls. One non-economic factor is the amount and line of Brahman breeding in your heifers. Many Brahman–cross females don't reach puberty by 14 or 15 months of age, even when adequately developed. These heifers won't work in a system that requires calving at 2 years of age.

One of the alternatives is contracting with someone who has better resources to develop your heifers for you. In recent years, several Florida cattlemen have opted to go this route or have purchased land in north Florida, south Alabama, or south Georgia for the purpose of having a place to develop their heifers.

On our May 1997 tour of the high plains we visited a professional heifer development center. At this location, which was essentially a feedlot, they received weaned heifer calves and returned

bred heifers. They are highly successful at synchronizing and artificially inseminating groups of heifers so that most of the time the heifers will all calve in a 2- to 4-week period.

Conventional management has considered the development program during the time when the young cow either weaned her first or sometimes her second calf. Data collected on cow condition studies and on nutrition experiments show that young cows are much more sensitive to nutritional stress and require better nutrition in order to be fertile and productive (Table 1). The time line in any replacement program should be at least until the cow has weaned her second or preferably her third calf.

Selection of potential replacements to put into a development program or, for that matter, as bred heifers is an important process and needs to be done carefully. This first step will be a major influence on the success or failure of the replacement program. Research and observation over the years has determined that, for a large percentage of the heifers to develop into productive cows, they need to be at defined points on their growth curve at various stages of their life. They need to weigh 45% of their mature weight at weaning, 65% at breeding and 85% at first calving (Table 2). These are targets or benchmarks that you can use to evaluate your development program. In addition, potential replacements should be structurally sound, well developed with adequate muscle, feminine, and have lots of volume (depth of body, spring of rib, capacity, or however you describe the ability to consume large quantities of poor quality forage).

Genetically potential replacements should be early puberty achievers with enough Brahman blood to allow environmental adaptation without reducing the marketability of their progeny when bred to your bulls. They should be sired by bulls with large scrotal circumference (related to early puberty and fertility) and out of your most fertile and productive cows. Easy fleshing is a trait with economic value as long as it is accompanied by adequate growth.

A nutritional development program for heifers begins while the calf is on the cow. Providing a complete mineral at all times aids in maintaining a healthy and effective immune system. A healthy immune system is important for the calf to respond to vaccinations and withstand the stress of weaning. Another preweaning tool is a self limiting, high-protein creep feed such as cottonseed meal and salt. Calves learn to eat dry feed and put on some economical gain. They handle the stress of weaning much better because they go to eating dry feed much quicker.

How a group of weaned heifer calves grows from 45 to 50 % of their mature weight at weaning to 67% at breeding is important if you are trying to breed them as yearlings to calve at 2 years of age. Tim Marshall took a set of heifer calves at weaning and divided them into 2 groups. One group was fed to reach 67% of their projected mature weight at the start of the breeding season on a constant rate of gain. The other group was fed at slightly over maintenance for half of the development period followed by a diet designed to allow them to reach their target weight by the start of the breeding season. After repeating the study so they had 2 years' data, the conception rate between the 2 treatments was the same, but the consistent gain group bred earlier in the breeding season. The significance of this experiment relates to the need to have a short breeding season on first exposure heifers so they calve early and have a reasonable chance to rebreed. This can be accomplished more readily if they are cycling at the start of the breeding season and, thus, can conceive early. This may not be as critical if you're not calving until 3 years of age, since the heifers

have more time to reach puberty. Regardless of age at first breeding, heifers need to conceive and calve early so they have a better opportunity to conceive early for their second calf, which sets them up to calve early the rest of their productive life.

Dr. Alvin Warnick has provided unpublished data from some work he was involved with at Deseret ranch. These data suggest that gains from weaning to the start of the breeding season under their conditions are more important than starting weight in determining percentage pregnant (Table 3). Light heifers fed to gain more to reach a target weight had a better conception rate than heavier heifers fed for lower gains to reach the same target. Their data also showed that clover was as effective as corn in getting the gains and conception rate (Table 4). Reports from the ranch indicate that this continues to be true: the faster-gaining heifers have the highest conception rate.

In my mind, the take-home message from all of these data is that to successfully develop yearling heifers, where success is defined as a high conception rate in a short period of time, you need to prepare before you wean the calves so they have a minimal backup at weaning and good growth postweaning. How to accomplish this economically with your cattle and resources is the challenge.

Some other strategies that need to be considered include exposing the heifers to altered or sterile bulls, use of ionophores in their supplement or mineral, and timing of their breeding season relative to the rest of the cow herd.

In Nebraska research, heifers exposed to a bull reached puberty 40 days earlier with 50% pregnant in the first 21 days compared to 16.5% pregnant for heifers not exposed to the bull. Similar results have been reported in other locations, as well as reports of no effect. Bottom line is that it is not a magic bullet but may help if age at puberty is marginal.

The use of ionophores is a proven practice and some of these products have been around for many years. They work well to improve feed utilization or efficiency under many situations. The important considerations are getting the material in the animal in a timely manner and at the appropriate dosage to be effective. Also remember that some of these compounds are toxic to other species (horses). Extra care in storage and feeding is needed with these compounds.

Breeding heifers to calve 3 to 4 weeks prior to the cow herd is desirable to improve their rebreeding. First-calf heifers usually require 2 to 3 weeks longer to come into estrus than older cows and calving earlier helps keep them calving with the herd.

When the breeding season arrives you should have the heifers in good condition (BCS 5, minimum; 6 preferred), cycling and ready to be exposed. One of the big problems with calving heifers is the high number of dystocias (difficult births) that are frequently encountered. Selecting bulls to reduce calving problems is essential. Select a breed of bull not known to have calving problems (but acceptable calves at the market) and use EPDs and performance records for birth weight to select bulls within the breed that will minimize problems at calving. When you consider all of the costs associated with having to help heifers calve—labor, dead calves, dead heifers and the lower percentage to rebreed after difficult births; carefully selecting bulls to use on first exposure heifers must be a priority.

Estrous synchronization is another technique or tool that can be used to increase the number of heifers that breed early in the breeding season. Progestogens (MGA and Synchromate B) have

been shown to initiate cycling in heifers that were about to start but hadn't. In addition, several new products are approaching the market. These products/programs can be used with bulls or artificial insemination.

The length of the breeding season on first-calf heifers needs to be given some serious consideration because of conflicting values—"pay me now" or "pay me later." We would like to get 100% of the heifers bred. A way to get closer to that goal is to leave the bulls out longer so the heifers that get bred at the end of the breeding season for the herd will calve at the end of the calving season. This may run into the next breeding season and they stand a high probability of not getting rebred for the second calf unless you have an unlimited breeding season. The complications of managing calves of all ages from a nutrition, health and marketing view point make this a unacceptable alternative. Heifers need to be exposed in a short breeding season so they calve early and can be rebred for a long productive life.

The most important management tool for getting first-calf heifers rebred is body condition at calving. Considerable data have been collected and published on the beneficial effect of having heifers and young cows at a body condition score of at least 5 when they calve. Early weaning of their first or even second calf may be necessary to allow that young cow to put on some condition before she calves. They should be maintained as a separate herd or group so that supplementation can be adjusted to help them maintain desirable condition.

Some work at the range cattle station at Ona shows that heifers have a higher protein requirement than mature cows. Heifers in these trials were in BCS 5 to 6 at calving but lost 1 to 1.5 BCS by the start of the breeding season. The heifers were on a diet of low-quality hay and those supplemented with molasses with no added protein had a 38% pregnancy rate. Heifers supplemented with molasses–urea had a 60% pregnancy rate and those with molasses–cottonseed meal had a 70% pregnancy rate. These same supplements did not improve the pregnancy rates of the mature cows indicating that heifers have a greater protein need.

I can't overemphasize the need for a good health program. A disease breakout such as lepto could devastate your calf crop. Parasites, especially lice, can rob your heifers of condition. Successfully developing heifers calves into productive brood cows is a challenging and important task requiring close management.

Table 1. Relationship of parity and body condition score to pregnancy rate, %[a]

	Body Condition Score[c]			
Parity[b]	**≤3**	**4**	**≥5**	**All**
1	20	53	90	84
2	28	50	84	71
3	23	60	90	85
4–7	48	72	92	87
≥8	37	67	89	74
All	31	60	89	82

[a]Rae et al., 1993; Body condition scored at pregnancy testing.
[b]Parity is the number of calving opportunities, present age minus age at first calving (years).
[c]Body condition scored at pregnancy testing from 1 to 9, 3=thin, 4=borderline, 5=moderate.

Table 2. Target weights for growing and breeding heifers to calve at 2 years of age (1,000-lb mature cow weights)

		Weight, lb			
Date	**Days**	Beginning	Ending	**Daily Gain, lb**	**Comments**
09/15–03/15	180	450	650	1.1	weaning to breeding
03/15–05/15	60	650	710	1.0	breeding season
05/15–12/15	210	710	875	.8	grow but don't fatten
12/15–04/01	105	875	825	–.5	calving—no flesh loss
04/01–06/01	60	825	850	.5	rebreeding in 90 days

Table 3. Influence of supplemental feeding on weight gain during winter grazing and subsequent conception rate

		Average Weight[b]			
Treatment[a]	**Number**	October	March	**Daily Gain, lb**	**Subsequent % Pregnant**
Control	125	516	571	0.36	56
1.3	125	519	605	0.56	55
3.0	125	465	600	0.88	58
5.0	125	403	582	1.17	70

[a]Lb 17% crude protein concentrate, fed daily.
[b]Average weight, lb.

Table 4. Effect of nutritional level on weight, gain, and pregnancy rate of heifers

		Body Weight[a]				
Treatment	**Number**	November	April	August	**Gain, lb**	**% Pregnant**
Control	453	447	472	679	232	63
Clover	213	450	503	650	200	77
Corn	213	444	508	695	251	77
Flush	211	445	463	620	175	57
Ralco	227	443	456	630	187	53

[a]Body weight, lb.

NOTES: