

HEIFER REPRODUCTION STARTS WITH NUTRITION

Hannah Clark, Graduate Research Assistant, Department of Animal Science

Sarah Moorey, Assistant Professor, Department of Animal Science

Katie Mason, Extension Beef Specialist and Assistant Professor, Department of Animal Science

Raising and developing replacement heifers directly impacts the economic success of a beef cow-calf operation. When correctly managed, a heifer can provide a positive return on investments over her productive life and contribute to longevity of the herd. Different management strategies can be utilized depending on the operation, and corresponding selection decisions should be made with long-term productivity and profitability in mind.

GOALS

Producers have specific goals for each class of animal in the herd. Goals for replacement heifers include:

- **Match the animal to the environment:**
Develop replacement females efficiently with adapted forages and available feed resources.
- **Puberty before the breeding season:**
Have heifers attain puberty before the breeding season and become pregnant early in the breeding season.
- **Cost-effective strategies:**
Implement cost-effective heifer development strategies.



Group of heifers grazing pasture. Credit: John Amis.

SELECTION

The selection of heifer calves from a designated calf crop typically begins at the start of weaning. Selection decisions should be based on age, weight, genetics, temperament and structural soundness. During this time, selecting older and heavier heifer calves can position producers well for the development phase. These heifers will be of greater age at the start of breeding, leading to a greater percentage of heifers cycling before breeding, increased pregnancy rate, and increased pre-calving weight. However, it is possible to manage later-born, genetically superior heifers to reach proper target weights by breeding. Additionally, selecting only the largest heifers at weaning could lead to larger, less efficient mature cows. Be sure to consider mature size and genetic growth potential of the sire and dam before selecting only larger heifers. Prior to final selection, evaluate structural soundness of the legs and hooves and temperament in the chute.

PUBERTY ATTAINMENT

It is important that replacement heifers reach puberty before the breeding season begins. Research has shown that heifers that enter the breeding season after reaching puberty or only have one estrous cycle prior to the breeding season have reduced pregnancy rates compared with heifers that had at least two estrous cycles before the start of the breeding season (Table 1).

Table 1: Effect of pubertal status before breeding on reproductive performance. Source: SDSU Extension.

	PUBERTAL	NON-PUBERTAL
Body Wt. at AI	785 lbs.	766 lbs.
AI Pregnancy Rate	61.9%	55.5%
Overall Pregnancy Rate	94.2%	87.7%
Percent Calving within 21 days	77.8%	66.2%

One management tool used to identify cycling, pubertal animals is reproductive tract scoring. This evaluation is done via transrectal palpation or ultrasound approximately 30 days before the breeding season to determine whether the heifer has achieved puberty and is cycling normally. Table 2 shows the range of reproductive tract scores and associated structures and measurements for each score.

Table 2: Reproductive tract scoring criteria.

TRACT SCORE	UTERINE HORN	OVARIAN WIDTH	OVARIAN STRUCTURES
1 Infantile	Immature less than 20 mm diameter no tone	8 mm	No palpable follicles
2 More than 30 days from puberty	20-25 mm diameter, no tone	10 mm	8 mm follicle
3 Less than 30 days from puberty	25-30 mm diameter, slight tone	10 mm	8-10 mm follicles
4 Cycling	30 mm diameter, good tone	12 mm	More than 10 mm follicles
5 Cycling	30 mm diameter, good tone, erect	15 mm	More than 10 mm follicles, CL present

PERCENT MATURE WEIGHT AS A MANAGEMENT TARGET

The concept of target weight or percentage of mature body weight was developed to ensure that heifers reach puberty prior to their first breeding season and creates ideal nutritional conditions to improve pregnancy rates. For optimal fertility, heifers should weigh roughly 55-65 percent of their mature body weight by their first breeding season. If heifers are to calve at 22-23 months of age, they must be bred at 13-14 months of age. Age at puberty is related to body weight and feeding strategies to achieve this weight are critical for puberty attainment. Whether a producer develops heifers to the lower or higher threshold of body weight is highly situational. Individual operations will make use of the different resources they have while keeping the same end goal in mind.

DEVELOPMENTAL STRATEGIES

Management and development strategies need to be planned around the goal of attainment of pregnancy by no later than 15 months of age. Developing heifers to the desired target weight requires a plane of nutrition that matches forage availability or feed cost. For example, if forage is abundant and supplements are inexpensive early in the development period, heifers can be fed to achieve a higher ADG to reach the target weight faster. If forage availability is limited and supplements are high in cost

early in development, heifers can be managed to achieve a lower ADG for a period of time, and then make nutritional adjustments to reach target weight as costs decrease and time of breeding approaches. If supplemental feed and forage availability are not a concern, a steady ADG can be maintained. Figure 1 illustrates the various planes of nutrition used in heifer development. Any of these management options can be used to achieve target weights prior to breeding.

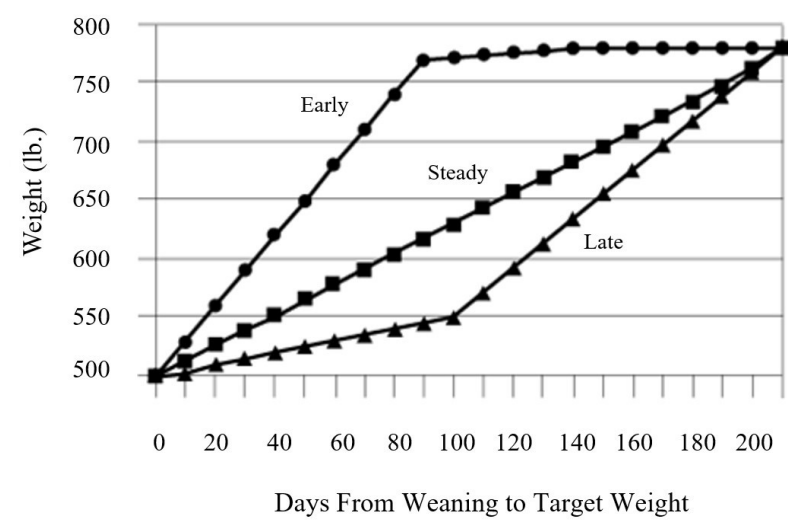


Figure 1: Optional planes of nutrition for heifer development. Adapted from Brandi Karisch, Mississippi State University.)

FORAGE AVAILABILITY

The greatest input cost in most cattle production systems is feed. Closely matching forage availability to nutrient requirements decreases the need for supplemental nutrients, which can improve profitability. This is especially important in heifer development systems, which take nearly two years of input costs before the heifer is positioned to begin providing returns to the herd. Forage quality and availability depend upon the forage base and land resources. Forages

differ in nutritional value based on how they are categorized. Generally, warm-season grasses are of lesser nutritive value than cool-season grasses, and perennial grasses are of lesser nutritional value than annual grasses. Overall, legumes have the greatest nutritional value. These various forage types also have different growing seasons in relation to the calving season. Pre-breeding heifer development in a fall calving program occurs from June through November and corresponds with the growing season of warm-season annuals and stockpiled fescue. However, pre-breeding heifer development in a spring calving program occurs from November through April and corresponds with the growing season of cool-season annuals and stockpiled fescue. Supplementation of 0.5 percent of body weight in the form of energy/protein supplement may be needed if grazing average quality hay or pasture.

Table 3: Nutrient requirements for a 500 lbs. growing heifer. Source: NRC, 2018.

MATURE WT. (LBS.)	DAILY BW GAIN (LBS.)	DAILY NUTRIENTS REQ.		DAILY NUTRIENTS AS PERCENTAGE OF INTAKE		
		TDN (lbs.)	CP (lbs.)	Intake (lbs. DM/d)	TDN (% DM)	CP (% DM)
1,300	1.0	6.69	1.12	11.3	59.4	10
1,300	1.5	7.37	1.32	11.5	64	11.5
1,300	2.0	7.99	1.51	11.6	69.1	13.1

SUMMARY

Identifying and developing good replacement heifers contributes to overall longevity and economic success of the cow herd. Selecting heifers that attain puberty before the breeding season can ensure greater pregnancy rates. A variety of nutritional management options, which depend upon target weight and forage resources, may be used to prepare heifers for the breeding season. Matching heifer nutritional needs to available feed resources, supporting puberty attainment and timely pregnancy, and using cost-effective development strategies are the keys to success in heifer development.

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