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# Assessing the Impact of Monensin Sodium on Early Lactating Buffalo: An In-Depth Analysis of Dry Matter Consumption and Milk Characteristics

**Rakesh Kumar Yadav[1]*, Apoorva Narad[2], Kamalraj R[3]**

*[1]Associate Professor, Maharishi School of Engineering & Technology, Maharishi University of Information Technology, Uttar Pradesh, India, Email Id- rakesh.yadav@muit.in, Orcid Id- 0000-0002-0151-4981

[2]Assistant Professor, School of Allied Science, Dev Bhoomi Uttarakhand University, Dehradun, Uttarakhand, India, Email Id- soas.apoorva@dbuu.ac.in

[3]Professor, Department of Computer Sceince and Information Technology, Jain (Deemed to be University), Bangalore, India, Email Id- r.kamalraj@jainuniversity.ac.in, Orcid Id- 0000-0003-0489-6062

**Abstract**

This study illuminates the nutritional dynamics of lactating buffalos by investigating the relationship between Milk characteristics and Dry Matter Intake (DMI). Determine effect of monensin sodium ingestion on earlier lactation buffaloes by an analysis of DMI with milk quality. Thirty apparent health buffaloes in the second week of lactation were chosen, and they were divided into two equal categories, the studycategory and the control category. The studycategorycomplemented the regular ration with monensin sodium at a dosage of 400 mg/day until the 12$^{th}$ week of lactation, whereas the control category was fed the standard ration consisting of concentrate, green fodder, and dry fodder. During the period of the examination, weekly records of the DMI, milk production, and milk components were kept. The control category had approximately 2.90% drop in DMI, with theimportance ($p<0.05$) variance in DMI of 10.32±0.02 and 10.03±0.06, respectively, compared to the studycategory. Buffaloes given monensin complementation had an average milk production (kg/d) of 7.18±0.11 and 7.77±0.25. When compared to the control category, buffaloes given monensin complements displayed a decreased fat percentage.

**Keywords:** Lactation, Buffaloes, Milk Production, Dry Milk Intake (DMI), Monensin Sodium

## INTRODUCTION

One of the most important variables influencing ruminants' feed conversion efficiency is their gut microbes, which execute important metabolic and digestive processes to obtain energy from dietary components (1). The extract derived from cashew nut shells includes secondary metabolites, which are phenolic compounds having antibacterial, antioxidant, and anticancer properties. These chemicals include anacardic acid, cardanol, and cardol (2). Animal researchers are working to find safe, natural feed additive alternatives in response to growing global recognition of the potential hazards associated with excess antibiotics used in feed. This awareness is reflected in many countries (3). Reproductive efficiency has increased in commercial dairies. Excess dairy heifers can be generated due to increased fertility from both genetic and management selection, the application of sex-selected semen, and the ability to identify superior cows with the use of genomic techniques (4). A combination of reproduction and lactation losses brought by several types of strain cost the dairy industry millions of dollars annually. Two stressors that could affect dairy farms' ability to produce the heat and the difficulties associated with the lactation phase (5). The breed is mostly raised for the production of Lighvan cheese, which is made from raw milk and is prized for its distinct hardness and its flavor the blend of salt and spice (6). The dairy sector makes extensive use of active dry yeast (ADY) as a feed component. Combined with the extra advantages of ionophore antibiotics, it was reported to enhance the milk production, and effectiveness of feed, reduce liver abscess, monensin, and tylosin (7). When dairy cows go from late gestation to initial lactation, their bodies must undergo several metabolic changes. Homeorhetic processes enable dairy cows to produce large amounts of milk during this transition without endangering their individual health and welfare (8). Buffalo contributes to the milk and meat pools that sustain the cattle farming system in the region, which helps to prevent malnutrition and ensure food security for the people in countries (9). The use of dairy goods from buffaloes has increased in recent decades, deepening the recognition of the buffalo breed in dairy farming globally. The milk of buffaloes has a high level of nutrients and a large yield for the manufacturing of its derivatives (10). The research (11) analyzed the impact of eating a number of cattle with higher starch amounts in diet along with the effect of combining thevitaloil using sodium monensin or amylase, on production, cadaver features, and cecal and ruminal morphology. The experiment has been set up with three starch levels and two additives a combination of vital oils with sodium monensin or α-amylase in a randomized blocks factorial design. The article (12) examined that buffer complementation affects milk output and quality in dairy cattle was the goal of this meta-analysis. The standardized averagevariances (SMD) among the control studies and buffer consumption used to determine effect's amount, or result size. Buffer consumption enhanced dairy cows' milk output and composition, according to this meta-analysis. The study (13) investigation assesses the impact of a single cell protein (SCP) feed cause of protein in the buffalo's nutritional intake, digestion, balance of nitrogen, and digestive kinetics. The orange pulp that endured fermentation looks to be a great source of protein to its chemical makeup. Across all studies, no discernible variation was seen in the amounts of dry matter consumed, nutritional digestibility, or SCP. It is demonstrated up to 12% of ruminant concentrate diets could include SCP based on data from comparable nutrition, nutrient digestion, and ruminal traits. The author (14) objective is to examine the health and productivity of breastfeeding buffaloes given diets enhanced with fibrinolytic enzymes and/or probiotics. Milk samples are examined for protein, fat, ash content, total solids, and lactose, and the estimate of nutritional digestibility was done along with the recording of daily milk yield. The data indicates adding probiotics to the meals of nursing buffaloes in conjunction with fibrinolytic enzymes might increase their productivity without harming their health. The research (15) investigated the cattle performed in the feedlot during the adaption and finishing phases when the withdrawal of monensin (MON) in combination with virginiamycin (VM) was implemented. Compare thecalf that has MON removed at the conclusion of the adaptation period showed that hot carcass weight (HCW) was higher than that of bulls given MON or VM, but it had no beneficial effect on feedlot performance. The article (16) examined that feeding composite feed additives affected the immune system, ruminal production of methane, utilization of nutrition, and production of milk in buffaloes (*Bubalus bubalis*). Findings of the research, providing a composite feed additive to buffalo feed helped to improve the animals' immune systems and production efficiency and also lowered enteric methane emissions. The study (17) determined whether lactation dietary additives containing fennel seed powder (FSP) affected the fermentation of rumen, milk fatty acid (MFA) structure, and general efficiency of dairy cattle. The amounts of acetone and non-esterified fatty acids in milk were reduced when the amount of FSP in the diet was increased. It is possible to conclude that early lactation cow performance could be improved by adding 50 g/d of FSP. The author (18) investigated to determine that an herbal mixture (HM) can improve water buffaloes' milk fatty acid composition, rumen fermentation, and production efficiency. Garlic (bulbs), ajwain (seeds), peppermint (leaves), ginger (tubers), and black pepper (fruit) were all equally proportionately present in the herbal concoction. They found that the herbal mixture can enhance the milk fat percentage and the amounts of fatty acids that are not saturated in buffalo meat at a lower enhanced level. The article examines intensively the dry matter utilization and milk qualities to determine why Monensin Sodium affects early nursing buffalo. The research attempts to provide information about enhancing nutritional and milk production during this important period using an extensive assessment.

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## MATERIALS AND METHODS

### Data collection

30 early-lactating cross-breed buffaloes in good condition, in the second week of lactation, with a mean weight of body with 550–600 kg,were chosen at random from an individual dairy industry.

### Splitting of Categories

Wedivide into two equal categories such as control and study categories. Category I buffaloes were fed a normal ration that included concentrate feed, Napier, and Jowar stovers by the control. Category II buffaloes were fed a conventional feed-in receiving 400 mg/day of monensin sodium, while category I was the study category. Category II buffaloes had been placed under adaptation for one week, or the third week of lactation, proceeding to the initiation of the trial. Monensin was provided during this time at dosage of 100 mg for initial two days, 200 mg for third and fourth days of adaptation, and 250 mg for the fifth, sixth, and seventh days of adaptation. At the end of the experiment, or up until the 12$^{th}$ week of lactation, the buffaloes in the studycategory received an additional 300 mg per head each day.

### Dry Matter Intake Calculation

Weekly records of the control and studycategory's dry matter consumption, yield of milk, and composition of milk were produced.An estimation of the dry matter consumption of buffaloes was conducted by placing a known amount of feed sample in moisture cups that had been previously weighed. The cups were put in a warm air oven set at 100±2ºC within 8–12 hours. The total dry matter (DM) of the feed was then determined using equation (1).

$$\mathrm{DM} = \frac{\text{Sample weight after drying}}{\text{Weight of the obtained sample}} \times 100 \qquad (1)$$

Subtracting the leftover dried matter from the DM of the given foods allowed for the calculation of dry matter consumption.Using a common weighing balance, the milk yield of each buffalo was measured in kilograms during the morning and evening milking sessions. The numbers were combined to represent the daily milk yield. Using an ultrasonic milk analyzer, 50 milliliters of a representative pooled every day and night milk sample was collected, preserved by adding formalin at a rate of one drop per 100 milliliters of milk, and kept at +4$^0$C until the fat of milk, solid not fat (SNF), total solids, lactose content, and total proteins were determined. The analysis included research on the combined samples' total ash content. Statistically evaluate the averages of DMI, milk yield, and milk composition between both categories of study.

## RESULTS AND DISCUSSION

Table (1) illustrates the mean DMI and dairy product yield of the studyand the controlcategories during the second week of lactation, which is before the adaptation period. The results indicate that there was not a significant variation in these parameters between the categories.

**Table (1).** The study and control categories before the adaptation phase(Source: Author)

| Measure | Control Category | Study Category |
|---|---|---|
| Milk Yield (*Kg/d*) | 6.70±0.38 | 6.61±0.41 |

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| | | |
|---|---|---|
| Solid Not Fat (%) | 9.49±0.29 | 9.45±0.26 |
| Milk Lactose (%) | 5.48±0.10 | 5.44±0.16 |
| Total Ash (%) | 0.84±0.04 | 0.82±0.03 |
| DMI (*Kg/d*) | 2.96±0.02 | 2.95±0.03 |
| Milk Fat (%) | 5.69±0.21 | 5.68±0.22 |
| Milk Protein (%) | 3.834±0.11 | 3.81±0.09 |
| Total Solids (%) | 15.18±0.40 | 15.12±0.21 |

From fourth to the twelfth week of breastfeeding, the week-by-week mean the difference in the DMIs of both study and control category indicated that the former with significantly (P≤0.05) lesser DMI than a second. These results are in line with others that showed lower DMI in cows given monensin complements. To meet the increased glucose demand of the mammary gland during lactation, the process of action of monensin in lowering the DMI may involve an increase in propionate supply. These variations can result from variations in the animals' reproductive condition, lactation stage, and food composition.

Monensin complemented buffaloes demonstrated thesignificantly (P≤0.05) greater milk yield than control category from eighth to the twelfth week of lactation, and the week-by-week average milk yield (*Kg/d*) of both study and control categoriesdemonstrated no apparent modification. The studycategory's average milk yield is 6.61±0.41 kg/d thatis larger (P≤0.05) than the control category (6.70±0.38 kg/d). Lactating buffaloes fed with monensin sodium produced 8.23 percent (6.70 v/s 6.61 kg/d) greater quantities of milk on average during the trial than the control category. The outcomes of this investigation align with previous research that has demonstrated elevated milk production in various dairy cow breeds with monensin study.

Table (2) illustrates that the buffaloes receiving monensin foods had a mean fat percentage that was 9.62% lower than the control category throughout the research with the significant difference (P≤0.05). The biggest lipogenic precursors for the production of milk fat are butyrate and acetate, which are consistent with the findings of previous research. The decreased ruminal generation of acetate and butyrate cause the Monessen's milk-fat-depressing action.

**Table (2).** Average of early lactation buffaloes fed with monensin and control (Source: Author)

| Measure | Control Category | Study Category |
|---|---|---|
| Milk Yield (*Kg/d*) | 7.18±0.11 | 7.77±0.25 |
| Solid Not Fat (%) | 9.78±0.09 | 9.68±0.14 |

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| | | |
|---|---|---|
| Milk Lactose (%) | 4.67±0.06 | 4.70±0.05 |
| Total Ash (%) | 0.74±0.04 | 0.75±0.03 |
| DMI (*Kg/d*) | 10.32±0.02 | 10.03±0.06 |
| Milk Fat (%) | 5.42±0.14 | 4. 90±0.14 |
| Milk Protein (%) | 3.45±0.04 | 3.40±0.05 |
| Total Solids (%) | 14.85±0.14 | 14.69±0.19 |

This could lead to a scarcity of lipogenic precursors, which lactating breast milk gland needs to synthesize fatty acids. There is small variationbetween the studycategoryand control category in average SNF, proteins, total solids, or total ash content. In contrast to the reported rise in milk protein levels in cows, these results for milk protein content were in line with reports and dairy cows. Detected reduction in milk protein level in nursing cows treated with monensin. Variations in the nutritional state, reproductive status, and quality of the ration that the animals were fed the cause of this discrepancy in the data on the proportion of milk protein in the response to monensin feeding.

**DISCUSSION**

The combination of a diet high in grass relative to concentrate, the amount of monensin complemented and the monensin feeding regimen are related to a decreased DMI. Higher ruminal propionate production is thought to be the cause of the DMI drop. Through inhibition of the hypothalamic feeding center's activity and subsequent regulation of the animal's feed consumption, extra energy derived from lactate can decrease DMI (19). To increase ruminal fill and decrease feed intake, monensin can also decrease ruminal motility. Complementation with monensin increased weight gain without influencing or lowering feed intake that enhanced feed efficiency (20). Increased synthesis of propionate boosts energy supply and utilization efficiency, which in consequence improves feed efficiency. Due to their antibacterial qualities, feed additives derived from plants are becoming more and more important in ruminant diets to regulate rumen fermentation, boost animal output, and lessen environmental pollution.

**CONCLUSION**

The effects of monensin sodium on earlier lactation buffaloes are the subject of a thorough investigation including DMI and milk quality. It has been demonstrated that feeding buffaloes 200 mg/head/day of monensin sodium affects their appetites and assimilation of nutrients. The research adds to our comprehension of possible advancements in feed efficiency through the discovery of a complex relationship between DMI consumption and research employing monensin sodium. An analysis of milk features indicates a considerable influence on the amount and worth of milk. With significant ramifications for boosting the general health and productivity of the herd, the data highlight the significance of monensin sodium in optimizing nutrition regulation during the crucial early lactate stage in buffaloes. To comprehend the impact of monensin sodium on buffalo feeding, more investigation into the molecular foundations of these effects is important.

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