

PRE-BREEDING STRATEGIES AND CONSIDERATIONS FOR HEIFERS AND COWS

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Introduction

In cow-calf operations, actions taken and decisions made during the pre-breeding period will have a significant impact on economics and efficiency of long term production. Simply stated, females that do not produce and wean one live calf per year are not cost effective. Implementation of strategies to optimize production efficiency should take into consideration that beef cattle enterprises vary widely and that not all the strategies are uniformly suited to all producers.

The general objectives of such improvement strategies should focus on ensuring that most of the females become pregnant early in the breeding season, maintain healthy pregnancies, give birth to healthy calves and raise a homogeneous crop while also recovering from pregnancy and parturition in order to reach the successive breeding season in optimal conditions. Genetics, nutrition, herd health and more importantly management strategies adopted by the producer and the veterinarian will determine the success of overcoming disadvantageous conditions.

As an initial approach it is important to maintain herd records because not much can be managed without proper data to be evaluated, quantified or used to identify problems. It is also important to set appropriate performance targets suited for the specific production with the understanding that achieving them may take time and efforts. Targets can be set at the individual and herd level in order to allow management by exception on those individuals that do not perform as expected. As with any implementation, a measurement of performance will reflect the effect in production and will allow for meaningful comparison and evaluation. The use of benchmarks offers a reference against which the herd may be compared or assessed under current conditions.

Replacement heifers

Indisputably, heifers required more attention as several factors influence special requirements needed to reach puberty and cyclicity, a competent immune system and reduce their risk for dystocia. In addition, first calf heifers are inexperienced mothers and will also take longer to recover from pregnancy and parturition.

1. Prenatal:

Considerations: The efficiency and success of selecting optimal replacement heifers depends on the denominator from where they can be selected and starts as early as in their fetal lives. Changes in gene expression levels due to environmental factors (e.g. dam nutrition during pregnancy) are represented as phenotypic variations and can be considered as a prenatal programming for heifers. Nutritional alterations during different pregnancy periods have different observed effects.

The average age for heifers to reach puberty varies among breeds, and although the decision criteria for breed selection by producers is not only based on this trait, but also on the environmental conditions of the area, the desired carcass quality, the target market, etc., producers can include this attribute in the selection of the breed of choice. Moreover,

crossbreeding can be used to take advantage of hybrid vigor at the same time that a new breed is incorporated into a herd.

Strategies:

- Selection of replacement heifers from those born early in the season.
- Maintenance of optimal nutrition status of the dams at all stages of pregnancy.
- Selection of breed or breed crosses that are more suitable for the production system.

2. Heifer health Program:

Considerations: As mentioned above, the preparation of replacement heifers begins during their fetal lives where multiple factors will in part determine their lifelong health. Nutrition, immunity and exposure to local pathogens during pregnancy have a direct impact in the immune status of newborn heifers. In addition, the consumption of proper quantities of good quality colostrum has a great impact on health, survival and appropriate growth of the replacements. Preweaning and postweaning nutrition continues to be a significant determinant for the onset of puberty and bodyweight gain, with energy being the most limiting nutrient in the diet in order to reach the expected 65% of adult body weight at the beginning of the breeding season. In terms of disease, heifers are naïve to several diseases and prevention should be a priority. The diseases that they are exposed to will vary depending on the region, the rest of the herd status, exposure to other animals, biosecurity measures as well as vaccination and deworming programs. Biosecurity plans should be established by assessing risk and by implementing control measures that will prevent the introduction of potential diseases. Examples of biosecurity procedures are quarantines, testing of new additions to the herd and prevention of disease transmission by fomites, including veterinarian's supplies and employee's clothing.

The establishment of a vaccination protocol varies by herd and includes in most cases vaccines against clostridial, respiratory and reproductive diseases such as Bovine Viral Diarrhea virus, Infectious Bovine Rhinotracheitis, Leptospirosis, Para-Influenza3, all of which have been shown to improve pregnancy rates and calving rates. Additional vaccination strategies are usually based on specific herd risks as in the case of Campylobacteriosis and Trichomoniasis. In any case, decision for vaccines should include whether a modified live or a killed vaccine is used. More importantly, label directions should be followed in order to prevent adverse effects including abortions. Another example of specific herd risk and associated prevention is the case of areas with prevalence of Epizootic Bovine abortion, where strategies related to management practices for heifers can diminish the negative outcome of the disease.

Strategies:

- Appropriate nutrition should be provided to the dam at all stages of pregnancy for fetal development and quality of colostrum and continued during lactation.
- Consumption of colostrum should be guaranteed in the first 12 hours of extra-uterine life and alternative sources should be available in case of low production or orphan calves.
- Nutrition quality and quantity should be maintained during pre-weaning and post-weaning periods.
- A biosecurity plan and a herd health program must be established, implemented and monitored.

3. Management:

Heifer selection: It is well known that heifers born during the first weeks of the calving season will reach higher and faster puberty and bodyweights than the rest of the herd- mates and therefore will be more successful during their own breeding season. The latter is represented by a higher percentage of female cycling and higher pregnancy rates early in the season. At weaning, heifer selection criteria includes those with better body weight, females with the desired phenotype, born to dams with good reproductive history and from the sire(s) of choice. Avoiding the use of heifers that have received growth-promoting implants is recommended as they can have a detrimental effect on fertility. A pre-breeding assessment for selection should consider those heifers that have reached 65% of their adult body weight, are around 15 months of age and have good temperament score. At this time, a reproductive tract scoring (RTS) system can be used with rectal palpation to evaluate the uterus, the ovaries, and the development of ovarian structures indicating cyclicity. In addition, the pelvic diameter can be calculated and the selection according to these two parameters, RTS and pelvimeter, will contribute to have higher pregnancy rates early in the season, better response to hormonal treatments and insemination protocols and will contribute to the decrease of dystocia cases.

Breed early in the season: Heifers are expected to start the breeding season (i.e. insemination or introduction of bulls) 2 weeks before cows. Ideally, they should have had their third cycle in order to increase the possibility of pregnancy in the first 21 days. Heifers will enter calving season 2 weeks prior to cows, allowing for a more dedicated observation of their parturition in case assistance is needed. Furthermore, it will take first calf heifers longer to keep up with the nutritional demands of finishing growing, raising a calf and return to cyclicity. The 2 extra weeks in relation with the cows calving season allow first calf heifers to reach appropriate breeding conditions at the same time than the cows.

Bull selection: Independent of whether live coverage or frozen semen is used, in order to prevent complications during pregnancy and parturition, the selection of the sire should consider the size of the bull in relation to the heifer. Strategies include the use of semen from known “calving ease” bulls, the use of sexed semen to guarantee the delivery of a female calf that will have lower weight at birth and the use of cross breeding with a sire from a breed smaller to that of the female.

Hormonal treatment and Artificial Insemination: The different protocols and the evaluation of whether hormonal treatment is appropriate for certain production is discussed elsewhere. Nevertheless, it is important to mention that it can increase the number of heifers bred in a short period of time and it allows for the introduction of new genetics, therefore producing a homogenous crop of genetically superiorly calves. In addition, those heifers that may not conceive to the insemination can benefit from the hormonal treatment for subsequent cycles, thereby increasing the overall number of heifers bred in the first couple of cycles. There are costs associated with these programs but which may be offset by an improved calving season, better genetics, and a need for fewer bulls.

Cows

In general terms, many of the points raised for heifers above also apply to cows, even though, some may not be as critical. The ideal cow gets bred in the first 21 days of the breeding season, calves and weans a healthy calf and remains in the herd for several years.

Culling criteria: The selection criteria of the cows to remain in the herd resembles that of heifers. During pregnancy check, cows called open, with reproductive pathologies or progressive

diseases should be removed from the herd. At weaning, cows with bad udders, with inappropriate maternal instinct, that did not produce a good calf, that calved too late in the season or aborted, as well as those reported to have had dystocia of maternal origin, missing or broken teeth, very low body condition or that don't meet the herd targets can be sold.

Nutrition: Appropriate cow nutrition is of big relevance at all stages as it determinates the quality of the calf produced and the time that the cows will take to recover from pregnancy and parturition. Rapid return to cyclicity and the ability to get pregnant in early post calving period defines their permanence in the herd and the production profitability. Multiple studies evaluating body condition score and pregnancy rate indicate that pregnancy rate and the percentage of cows that become pregnant in the first 21 days is significantly higher as the condition score increases. Mineral balance should be taken into consideration as they play an important role in reproduction.

Herd Health: In most cases, cows will follow the same herd health program as the heifers. Similar considerations for biosecurity and other control and prevention methods also apply to prevent the introduction and effect of disease. Ideally, each production operation should also design protocols for potential health issues as down cows, dystocia, and euthanasia.

Bull selection: Dystocia is one of the greater causes of calf loss. Although cows have less risk than heifers to have parturition complications, the risk is present and pre-breeding strategies can decrease the chance of dystocia. As with the heifers, the selection of the sire will be a significant contributor to the size of the calf at birth. The use of calving ease semen when dealing with cows with small frame or when a bigger breed is being introduced are some of the alternatives. When using live coverage, the size of the bull can provide clues and a complete record system can help with future decisions.

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