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Effect of Feeding Mineral Supplements on Reproductive Performance of Indigenous Cows

Dr. Sandeep Singh Kashyap

Assistant Professor (Veterinary/Animal Science) A.N.D. University of Agric. & Tech., Ayodhya (U.P.), India

ABSTRACT: Minerals in animal feed occur in variable structures, most of which determine the uptake and usage in biological processes in the body. Effective chemical breakdown of minerals may ensure efficient utilization in metabolism. The aim this study was to evaluate the effects of mineral supplementation on reproduction in cows. A farm was selected for the experiment due to the fact that it previously experienced different reproductive conditions in the farm. The body weight gain was significantly higher in the experimental group compared to the non-supplemented group. Supplemented cows had significantly ($p < .05$) high levels of triglycerides and creatinine kinase. A case of retained placenta and dystocia among non-supplemented cows were noted. Thus, mineral supplementation can be used to improve productivity and reproductive well-being. Deficiencies in calcium, magnesium, phosphorus, copper, selenium, zinc and manganese have been associated with occurrences of hypocalcaemia, retained placenta, abortion, dystocia, vaginal prolapse, downer cow syndrome and overall depressed reproductive performance in cows. Whenever natural grasslands are the main or only source of nutrition supply, it is essential to determine the nutritional content of pastures, to quantify and measure different elements in order to account for deficiencies and improve the feed in order to enhance production and reproduction. Increased attempts to reduce mineral deficiencies have as well increased the risk of toxicity. It is a common practice to offer cow mineral lick in an effort to balance requirements; however, this is not achievable unless the concentrations of minerals in the supplement are exactly the amount required. Thus, proper supplementation is necessary in order to reduce incidences of reproductive problems and animal losses due to nutritional imbalances.

This study was performed to determine if supplementing concentrates and/or minerals significantly affect productive and reproductive efficiency in indigenous cows. This was studied because determining the factors that improve the efficiency of dairy cows and implementing them would expand the dairy sector. There is potential to expand the industry, which will provide jobs and a source of income for local people. The expansion of the diary sector requires further studies on cows nutrition and improving reproductive and productive efficiency. Even with the increase in improved cows, dairy supply wasn't meeting demand and still isn't. Expansion of the dairy sector is necessary to meet the growing demand for milk as well as to contribute to the country's economy.

I. INTRODUCTION

The objectives of this study include: estimating if the cows are meeting their nutrient requirements, if supplementation significantly improves milk yield, and if supplementation impacts reproductive efficiency measured by time between calving and resumption of heat. The hypothesis is that supplementation is an important factor influencing production and reproduction given the correct management strategies. The study was shown to provide higher plane of nutrition, vitamin E and mineral supplementation for augmenting the improvement in reproductive performance. However, the mineral supplemented group had lower levels than the control group at all the stages but vitamin E values had higher levels than the control group at all the stages. Cervical and uterine involution was completed in lesser days, involutory changes took place at a faster pace and there were lesser percent of cows suffering from abnormal uterine changes in supplemented compared to control group. Supplemented group showed better reproductive performance considered in the study than control group. In total, around 12 days could be saved in days to first service if vitamin E and minerals were supplemented. Supplemented group showed early initiation of cyclicity (32 days postpartum) compared to control group (35 days postpartum). Cyclicity in most of the animals might have been initiated earlier than 30days as was evident from progesterone concentration (>1 ng/ml). Short and long luteal phases were observed on appraisal of progesterone concentration in both the groups which delayed the days to first service in these animals. It can be concluded that mineral and vitamin E supplementation improved the reproductive performance of cows during periparturient period.[1]

Nutritional management during the dry period is the main factor which may affect susceptibility of cows to metabolic and infectious diseases during the periparturient period . Besides general nutritional status, deficiencies or imbalance with respect to specific nutrients (minerals and vitamins) have been found to have drastic effects on various determinants of reproductive performance leading to infertility.[2] Vitamins and minerals (macro and microelements)

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in minute quantity play a decisive role in overall metabolism, normal growth, production and reproduction. Excess or even imbalance of some minerals and vitamins may have deleterious effect on health . Further the impacts of such disturbances on general health including insidious sub-clinical diseases/ disorders have been recognized as the most important but covert factors with deleterious consequences for reproductive performance.

Minerals and vitamins have direct or indirect relationship with productive and reproductive health of animals. Vitamin E is important for maintaining optimal immune function and as anti-stress factors and requirements are higher compared to production or reproduction requirements . Deficiencies and imbalance of minerals during peri-parturient period are either solely incriminated for or associated with anestrous , repeat breeding , metabolic disorders, retention of foetal membranes , dystocia, abortion , weak calf syndrome , milk fever, vulval discharge , and poor conception rate . Thus have negative impact on the subsequent fertility of the cow. Such disorders could probably be prevented by addressing to the basic etiology through balanced feeding and mineral supplementation during advanced pregnancy and early post-partum period, when the animals are highly prone to stress of heavy nutrient demand and drain .Thus nutritional supplementations play important role to improve general, productive and reproductive health of animals . Further mineral and vitamin E supplementation improves reproductive performance because of their positive effect on steroid synthesis, release, follicular growth and symptoms of ovulatory oestrus . [3] The impact of minerals and vitamins supplemented in the peripartum period in buffaloes on subsequent fertility is lacking and needs due importance for prevention of periparturient problems and improvement of fertility. In order to deal with above problems and to improve overall reproductive efficiency in cows, the present investigation was undertaken to fill up the gaps in knowledge in cows with the objective to investigate the role of prepartum mineral and vitamin E supplementation on postpartum reproductive performance[4]

II. DISCUSSION

Livestock farming is crucially important for provision of animal-based food products for the population, and as a source of income for many resource-poor farmers in developing countries. With the increase in human population and economic growth of many Asian countries, the demand for livestock products is likely to double in the coming 20 years. However, the main constraint to livestock development in these countries is the scarcity and fluctuation in the quality and quantity of the year-around animal feed supply. Increased populations and industrialization are making arable land scarce and in addition a large area of the available arable land is being degraded due to human activities. For sustainable development of the livestock sector it is essential for RCA (Regional Cooperative Agreement for Asia and the Pacific) member countries to secure sufficient supplies of balanced feeds from resources which do not compete with human food. [5]

The conventional feeds such as soya bean, groundnut, rapeseed meals etc. are either not available or are available at very high cost. Most of the RCA member states have recognized the need to efficiently utilize locally available feed resources such as tree and shrub leaves, agro-industrial by-products and other lesser-known and new plants adapted to the harsh conditions and capable of growing in poor, marginal and degraded soils. A severe setback impacted to the livestock industry during the nineties by the financial crisis . Another important limiting factor for enhancing animal productivity in tropical countries is the heavy internal parasitic load in livestock. The development of economically viable and environmentally friendly strategies and their strategic use for controlling internal parasites were also identified by the participating countries as one of the priority areas to be addressed in the project. Direct reproductive traits as they are currently measured tend to be low in heritability, making the environment a beef female is produced in key to reproductive success. Large cow size and high milk production translate into increased energy and protein requirements for the cow, even when not lactating. The increased nutrient requirements can significantly limit the carrying capacity of any farm or ranch. A cow's nutrient requirements must match feed resources or reproduction will be compromised. Body condition score (BCS) is correlated with several reproductive events such as postpartum interval, services per conception, calving interval, milk production, weaning weight, calving difficulty, and calf survival; which greatly affect net income in a cow/calf operation .The most important factor influencing pregnancy rate in beef cows is body energy reserves at calving . Body condition at calving is the single most important factor determining when beef heifers and cows will resume cycling after calving. Body condition score at calving also influences response to postpartum nutrient intake. [6] The primiparous cows were fed differing in body condition (BCS 6 vs. 4; 1 = emaciated, 9 = obese) to gain either 1.87 or .97 lb/d. The percentage of BCS 6 cows in oestrus during the first 20 days postpartum increased from 40 to 85% when fed to the higher rate of gain, the cows in BCS 4 only increased estrous response from 33 to 50% during the first 20 d postpartum when fed to gain at the higher rate. Cows should have an optimum BCS of 5 to 6 at calving through breeding to assure optimal reproductive performance. Body condition score is generally a reflection of nutritional management; however, disease and parasitism can contribute to lower BCS even if apparent nutrient requirements are met.[7]

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III. RESULTS

Feeding a balanced diet to beef females in the last trimester of pregnancy through the breeding season is critical. Nutritional demands increase greatly in late gestation and even more in early lactation. Reproduction has low priority among partitioning of nutrients and consequently, cows in thin body condition often don't rebreed. Plane of nutrition the last 50- 60 days before calving has a profound effect on postpartum interval . The importance of pre- and postpartum protein and energy level on reproductive performance has been consistently demonstrated . Positive energy balance postpartum is essential for prompt rebreeding of heifers calving in thin . Inadequate daily energy intake is a primary cause of reduced cows performance on forage diets. In many instances with warm-season perennial forages (and possibly with coolseason perennial forages at advanced stages of maturity), there is an inadequate supply of crude protein, which will limit energy intake . Dry matter intake declined rapidly as forage crude protein fell below 7%, a result attributed to a deficiency of nitrogen (protein) in the rumen, which decreased microbial activity. If forage contains less than approximately 7% crude protein, feeding a protein supplement generally improves the energy and protein status of cows by improving forage intake and digestibility. For example forage intake was about 1.6% of body weight when crude protein was 5%, while at 7% crude protein, forage intake was 44% higher and consumption was 2.3% of body weight. Improved forage intake increases total dietary energy intake, and explains why a protein deficiency is usually corrected first when formulating a supplementation program for animals grazing poor quality forage. As suggested, when the crude protein content of forages drops below about 7%, forage intake declines. However, intake of other forages may decline when forage crude protein drops below 10%. [8]

Part of the variation is attributed to differences in nutrient requirements of the cows, with the remainder of the variation attributed to inherent differences among forages presenting different proportions of nutrients to rumen microbes. Intake response to a single nutrient such as crude protein is not expected to be similar among all forages . Livestock producers are often concerned excessive dietary nutrients during the last trimester of pregnancy may negatively influence calf birth weights and dystocia. It was summarized that the effects of providing either adequate or inadequate amounts of dietary energy and protein on calving difficulty, reproductive performance, and calf growth. Reducing energy pre-partum had virtually no effect on dystocia rates, even though birth weights were altered . [9]

IV. CONCLUSION

Dairy cows are sensitive to changes in diet. For optimal rumen function, it is important to balance rate of carbohydrate fermentation and rate of protein degradation. This balance improves production and reproduction. So, not only is it important to feed concentrate supplement, but proper feeding of forage is necessary. Green forage also provides many essential minerals and trace elements that are vital for different body functions. [10]

Knowing the nutrient requirements of your cows, and meeting those requirements stem from an education in cows nutrition. In India, dairy farms bring in nutritionists to evaluate the cows and create a specialized ration that meets their requirements. This may be a factor in the production difference between Indian dairy cows and the other dairy. To further improve reproductive and productive efficiency, educating smallholder farmers needs to become a priority. Perhaps further studies can look into if education level impacts milk yield in smallholder farms. Management practices also play an important role in preventing disease and optimizing production. Much of the literature emphasized the importance of management strategies. [11]

Milking techniques are important in maintaining udder health and high production, but almost no farmers, in a study from 1998, use post-milking drips or therapy .[12] The knowledge of management strategies stem from an education in dairy cows. It is important to explore ways to optimize productive and reproductive efficiency of dairy cows because many people are dependent on milk to supplement their income. Improving the dairy sector would better the lives of farmers by increasing income, providing jobs, and promoting development. As milk production increased, processing plants would be working at higher capacities and supply would be able to meet demand of dairy products. This would benefit the economy and contribute to the GDP. With better resources and more time, more in depth studies can be performed. Every variable that I wanted to look at could be analyzed further to find more significant results. Analysis of feeds, milk constituents, reproductive health, general health, disease status, and others would be interesting. Further studies could also compare productive and reproductive efficiency between different areas here. [13]

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