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Monitoring Dairy Heifer Growth

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Monitoring dairy heifer growth and development will insure that calves are on target to reach a weight of 1350 pounds at calving, with a height of 54 inches at the shoulders, and a body condition score of 3.25 to a 3.5 (5 Point scale) at 24 months of age (Figure 1). Heifers should start lactation with a post-calving weight between 1225 and 1250 pounds; therefore, they will need to add 50 pounds of body weight per month from birth to first calving for an average daily gain of 1.8 pounds per day. Average daily gains of 1.3 pounds per day are too low because they add only 40 pounds per month, resulting in a post-calving weight of 950 pounds. By strategically feeding during specific growth phases, producers can set goals for different months of age, cut expenses, and increase profits for the dairy.

The cost of raising a dairy heifer ranges from between $1000.00 and $1350.00 across the United States. Producers can reduce the number of days to calving or reduce the number of days in the nonproductive state, while decreasing expenses incurred raising heifers. Only by monitoring heifer growth at specific times during this development, much like milk weights, somatic cell counts, or days open are monitored, can producers be certain they are on target to reach their goal at calving. Research by Hoffman at the University of Wisconsin found that differences in growth rates of heifers between farms was due more to environment (parasites, disease, ventilation, mud, etc.) than to nutritional management. This emphasizes the need for monitoring growth rates with periodic graphing for making appro-

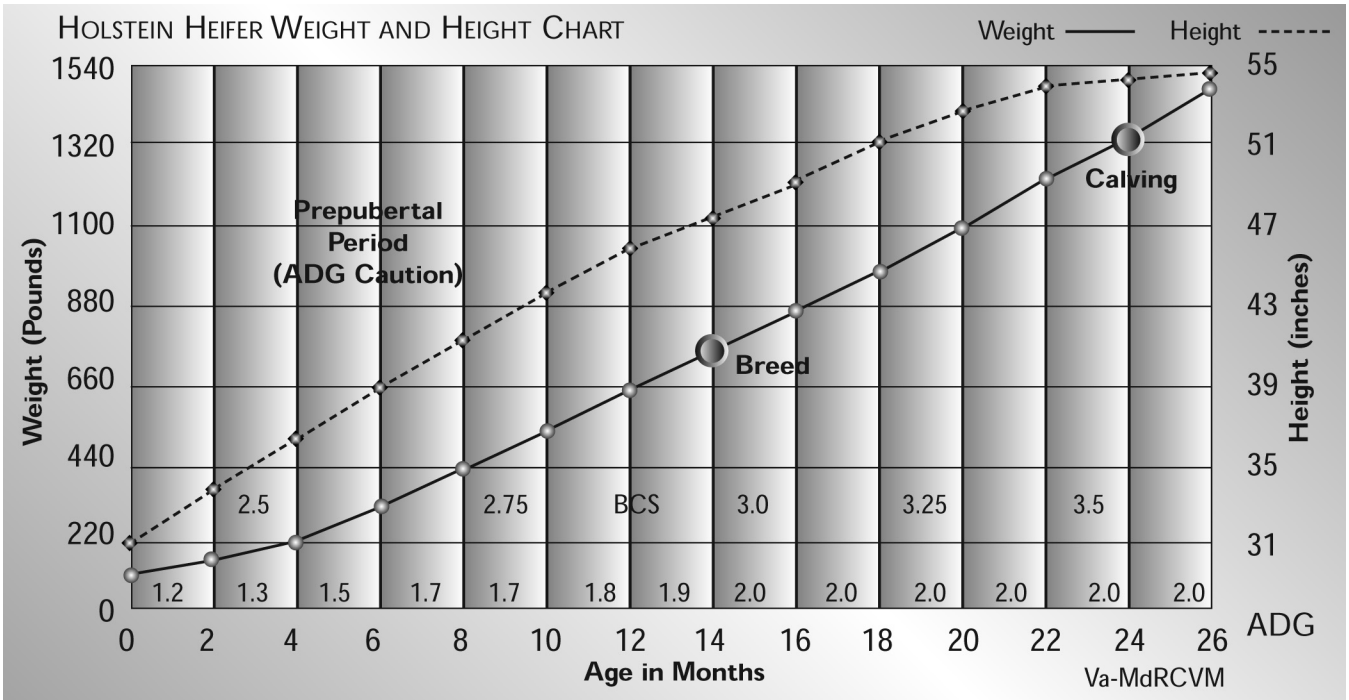

Figure 1: Heifer chart demonstrating optimal weight, height, ADG, and BCS by months of age.
*ADG (average daily gain) stratified by months of age.
^BCS (body condition score) stratified by growth periods.

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priate changes in the environment or the nutritional program to insure that heifers don't grow too slowly, too fast, or too expensively.

Heifer Puberty

Puberty is defined as the time when the heifer has her first ovulation. Following the first ovulation, the heifer should begin to have heat periods on a continual basis, typically every 21 days. The age at which heifers have their first heat or reach puberty determines when the heifer is bred the first time. Delays in reaching puberty will in turn delay age at first breeding and delay age at which the heifer calves. Optimally, the Holstein heifer should reach puberty at 9 to 10 months of age, begin cycling on a typical basis, and have her first insemination at 14 to 15 months of age (Table 1) to calve at 23 to 24 months.

Table 1: Recommended Breeding Weight And Age

Breed	Weight (Pounds)	Age (months)
Holstein	785	14 to 15
Brown Swiss	785	14 to 15
Milking Shorthorn	750	14 to 15
Guernsey	685	14 to 15
Aryshire	685	14 to 15
Jersey	550	12 to 13

There is a critical period when overfeeding can have a detrimental effect on udder development. This begins at about 3 months of age and ends at puberty or approximately 9 to 10 months of age. This is referred to as the allometric period of mammary growth. During this period, udder growth and development is 3.5 times that of other body systems. Studies indicate that when overconditioning during this period occurs, mammary secretory or milk producing tissue in the udder is greatly reduced and replaced with fat. Temporary periods of rapid gain after puberty are acceptable and may allow compensatory adjustments for weight gain to our target at 24 months and weighing 1350 pounds the day of calving. However, ADG's should be limited to not exceed 1.7 lbs. per day during this 3 to 9 months of age period.

The age heifers reach puberty depends on their plane of nutrition and average daily gain (ADG). Puberty, therefore, may be delayed or accelerated. Plane of nutrition or variation in feeding programs, whether calves are on a high, medium, or low nutrient or energy intake, dictates accelerated or decreased growth rates (Table 2). Puberty is generally thought to be reached when heifers are between 40 and 50% of their mature body weight. Age at which heifers reach puberty can be long when they are fed low energy diets, which yield low average daily gains. When the age to puberty is delayed, it is likely that the growth of mammary gland is also delayed compared to that of heifers that reach an earlier puberty. Breeding should begin by 14 to 15 months of age when they are about 50 to 60% of mature body size in order to become pregnant, and calve at 24 months weighing 1350 pounds. Heifers should start lactation with a post-calving weight between 1225 and 1250 pounds; therefore, they will need to add 50 pounds of body weight per month from birth to first calving or an average daily gain of 1.8 pounds per day. Average daily gains of 1.3 pounds per day are too low because they add only 40 pounds per month, resulting in a post-calving weight of 950 pounds.

Table 2: Average Daily Gains and Age at Puberty

Average Age in Months	Daily Heifers Gain Reach Puberty
2.0 (gains are excessive = fat deposits in udder)	7
1.5 and 1.7 (average gains between 3 and 9 months)	9
1.2 (too low average daily gains)	12
0.8 (puberty delayed = delayed calving)	14

Monitoring and Graphing Heifer Growth

Charting heifer growth for body weight, skeletal development, and body condition scoring can evaluate performance and spot trends or problems in heifer management (Figure 2). Remember: IF WE CAN MEASURE IT, WE CAN MANAGE IT.

We have records for monitoring milk weights, somatic cell counts, number of inseminations, and days open. Monitoring heifer growth and development affords us the opportunity to make changes in heifer management based on information derived from actual measurements.

These charts show stages of growth and development in partitioned groups and determine either decreased skeletal development, overconditioning or underconditioning. All are good indicators of improper feeding or poor overall heifer management. Insufficient height is generally an indication of low protein in the diet. This usually occurs in heifers older than 7 months during summer month periods when grass pastures are of poor quality or heifers are fed low protein corn or small grain silages without protein supplementation. Overconditioning heifers may indicate excessive corn silage diets or feeding high energy rations, such as feeding refusal from the lactating cow ration. Body condition should be monitored to insure adequate skeletal development (height) and body tissue mass. Heifers should be charted at least 5 times before they reach 2 years of age. This can be done at times of deworming, vaccinations, breeding, or pregnancy checks, so it is not an additional chore. Unfortunately, once breeding occurs and heifers are examined pregnant, they are often neglected until calving. Heifers should be monitored during this time for adequate projected weight and height at calving. In the authors' experience, heifers typically fall below our target goals for average daily gain during the period of time between breeding and calving (Figure 2). Charting growth and height can insure that heifers are on target for our goals at breeding and calving (Figure 1). Heifers should be first weighed or girth taped[1] and measured using a height[2] stick at 2.5 to 3 months. This could coincide with the time calves are removed from the hutches and delegated to smaller partitioned groups. Frequently, a one-month delay in time to calving occurs during this first threemonth development period and is reflective of poor nutritional and young stock management. The second measurement should be done as the calves are vaccinated for calf-hood diseases at about 5 to 6 months of age. Measure again at 9 to 12 months of age to evaluate the critical period up to puberty, when calf development is so important for udder growth. A prebreeding graph will determine if development is on target for breeding weight at 775 pounds to 800 pounds and height is 48 in, or greater. A fifth measurement, which is going to be an additional chore at 18 to 22 months, is taken to insure heifer growth is adequate to meet goals at calving. Heifer performance is often suboptimal at this time, but can be clearly demonstrated with a simple chart of weights and heights in relation to optimal growth (Figure 2.)

Body condition scoring is also a useful tool in determining how heifers are developing. Heifers should not be allowed to exceed a body condition score of 2.5 to 2.75

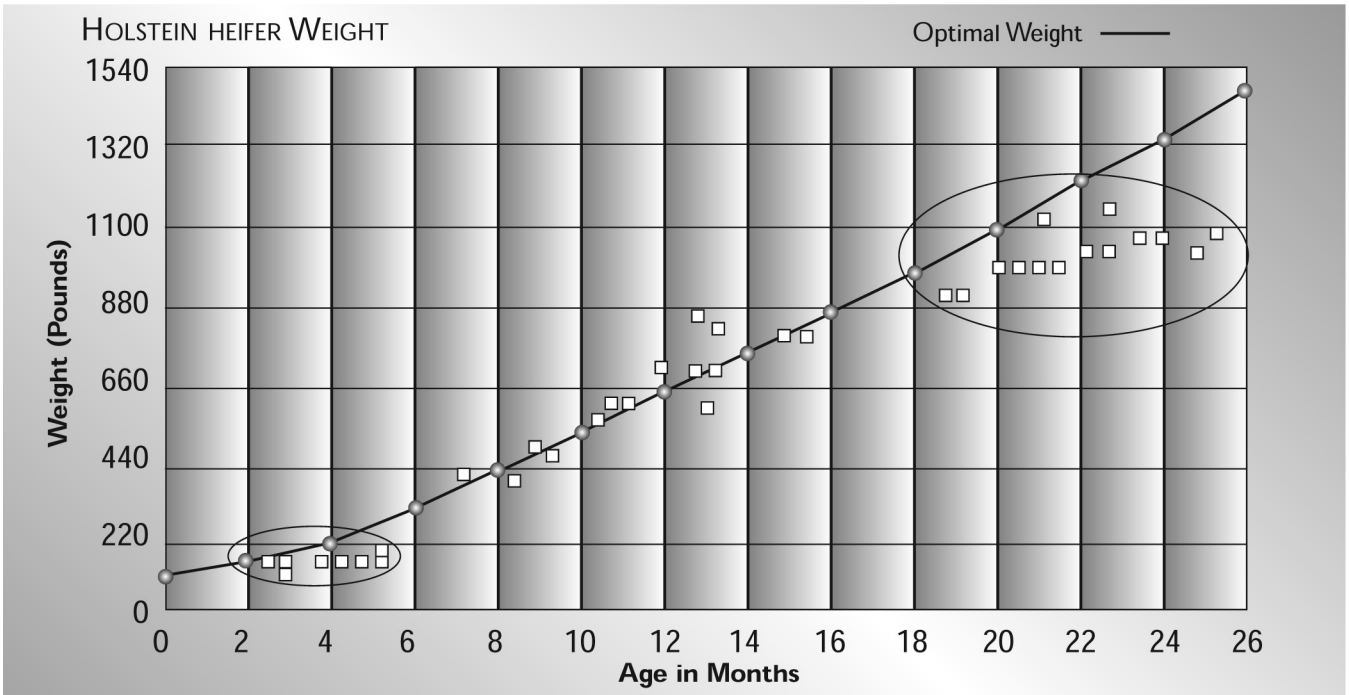

Figure 2: Chart with heifers plotted (□) based on weight in relation to months of age.
Chart indicates period of poor heifer development during the early prepubertal period. Heifers are also falling below our optimal development after breeding. Heifers are often bred, pregnancy checked, and neglected until freshening.

[1] Weigh tape, NASCO, PO Box 901, Fort Atkinson,WI 53538.
[2] Height stick, NASCO, PO Box 901, Fort Atkinson,WI 53538.

during the period from 3 months of age to puberty, as a higher score may lead to fat deposition in the mammary gland. After puberty and up to the time of prebreeding, a condition score of 2.75 - 3.0 is desirable for optimal fertility. At calving a body condition score of 3.25 to 3.5 is acceptable because overconditioning can lead to fat deposits in the pelvic canal and potential problems with calving.

So, why aren't more producers charting heifer growth? Primarily because heifers are in a nonproductive state and are thought of as an additional chore to maintain. More often as well, producers have inadequate facilities for handling young stock. Self-locking head gates at the feed bunk or a well designed pen and working chute could facilitate vaccinations, deworming programs, and monitoring growth. Producers with a large number of heifers may find the use of scales to be very cost effective.

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