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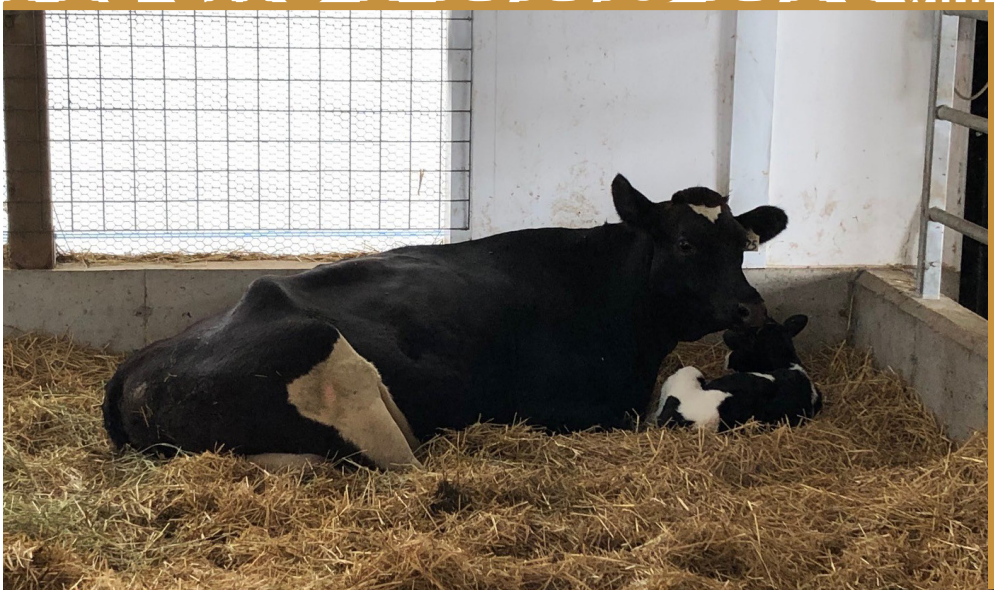

DAIRY Edition
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The Impact of Nutrition on Reproduction

Written by: Rami Kridli, PhD., Ruminant Technical Representative

Maintaining a lactating herd with low days in milk is the goal for higher milk production. This requires good reproduction to allow cows to calve at 12- to 13-month intervals. Reproduction is a complex process that is influenced by the interaction of genetics, environment (such as nutrition, health, temperature, etc.) and numerous biological factors. Although it is important for the continuation of the species, reproduction for the individual animal has low priority when nutrients are scarce. Thus, under periods of high nutritional demands, such as during lactation, reproduction may become sub-optimal. A low reproductive efficiency is determined by no or reduced heats, low conception and pregnancy rates, more inseminations required per conception and pregnancy losses. To tackle these issues, we must have a basic understanding of reproduction.

The reproductive process begins during fetal development and continues throughout the productive life of a cow. It is important to also understand that this reproductive development can be impacted both in utero and after birth. For example, maternal undernutrition during pregnancy can retard fetal ovarian development. Similarly, the proper raising of healthy heifers is essential for a good reproductive development. Once a heifer reaches puberty, she will begin to cycle regularly at 21-day intervals and will continue to cycle until she conceives, at which time the cycle ceases until after calving. Follicular development begins in the cow around one-week post calving. However, these developing follicles will not be able to establish a pregnancy until uterine involution is complete. The largest developing follicle will ovulate by day 20 to 30 post-freshening in about 50% of the cows while it may die or form a cyst in the remainder. The more cycles with ovulation a cow experiences during the voluntary waiting period (period between calving and breeding), the greater the chance of conception at first insemination. Follicles require about 3 months of development before they ovulate in a given cycle. Any negative impact during this period (heat stress, disease, inadequate nutrition, etc.) will affect follicular development and, potentially, fertility of the oocyte (egg) released from a follicle. Thus, events such as heat stress can not only impact reproduction during the summer, but also for up to 3 months after it ends.

Nutrition affects reproduction throughout a cow's life but more critically during three successive periods: transition (3 weeks pre- and post-calving), during breeding and through early pregnancy. It is well established, that a cow experiences a period of negative energy balance for a few weeks after calving

due to reduced dry matter intake resulting in the cow's inability to meet her energy demands. In general, cows with a high body condition score (BCS) during the close-up period (BCS>3.5) are more predisposed to lose weight after calving and therefore under risk of metabolic challenges such as ketosis. These cows will experience suboptimal follicular development and delayed first estrus. Thus, keeping cows at BCS between 3-3.25 at dry-off and ensuring adequate dry matter intake during transition is critical for health, production and improved reproduction. Also, acknowledging that a follicle requires approximately 3 months to develop, the dry period can have a significant impact on oocytes that are to be fertilized around 60 to 70 days post-calving.

Protein is also vital for reproduction as too high or too low dietary protein can alter the reproductive process. In addition to its effects on follicular development, low dietary protein can reduce appetite and further increase negative energy balance. This can reduce cyclicity and increase ovarian cysts. Too much soluble and rumen-degradable protein (RDP) can elevate blood urea and ammonia resulting in poor follicular development, delayed ovulation, lower oocyte and embryo quality and increased abortions. Additionally, excess RDP may intensify a negative energy balance during early lactation due to the energy cost of detoxifying ammonia.

Conclusion

Nutrition can have significant effects on reproduction beginning in the dry period and continuing until the cow is safe in calf. A proper dry-cow program ensures providing a balanced supply of nutrients that are required for allowing the resumption of cyclicity within 30 to 40 days after calving. Also, minimizing the severity and duration of negative energy balance along with supplying the right fractions of dietary protein and other nutrients are key towards improving reproductive performance.

Company Update

By: Phil Roberts, National Sales and Marketing Manager

Hopefully, the weather cooperated in your area for a timely harvest and it has gone as smoothly as possible during this unique time. Thankfully, this year we are dealing with a plentiful and good crop quality in most regions.

The COVID-19 pandemic continues to impact all aspects of our business and economy. We continue to realize supply chain challenges; but rest assured New-Life Mills has itself positioned extremely well to ensure we can support the needs of our marketplace. We are closely monitoring local and world supply chains to ensure that we continue meeting your needs and can provide the assurance in quality that you have come to expect. It is fair to say that our ability to plot a course through the challenge and be successful is largely driven from the amazing individuals that make up this great organization and the clients we work with. There are numerous tasks internally and externally that occur day-to-day to ensure we can meet your needs. I am very honored to work with an amazing group of individuals that strive everyday to be the best they can be.

Over the years, many of you have established strong relationships and a wonderful mutually beneficial business relationship, for this I would like to say, 'Thank You'. To those who are newer to working with New-Life Mills, I'd like to welcome you as we look forward to growing our relationship together. As we continue working through the challenges of a pandemic, we are strengthening our abilities to meet your needs and work along side you while we continue "Feeding Your Future." All the best as we enter the Christmas season and ring in 2021!

Opportunities in Heifer Raising

Written by: Erik DeVries, BSc., Ruminant Technical Representative

A common area for improvement on dairy farms is first lactation performance. The typical milk production target for 1st lactation cows is 80% of that of 2nd lactation cows and 75% of mature cows. Therefore, for a herd with 13,000 kg mature cow production, 1st lactation cows should ideally milk 9,500+ kg.

Although replacement heifers are integral to our dairies, there is no return on investment until they start milking. The industry has been successful in decreasing age at first calving (AFC) to around 24 months, but if heifers are raised well, there are still opportunities to further decrease AFC to 22-23 months.

Heifers reach puberty based on size (mainly weight) rather than height or age. However, height should be monitored to ensure that heifers have the appropriate frame development prior to breeding. With weight in mind, the goal is to raise a properly developed, productive heifer. To achieve this goal, producers should target increased lean growth at a young age when heifers grow most efficiently. This will allow heifers to calve earlier and reduce costs associated with rearing.

Economics

When looking to improve profit margins, it is recommended to focus on large expenses, where even a small improvement can have a higher return than a large improvement on a small line item. After feed costs, raising heifers is often the largest cost on dairy farms, with estimates calculated to be between $2000-$2500 per heifer. Considering that the selling price of a fresh heifer seldom exceeds the cost to raise them, feeding excess heifers can be a significant financial loss to the farmer. Therefore, it is important to determine the appropriate number of heifers needed for your operation to avoid the unnecessary cost of too many replacement animals. The number of heifers required can be calculated using the following formula:

$$\frac{\#\ of\ cows\ *\ cull\ rate\ \%}{(1-heifer\ mortality\ \%)*(1-heifer\ cull\ rate\ \%)} * \frac{2*Age\ at\ First\ Calving}{24}$$

In addition to the number of replacement animals, AFC also needs to be considered. Using a target AFC of 23 months and estimating feeding and housing costs at ~$3.00/day, every month over target AFC will cost the producer $90-100. Therefore, a dairy that requires 30

Table 1: Heifer Growth Targets

STAGE	AGE months	WEIGHT kg at the end of stage	RATE OF GAIN REQUIRED kg/day
PRE-WEANING	0-2	100	0.90
WEANED	3-12	400	1.00
BREEDING	13-14	450	0.83
BRED	15-23	670	0.81

fresh heifers a year and calves 1 month past the target is incurring an extra $3000/year in rearing costs while also increasing their heifer inventory. With all this in mind, reducing the age at calving and only raising the necessary number of replacements needed can have a tremendous impact on profitability.

Targets

Based on Table 1, a heifer with a target AFC of 23 months, and a weight of 100 kg at weaning, needs to gain 570 kg in 640 days, or 0.89 kg/day from birth. Regular monitoring of heifer growth is necessary to consistently identify heifers that can be moved into the breeding group.

Target high growth rates from preweaning until breeding size, when the heifer is most efficient. Heifers should weigh 400 kg at 400 days old, with high rates of gain unnecessary in pregnant heifers.

Heifer Feeding Options

So how do we grow a heifer that will calve at 23 months and milk 9,500+ kg?

It all starts with calves on milk, as this is when the young calf grows most efficiently. Although this is the most expensive part of raising youngstock in terms of purchased feed, it is the most critical since if this step fails, the next step of heifer raising is also liable to fail. Ideally, pre-weaned calves will be fed at least 4-6 L of milk or milk replacer 2-3x/day, with continuous access to fresh water and calf starter. Calves should at minimum, double their birth weight by weaning.

Postweaning, the goal is to have a fully developed rumen by 5-6 months of age. Fiber and dry forages are key to support the rumen functional growth. Supplemental concentrates at 2-4 kg per head should be fed to support rumen wall development, and to ensure that the energy and protein requirements are met for the breeding age target.

Alternatively, good results have been observed with a program that feeds young heifers (2-8 months) a TMR containing chopped straw, a commodity protein source, ground corn, and a premix with monensin. This program allows dairies to have a customizable heifer program which takes advantage of the investment made in a TMR mixer, while reducing the need for bagged feeds and not having to purchase another bin for bulk pelleted feed.

At breeding age (12-13 months), energy and protein demands can be easily met with high quality forage sources, whereas vitamins and minerals need to be balanced using a heifer premix. If forage quality is poor, supplemental protein and energy sources may be necessary to meet requirements.

Conclusion

Raising quality replacement heifers is an integral part of dairy operations. Proper feeding and management at all stages of the heifer rearing process will help to ensure that 1st lactation animals will exceed the production standard expected of them. Utilizing homegrown feeds and available purchased feed sources effectively will ensure that heifers are raised efficiently and economically.

Contact Information

Sales & Nutrition Office
1-800-463-1196
info@newlifemills.com
www.newlifemills.com

Clavet Mill
1-800-667-4693

Inkerman Mill
1-800-565-5175

Wyoming Mill
1-800-265-7507

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