

Management Components to a Designated Heifer Rearing Program

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Heifer and calf rearing is a low priority system in many dairy herds resulting in high death losses and/or lowered lifelong productivity. It is essential as we move to a more economically productive management system that the importance of heifer management needs to be emphasized. Heifer rearing for this paper is the rearing of replacement females from weaning to first freshening.

There are **six essential components** to any heifer-rearing program.

- 1. Heifer selection criteria and genetics**
- 2. Nutrition and dietary management**
- 3. Heifer housing and comfort**
- 4. Fertility management**
- 5. Disease prevention**
- 6. Record keeping and economics**

Heifer Selection Criteria and Genetics

The fact that heifer rearing is the major source of replacements for the milking cows in many dairy herds needs to be continual emphasized. It is the second costliest aspect of dairy farm production. **KEY POINT: The genetic potential of replacement heifers should exceed that of the cows being removed from the herd.** This should be taken into account any time animal selection and breeding criteria are evaluated for an individual animal or the herd.

Genetic assessment of the heifer-rearing program includes:

- a. DHIA records of dam
- b. Evaluation of herd records
- c. Evaluation of heifer records
- d. Evaluation of the genetic merit of the sire
- e. Adequate animal numbering and recording system
- f. Assessment of health records of the heifer, dam and if possible the sire
- g. Evaluation of the persistence of the dam's productivity and herd longevity

The genetic selection program emphasizing heritable traits of significance should be paramount in a heifer rearing program. All major dairy breeds possess genetic disease and unwanted heritable traits. When these traits are genetically dominant, they are deleterious to health or productivity. Most genetic diseases are of low prevalence but should still be monitored when evaluating an individual's genetic potential. The concept of duplicity comes into play, i.e. each heifer has received two genes for a particular trait from both the sire and dam. Simplifying this concept further, three types of genes can occur: dominant, semi-dominant and recessive.

Dominant genes provide that every gene carrier expresses the condition. One parent generally inherits this condition and therefore 25% of the offspring will express the condition. Environmental factors and modifying genes can affect the outcome of the dominant gene.

Semi-dominant genes are very common in dairy cattle breeds. With this condition, a single gene can produce the heritable defect, while a double gene can greatly increase its dominance. Selection for the carrier of this trait can intensify the heritability substantially.

Recessive traits are generally not easily expressed in an individual because more dominant genes can suppress the trait. A double gene only expresses these genes. Neither parent will be affected but all offspring will express the trait. Carrier trait recognition can be a very important tool in understanding the genetics of the producers breeding program. Controlling recessive genes is important in an epidemiological basis of production. Control of problem genes depends on gene frequency. This is the proportion of genes of the expressible trait within the herd. The gene frequency can be low within the breed overall but high within a herd where a carrier male has recently been used. The heifer-breeding manager can rapidly reduce a negative recessive gene through selection but eliminating it from a herd completely will be difficult.

One of the main problems in selecting against a recessive trait is the large numbers of carriers that are not easily recognized within the breeding herd. When a deleterious breeding situation is identified, use of the current sire should be discontinued immediately. The use of herd breeding bulls in lieu of artificial insemination can easily intensify and propagate negative traits rapidly. Monitoring sire selection is of extreme importance to the overall productivity of the herd.

Genetic selection programs should emphasize:

- a. Calving ease (highly heritable)
- b. Heifer conformation
- c. Milk production
- d. Metabolic disease (20 to 25% heritability)
- e. Mastitis (10 to 15% heritability)
- f. Disease resistance
- g. Select for longevity (first lactation yield is the best indicator of longevity and lifetime yield)

Nutrition Program and Dietary Management

The nutrition component should be uniform within groups and emphasize weaning by six weeks of age. **KEY CONCEPTS include:**

- a. Adjust grain to forage ratios in diets based on age, body size and body condition.
- b. Provide adequate bunk space for each individual heifer.
- c. Small groups of heifers diminish stress and help timid eaters to receive their share.
- d. Gradual but consistent changes in rations help eliminate stress.
- e. Forage quality is extremely important for growing heifers. High quality forages promote good growth and health. Balance rations with grain to complement forage quality and not as a substitute for poor quality forage.

The key to nutritionally manage replacement heifers is to balance the ration for both protein and energy requirements. Once these are met, vitamins and minerals should be included to prevent nutritional deficiencies and enhance growth. Free choice frost free water needs to be present at all times.

Practical evaluation of the heifer nutrition program involves monitoring heifers for growth and body condition. Heifers should not be over fed between weaning and puberty as prepuberal fat heifers have been shown to have decreased mammary glandular tissue with a subsequent decrease in lactation ability. Body condition scoring should be an ongoing process as well as recording of weight gains. Body weight can be either extrapolated through girth measurement or by direct weight. Height at the withers also needs to be monitored. Monthly comparisons should be made to previous herd averages and existing data for the breed on heifer growth. Evaluation should be made of both the nutritional as well as the genetic program at this time. Computer spreadsheets are readily available for monitoring heifer growth.

Heifer Housing and Comfort

It should be emphasized that housing of heifers plays a large part in the health and comfort, and thereby the success of the heifer-rearing program.

Housing problems of heifers raised indoors:

- a. Inadequate air quality and ventilation. Generally this is due to inadequate air inlet size restricting inward airflow. Inadequate outlet volumes, poor barn placement in conjunction to prevailing winds and over crowding are other factors.
- b. Temperature and humidity extremes for replacement heifers. Heifers can tolerate cold temperatures when they are dry and have a dry place to lie down. High humidity is often due to over crowding of heifers in a facility.
- c. Inability to pen calves by age and size precludes calf comfort and predisposes them to health problems, which eventually leads to poor growth and lower milk production as an adult.

KEY CONCEPT: Overcrowding and ventilation are the most common limitations in heifer housing.

The most stressful time period in the calves' life is at weaning and moving to multimember housing. This is a special concern for calves moved from hutches into barns. Heifers should be grouped by age and size in the new housing environment and within these confines adequate individual heifer space must be available.

Small group sizes immediately post weaning is a key component to heifer success. Initially calves should be acclimated in-group sizes of less than or equal to 6 individuals for the first four weeks after weaning. This insures adequate adjustment to the new environment while minimizing stress. During all time periods of heifer rearing, but especially post weaning, calves will require continual observation for the special accommodation of timid calves. **Freestall housing is not recommended for the post weaning age group.**

Animals at four months of age are ideal for the shifting to freestall housing. Emphasis on air quality is extremely important to calf health with naturally ventilated structures preferred over mechanically ventilated ones. Once again it should be emphasized when housing heifers, smaller groupings are important to minimize stress. Group sizes of 6 to 12 at the 4-month stage appear to be ideal.

Heifer housing concepts:

- a. Frequent observations
- b. Designated heifer rearing manager
- c. Ample frost-free water
- d. Natural ventilation is preferred. However, if closed type barns are utilized, adequate airflow needs to be monitored and maintained.
- e. Comfortable bedding pack needs to be maintained
- f. Adequate feed bunk space
- g. Completely isolated from mature cows
- h. Adequate pen size
- i. Regular performance analysis - weight and height measurements
- j. Extensive cleaning and disinfecting when animals are moved out of pens. Adequate pen numbers will ensure extra pens are always available.

Fertility Management

The primary goal of heifer fertility management is to achieve a 23 to 24-month average age at first freshening on a herd basis. As age at first freshening increases, herd productive lifespan and overall long-term productivity of the animal decreases. The breeding of heifers should be based on weight, body size (on a specific breed basis) and health assessment. Heifers should be bred to sires identified for calving ease.

Regular assessment of the heifer reproductive program is extremely important. Parameters for assessment of replacement heifer reproductive success include:

<u>Parameter</u>	<u>Goal</u>
a. Success of insemination	
b. Success of heat detection	
c. Age at first calving	22 to 24 months
d. Age at first service	15 months
e. Age of first recorded heat	<12 months
f. Interservice interval	<30 days
g. Pregnancy rate	>75%
h. Dystocia rate	<8%
i. Stillbirth rate	<3%

(From: Radostits, O. M., K. E. Leslie, J. Fetrow, 1994, Herd Health Food Animal Production Medicine. W. B. Saunders Co., Philadelphia, PA)

Artificial insemination should be an important tool in the management of the heifer reproductive program. A well-managed artificial insemination program utilizing genetic selection for ease of calving and appropriate heat detection is far superior to bull breeding. Crossbred beef breeding

greatly restricts replacement heifer production. Extensive genetic improvement can be made through AI selection as well as diminished trauma secondary to bull mating. Breeding recommendations for heifers should be made on the dam's milk production, conformation of the heifer and calving ease of the selected sire.

Disease Prevention Programs

Maintenance of the heifer's health should be on a proactive or preventive basis. It has been shown that heifers without respiratory disease are twice as likely to enter their first lactation as those heifers treated for respiratory disease. The average age at first freshening was 6 months less for heifers without respiratory disease. Also heifers treated for scours are nearly 3 times more likely to calve after 29 months of age. These factors alone are extremely important in the assessment of production based herd health.

Key components for inclusion into a heifer-rearing program:

- a. Respiratory disease management
- b. Diarrhea disease management
- c. Colostral management (initially)
- d. Parasite control
- e. Initial mammary health
- f. Feet and leg health programs (emphasizing conformation as well as health)
- g. Vaccination programs
- h. Veterinary procedural completion at the youngest age possible

Procedural veterinary tasks should be done at ages that minimize stress. Examples include: dehorning and removal of supernumerary teats, reticular magnets by age of first breeding, medial dewclaw amputation (if a herd procedure) and tail docking (if a herd procedure). Early parasite control is as always important. Deworming heifers before first lactation gives the producer greater latitude in selecting appropriate products than while lactating. Breaking the parasite lifecycle is to be emphasized not just the destruction of existing parasites. Therefore, initial deworming followed by a second deworming in 3 weeks will break the life cycle of most parasites. Knowledge of the current parasite population would be helpful. This can be attained utilizing fecal diagnostic capabilities. External parasite control can be important in many areas. Lice control can easily improve heifer comfort and production. Those geographic areas where warbles are endemic, fall applications of parasiticides are essential.

Clinical coccidiosis is often a direct result of external stress factors. Stress factors include: weaning, overcrowding, poor sanitation, concomitant disease and inclement weather. Subclinical cases can reduce growth as well. Control should be emphasized when developing a health program.

Vaccination programs should be tailored to each farm. Vaccine programs are most effective when they induce immunity as close to the diminishment of colostral antibodies as possible.

Vaccination assessment factors:

- a. On-farm disease incidence and prevalence
- b. Assess risk of exposure
- c. Cost benefit analysis
- d. Efficacy of vaccine available
- e. Autogenous vaccine program discussion
- f. Discuss the pitfalls of purchased heifer programs
- g. Discuss the merits of a "Closed Herd System"
- h. Discuss the merits of prevention rather than treatment program

When generating the vaccination program for a farm, all personnel inclusive of the program should be involved. Discussions of vaccine types (Killed vs. Modified Live vaccines vs. mixed vaccines; univalent vs. multivalent) and proper technique (and timing) need to be discussed. Work with your veterinarian to develop good techniques and remain in compliance with usage and procedures for all drugs and vaccines.

Heifer age at vaccination is important. Many vaccination schemes are on a quarterly basis. Heifers are vaccinated between 5 to 6 months of age and then boosted again in six months at 10 to 12 months of age. Vaccines such as the clostridial and leptospiral agents will require different timing if incorporated into the heifer-rearing health program.

Record Keeping and Economics

Quarterly

- The heifer grower and veterinarian should review the health program. A final written report should be presented at the end of the year.
- The housing program should be assessed on a seasonal basis and changes made with the changing seasons.
- Genetic selection and breeding evaluations made on a per animal per herd basis.
- Assessment and updated training of all people responsible for the daily care of heifers should be conducted.

Monthly

- Evaluate reproductive parameters monthly with a twice-annual assessment of the artificial inseminators technique.
- Semen tank evaluation should be provided and kept up by the bull stud company assuring the highest quality storage of semen.

Bi-weekly

- The nutrition program should be assessed with changes made as forage moistures and quality change.

Record analysis should be on going including DHIA, farm records as well as DairyComp 305 if utilized. The use of computer spread sheet analysis for calf rearing should also be incorporated into the economic evaluation of the program. It should be emphasized to the producer that feed costs are the largest single expense of the dairy followed closely by raising replacement heifers.

Successful management of the designated heifer replacement program can make the largest overall impact to dairies profitability over time. It should be again emphasized that this is a multifactor program utilizing: genetics, nutrition, housing, reproduction, health and economics. Feed costs are generally the largest single expense on a dairy followed closely by raising replacement heifers.

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