A perspective on the evaluation of dairy calf rearing operations

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Abstract

The basis for evaluation of calf rearing operations is to determine the role of the operational activities in affecting calf growth and development. The evaluation process should include the following; understanding and establishment of expectations for physiological growth and development, unbiased observation of the existing operation, compilation of operational activities and facilities as they relate to observed performance, identification and explanation of strengths and weaknesses, prioritization of corrective measures including impact on the operational function and economics, and a plan for education and implementation of corrective measures with expected outcomes. The evaluative process can help improve the calf rearing operation by focusing the operational activities on quality care of the calf to enable optimal genetic expression.

Key words: calf evaluation

Introduction

Raising calves has been an integral part of bovine animal husbandry since the inception of the domesticated cow. At its beginning and even today in some parts of the world, cow's milk is shared with the dam's offspring and people. However, the predominate evolution of calf rearing has shifted the calf's primary nutrient source from naturally produced cow's milk to alternative non-milk ingredients blended with or without components of milk. These blends have become the "normal" in replacing cow's milk. Hence, the term "Milk Replacer" began to be used to describe any ingredient or blend used to replace the naturally produced whole milk fed to calves. The greatest influencer of this shift came at a period in time during which it was determined that the nutritive and economic values of naturally produced cow's milk for human consumption exceeded those of the calf.

It was also during this period of time that commercialization of calf rearing started to grow and become a part of the dairy industry. As the drive to produce more milk per acre of ground grew, young stock associated with dairies began to be removed from the primary milking facility and re-located to off-site and even second party entities. The ability to utilize milk replacers and concentrate the labor force on rearing calves, while freeing up space to milk more cows helped enhance the growth of the commercial calf ranch operations.

Calf raising facilities vary tremendously across the world. Some are as they were at the inception of calf raising with calves allowed to run somewhat free, but stay relatively close to their grazing dams and nurse at will. On the opposite extreme, calves are housed in climate-controlled buildings with automatic feeders supplying and monitoring nutrient intake and calf activity on an on-going basis. These are the range extremes of calf rearing facilities with a whole myriad of combinations of housing and nutrient supply being employed in between.

The concept of the nutritive value of natural cow's milk having greater economic value to people versus calves opened up the belief that calves could be reared in a less expensive fashion than previous methods. This further led to studies and anecdotal evidences of using alternative feeds and housing to raise calves with equal and/or greater growth than previously experienced and at a lower cost. Over time, the unfortunate un-intended consequence of primarily focusing on the least expensive means of raising calves has developed, allowing the establishment of calf growth and development well below their genetic capabilities to become the norm. The drive to improve efficiencies shifted away from sound physiologically driven fundamentals to reducing expenses. This mantra of producing at a lower cost became rampant throughout the industry and even today is very apparent in the decisions being made in raising calves. This least cost focus is so strong that it often clouds the obvious and causes poor decisions to be made as they pertain to the physiological well-being of the calf. In more recent years, there has been a sound movement towards recognizing that genetic expression of dairy replacement animals is markedly influenced by the early age growth and development of the calf.

Successful growth and development of calves occurs in nature through a natural progression of nutrient supply, and protective influences of the dam. In rearing calves away from their dams, we have removed or diminished some critical nutritive and physiologically enhancing compounds from the calf. While there has been significant attention given to the transfer of maternal antibody through feeding colostrum, the emphasis on antibody transfer has over-shadowed the significance of other biologically active compounds and nutrients in colostrum and transitional milk as fed to calves or not fed to calves. The evolution of colostrum to saleable, normal, whole milk is significant in assisting with normal growth and development of the gastrointestinal tissues and the emerging microbiome of the digestive tract.

Over the last 5 decades, I have been fortunate to have received training and experience including privately and commercially raising calves, academic and professional training in animal physiology, and continued experiences (both private and consultative) in dairy and beef cattle production and evaluations. I believe that I have lived a significant proportion of the growth and development of the industry by being a part of the latest technologies and housing and exploring the utilizations of alternative feeds and additives to enhance production. Like many others, I have experienced tremendous successes and absolute failures in raising calves.

While I have always been inquisitive as to how things work, I was driven to a clear understanding of this inquisitive nature by one of my professors at the University of Nevada, Reno. Dr. Howard Weeth taught undergraduate Animal Physiology and effectively changed my course of professional training and career direction. His teachings of the principles of physiology were founded on the premise of asking the questions of how, what, and why. He emphasized that when you could correctly answer these questions as they pertain to the subject you were studying, you understood it. I readily adopted this methodology as a means for my studies, training, and evaluations. I must admit that at times I have deviated from this foundation of understanding and application, only to recognize that when I failed, it was because I did not adhere to the basics learned by asking how, what and why for the application at hand.

Calf rearing operations, like other enterprises are like giant picture puzzles in need of all of their pieces presenting each of their respective parts in order to correctly complete the picture. Successful calf rearing operations recognize the significance of each of these components and strive every day to ensure that each of these activities blend together to create a positive outcome. The following synopsis is offered as a means by which I choose to evaluate calf rearing programs.

Dairy Calf Rearing Program Evaluation

The foundation of any sound dairy calf rearing program evaluation must be a clear understanding of what is the physiologically normal course of growth and development of the calf. When all else fails, turn to nature for the explanation and pattern to follow for success. Growth and development are not necessarily the same outcome. Growth is the increase in cell size and/or numbers. Development often involves growth, but is much more intricate in that it is the increase in functionality of a cell, tissue, and/or organ, often described as differentiation and maturation. Growth may occur, but optimal development may not in some circumstances, with the net effect of reduced functionality. The selection of genetically superior animals has and continues to be a significant part of the dairy industry. Impediments in housing, nutrition, and environment can certainly restrict the ability of genes to be expressed. The successful growth and development of a dairy heifer calf implies that the replacement heifer will grow and develop into a productive cow with a long-life expectancy. Likewise, successful growth and development of the dairy steer (and dairy cross) calf suggests that the steer will grow and develop into an animal with good feedlot performance and carcass characteristics. A key principle in understanding development is that of recognizing that what happens to the animal in each successive phase of an animal's life predisposes the development and even expression in the next phase.

Growth, often measured by weight and/or height, is generally used as the determinative measure of success in calf rearing programs. Development is more difficult to assess and as such typically is not used as a standard measure of success. However, by looking at the physiological response as measured by indirect productivity, standards of development can be extrapolated. For example, mammary development as measured by 1st lactation production. Most physiological developments will occur, the key to a successful developmental program lies in the rate and extent to which those developments occur. For example, the rumen papillae will develop in all calves over time regardless of feeds presented or not presented to them. However, the rate, extent, and magnitude of functional development of rumen papillae varies widely in response to the feedstuffs and other challenges presented to the rumen environment. The evaluative process needs to be based on the knowledge as to how and why rumen papillae develop. If a concern of poor development exists, what needs to change to correct the concern and how do you implement the change so that it positively impacts the development of rumen papillae.

The next step is to couple the normal expectation of physiological outcomes with the establishment of clear, objective perspectives as to expected outcomes for the calf rearing operation being evaluated. What is the primary motivator for performance at the facility? All too often, the primary motivator does not match normal physiological growth and development expectations and expected outcomes for the calf operation. Owners, managers, and all other personnel tend to drift into putting out fires that are raging that day and lose sight of what the focus really should be. Helping to identify this drift will help them to focus on the basic steps necessary to prevent the fires from raging. What is present or absent in the daily operation that facilitates the desired outcome or detracts from it? This step is critical in helping people to understand the link between sound scientific principles and the practical application of those principles. It is not uncommon to hear the statement that," I understand that is the correct way to feed calves, but there is no way that I can afford to do it that way." The focus of calf rearing operations should be on providing the best possible means of helping the calf to grow and develop into the animal it is genetically capable of achieving. By linking the scientific principle with the correct application of that principle it is easier to establish a trail of "cause and effect". When calves are fed the appropriate nutrient balance in the appropriate manner and in the appropriate amounts, then the incidence of scours is markedly

reduced. Treatments are drastically cut and the appropriate establishment of digestive tract microbiome occurs leading the calf to improved digestive, metabolic, and immunological success. Identifying the appropriate characteristics of the puzzle pieces aids in putting them together in the appropriate fashion which leads to productive efficiencies and often an even greater return on the investment.

This next step is primarily the responsibility of and a reminder to the evaluator. Be open minded enough to realize that success in reaching the desired outcomes as previously established may occur under a variety of circumstances. If there was only one way to raise calves correctly, then the industry would have migrated to that years ago. This statement is not intended to excuse poor management decisions, but rather to point out that successful calf rearing can and does occur with a variety of differing variables in existence. I have had the good fortune to observe some extremely well raised calves under the most ideal conditions and also the same type of calves raised under very poor conditions. What physiological mechanism allows for this dichotomy to occur? I have found that by dissecting the conditions one by one and understanding the role of each in the growth and development of the calf, I can generally find the pathway of success that the calves are following. This path may not be the one that I would recommend, but it is difficult to argue with sustained success. Use this open-mindedness in helping to formalize your recommendations to give the greatest opportunity for change to occur. Another perspective of this point is to pick the battles that are necessary to fight and leave the others alone --- for now.

Operational observation is an all-encompassing term which means that all calves, people, facilities, procedures, recipes, organizational structure, environmental, nutritive, and health related functions as well as owner/manager/personnel concerns and opinions are open to evaluation. Each of these contribute to the completed picture of the puzzle and must be considered in order to affect change. At this point, observations are used primarily to help identify the clarity of the characteristics of the puzzle pieces to help get them into the right general area of the puzzle. The detail of any of these observations can become overwhelming if allowed. Do not put on the blinders! Productive evaluations occur through the ability to absorb as much pertinent detail as possible and yet still maintain a more global view of the operation. These observations need to made with the foundation of how, what, and why for each of the points of observation with the realization that it is the cumulative effects of the individual activities that determine the outcome. While the answers to most areas of concern are going to involve correcting the details of various activities within the calf ranch, it is the interaction of these functions that you are ultimately affecting. The occurrence of tunnel vision and focusing on one particular point must be avoided and is often more detrimental than not changing anything at all. In most animal production facilities, the observance of a particular concern is often the result of one issue leading to the detrimental development of another issue which ultimately leads to the observed concern. For example, nutritional imbalance which leads to parasitic challenges which predisposes the calf to viral invasion and ultimate death due to bacterial release of toxins. In this case, the observed concern is the death due to bacterial release of toxins. By collecting information for all aspects of the process, the evaluator would identify nutritional imbalance through nutritive assessments and correlate that with observed changes in calf stool appearance and perhaps even calf health and well-being as evidenced by body condition, alertness, and hair coat appearance. As the points of observation are noted, typically what will unfold are the pathways of successes and failures. Both are important in putting the solutions together to correct the shortfalls as the strengths of the successes can be used to correct the failures. For example, a facility is having an abundance of scouring calves caused by nutritional inconsistencies. This same facility has a doctoring crew that is very diligent about treating scouring calves, but the treatments are often antibiotic in nature and tend to compound the scouring issue. By correcting the nutritional deficiencies and re-directing the treatment crew to identify the varying types of scours and appropriate treatments and/or supportive therapies for each, calves undergo less scouring and recover more readily with the appropriate treatment.

Analytical testing is typically not employed at this point of the evaluation. Observations may lead to further questions that may only be answered through analytical testing. It is important to understand that testing should not be used to replace observation. Observation is used to develop the analytical testing needed. Consider the following as an example of this process. Observations of a facility reveal that calves up to 3 weeks of age may be fed less nutrient than required and there is an imbalance of nutrients supplied. Approximately 70 percent of calves begin to scour at or about day 6 and continue to scour through approximately 18 days of age. Stool color and consistency are variable. Stool samples and calf tissue cultures could lead to a recommendation of antibiotic use. This may slow the pathology of the scouring but also contribute to less than optimal microbiome development. However, by looking at the observations collectively, a correction in the nutritive intake could be the solution necessary to reduce the scouring issue and enhance microbiome development.

Compilation of the observed information is the next step in the evaluation process. When organized, the compiled information should identify the personnel, environmental, nutritive, and immunological processes that impact the calf in its journey through the first few months of life. By methodically tracing these processes and overlaying the growing and developing calf performance at each step, strengths and weaknesses of the process can be identified. Observed weaknesses in the calf are more easily correlated with weaknesses in the operation and thus lead to more appropriate solutions for correction. Employment of the questions of how these

weaknesses occur, what are the weaknesses and their affects, and why are they weaknesses, opens the understanding of cause and effect that leads to the implementation of corrective measures. The managerial objectives need to be centered upon preventing weaknesses from occurring.

Prioritization of the implementation of corrective measures is the next key step of the evaluative process. It is the establishment of priority that yields to a course of action to educate the calf rearing operation personnel as to what, how, and why corrective measures need to be implemented.

The cumulative result of the evaluation process is a workable plan of implementation of corrective measures coupled with their respective expected outcomes. The plan of correction must be explicit enough for all participants to understand their roles and the impact of the corrective measures on the functional and economic operation of the facility. The better the participants understand the correlation between their daily activities and the performance of the calves, the more likely they are to excel at what they do and the greater the opportunity of realizing the goals of the operation.