Response of Dairy Cow on Different Types of Feeding Diet: A Review

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Abstract— *This research critically investigates dairy cows responses to various feeding diets, including forage-based diets, total mixed rations (TMR), and new dietary supplements. Dairy cows are fed a variety of diets, each with its own role and effects. The review explains the varied consequences of various feeding regimens on dairy cow performance, health, and environmental sustainability through a thorough examination of contemporary literature. Milk yield, composition, and quality, as impacted by various dietary components, are important topics of study. The review also investigates the nutritional adequacy and digestibility of alternate feed sources in dairy cow diets, such as crop residues and byproducts, to provide light on their potential as sustainable feed solutions. From this review article we have learned that if green fodder and concentrate is given to dairy cow as part of mixed diet then overall health or milk production of the animal will be improved and when feed mixture of dry fodder or concentrate or mineral mixture or biphosphate is given along with green fodder, the animal is healthy or gives good milk production and well prepared for the next calving.*

Keywords— Animals, Dairy, Cow, Feeding, Milk.

I. INTRODUCTION

For thousands of years, dairy production has played a significant role in the agricultural landscape. About 70% of people live in villages in India, a For thousands of years, dairy production has played a significant role in the agricultural landscape. About 70% of people live in villages in India, a country with a predominately agrarian economy where animals are essential to everyday life. High- quality foods like milk, cheese, butter, ghee, and others are produced by livestock. India is the world's biggest consumer of milk and milk products in addition to being one of the top producers of milk worldwide. To meet domestic demand, we must import a sizable quantity of milk products due to the shortage in supply. Animal husbandry and agriculture coexist in a symbiotic connection whereby the former supplies livestock with food and straw, while the latter provides milk, manure, and labor for a variety of agricultural tasks. India's socioeconomic landscape is changing thanks in large part to the dairy industry. In addition to offering better nutritional benefits, it has produced a great deal of job chances.

With a rise in domestic output, dairy production is essential to the livestock industry and the country's economy Azage *et al.,* (2013). Regarding employment, income creation, and consumption, this sector provides a substantial and widely held section of the rural population with their means of subsistence. Additionally, milk and milk products contribute to nutritional energy requirements, high-quality protein, minerals, and vitamins, especially in vegetarian diets for humans. Górska *et al.,* (2019). Dairy cattle form a unique niche among animals used for human purposes. They were chosen from among cattle to serve a single, highly specialized function: producing fluid milk. There are no other livestock breeds that have undergone as much systematic and prolonged selection for milk production as dairy cattle, despite the fact that many dairy cattle are equally valuable as meat or draught animals. Cattle are raised for dual (meat and milk) or even triple (meat, milk, and draught) purposes in many regions of the world. Cattle breeds usually exhibit the results of having so many goals. Breeds of cattle raised primarily for milk production, particularly in Europe and North America, are known as dairy cattle breeds.

Five essential nutrients—protein, carbs, fats, minerals, and vitamins—are needed by cattle. Each nutrient plays a unique purpose in the body. For example, protein is necessary for body growth and to repair wear and tear on the body. It also plays a significant role in the production of milk. The primary sources of protein include sunflower meal, groundnut cake, and oil cake.

The body needs carbs as a source of energy to carry out its basic functions. Fats, on the other hand, supply about 2.5 times the energy of proteins and carbohydrates combined. Animals obtain their fat from oil seed cake and feed additives such as bypass fat. Maize, pearl millet, etc. Since maize has a larger energy content than other grains, ground maize is employed as an energy source in the majority of animal feeds. For dairy animals to produce and reproduce well, about fifteen minerals are needed, including calcium, phosphorus, magnesium, sulfur, copper, and cobalt. Dairy animals may produce certain vitamins internally, such as B complex, C, K, and D when exposed to sunshine, but we also need to provide them external sources of vitamins A and E, which can be obtained from minerals mixed with green feed.

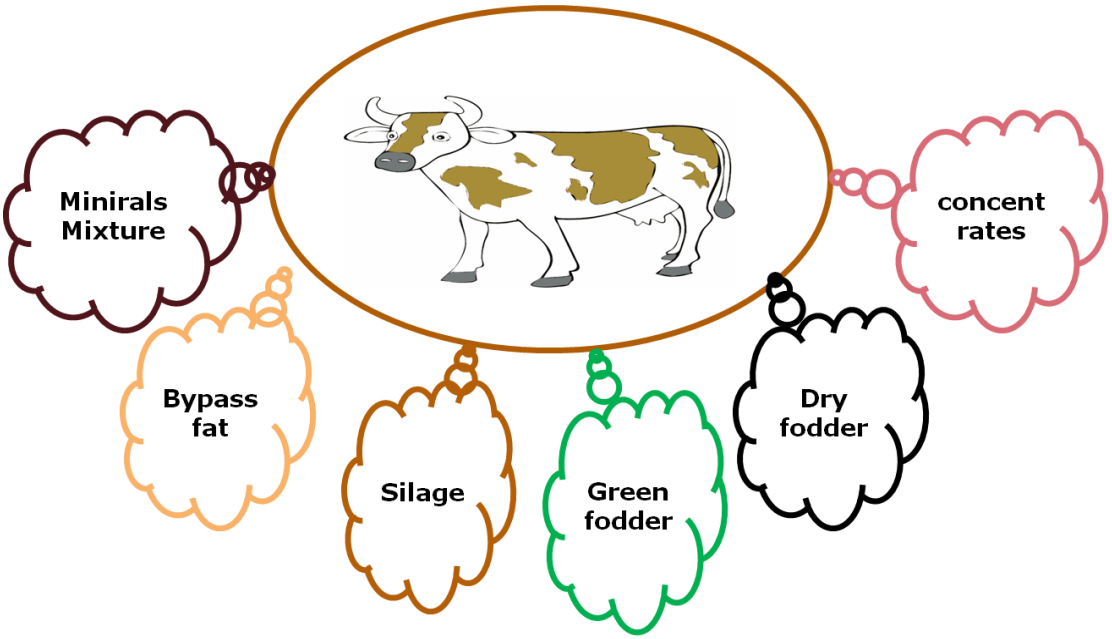

FIGURE 1: Scientific feeding of dairy animal

TABLE 1

Breed	Origin	Milk Production
Holstein Friesian	Holland.	7200-9000 Kg
Jersey	France.	5000-8000 Kg.
Red Sindhi	Pakistan	1700 -3400 Kg
Sahiwal	Pakistan	1350 - 2100 Kg
Gir	India	900 - 1600 kg

1.1 Milk production of dairy cow kg per lactation according to icar.org:

The way dairy cows are raised plays a vital role in milk production, and a high- grain diet has a significant impact on milk production.

High-grain diets, characterized by a higher proportion of grains such as corn or barley, have been shown to affect dairy cow performance and lead to changes in fat and protein content in milk.

Research shows that diets based on barley and corn generally produce higher fat yields compared to concentrates, highlighting the importance of dietary composition on milk production.

Additionally, research shows that a high-fat diet improves milk production efficiency, as evidenced by lower dry matter intake and increased milk and butterfat production. On the other hand, dairy cows' milk quality has been demonstrated to be impacted by diets based on forage. The fatty acid profiles of milk can be impacted by the quality of the forage consumed; dairy cows fed maize stalks produced milk with a higher concentration of particular fatty acids. In addition, it has been discovered that diets with higher-quality alfalfa and a lower concentrate % produce milk that is equivalent to diets with lower-quality alfalfa and a higher concentrate percentage, highlighting the significance of forage quality in preserving

milk productivity. These studies show that adding forage-based diets to dairy cattle's diets can significantly affect the content and quality of their milk. Since balanced diet gives dairy cows the nutrients they need to produce large amounts of milk, it is crucial for increasing milk productivity.

Moreover, the diet's composition—in particular, its level of fat, protein, and carbohydrates—is essential for supplying dairy cows with the nutrients they need to produce a lot of milk.

II. GREEN FODDER

Green fodder is fed fresh either after cutting it from the field or after cutting it at home. Hence there is no need for its storage. Green fodder contains abundant amounts of protein, vitamins, carbohydrates, fiber and mineral salts. For dairy cattle, green grass is a cost-effective source of nutrition. It is quite easy to eat and digest. Green fodder's microorganisms aid in enhancing crop residue digestion in mixed feeding systems. Additionally, it promotes animal health and increases the effectiveness of animal reproduction. The cost of producing milk may be decreased if cows were fed more green grass. Green fodder output must be increased by increased usage of improved fodder seeds in order to close the gap between supply and demand. Farmers must implement the following farming strategies in order to guarantee the supply of green fodder throughout the year. Green fodders are rich in nutrients and also the primary source of Vitamin 'A'. Animal immunity is increased when green fodder is fed in a balanced manner. Better vision and the health of the respiratory system depend on vitamin A. It is crucial to the upkeep and functionality of the mucous membrane. It is necessary for the maintenance of pregnancy, placenta shedding, and other reproductive processes. It is necessary for the gastrointestinal system; lack of it results in diarrhea, poor nutrient absorption, etc. It is necessary for the urinary tract; insufficient amounts result in kidney, ureter, and bladder stones. Twenty thousand I.U. of vitamin "A" are excreted from each litre of milk during lactation. Green fodder lowers milk production costs by reducing concentrate feeding. The microorganisms found in green fodders are mostly responsible for its digestibility and palatability. It supplies vital nutrients needed for animal reproduction, health, and the production of milk and meat. In use, it is a laxative. A cheap source of vitamin "A" is green fodder. In addition, it contains dry matter, crude protein, all digestible elements, and minerals. Additionally rich in phytochemicals and oxidants, green fodder is crucial for growth, reproduction, health, and productivity.

III. DRY FODDER

Dry fodder is the fodder which is made by drying crop residues, Hay, stovers like jowar kadbi, and straws with a moisture content of 10-15%, such as paddy straw, wheat bhussa, and Karad grass, are the main sources of dry feed. Adult cattle need three to six kg of dry feed per day in total. The amount and quality of dry feed have a big impact on how much milk dairy animals produce. Superior dry fodder improves rumen health and microbial activity, which in turn improves milk yield and composition. It does this by having an ideal nutritional content and digestibility. On the other hand, subpar dry feed can negatively impact the effectiveness of milk production and the health of the herd. Research by Johnson & Associates (2018). The wellbeing and general health of dairy cattle are greatly impacted by the quality of their dry feed. Sufficient fiber from dry hay is necessary for healthy rumen function and guards against digestive issues like bloat and acidity. However, low-quality dry fodder might put cattle at risk for dietary deficits and metabolic disorders. Mycotoxins can have a negative impact on milk quality and offer a health concern to dairy calves. They are often found in moldy or contaminated dry feed. Study conducted by Kholif *et al*. (2017)

IV. SILAGE

Silage is a type of fodder made from green foliage crops which have been preserved by fermentation to the point of acidification. It can be fed to cattle, sheep, and other animals Animals that ingest sugarcane top silage treated with urea and molasses more effectively than those that feed sugarcane top (SCT) silage without additives would gain greater weight each day, according to Silvester *et al.* (1976). Compared maize silage with and without hay at low and medium dry matter levels. The low dry content corn silage matter (24%) decreased intake and output; however, this effect was countered by include hay in the diet. According to Kumar *et al.* (2019), fermented silage is as nutritious as green fodder since it keeps the nutrients in their natural state, making it just as useful for animals.

V. CONCENTRATE

A concentrate mixture containing protein supplements such as oil cakes, energy sources such as cereal grains (maize, jowar), tapioca chips, and laxative feeds such as brans (rice bran, wheat bran, gram husk) is commonly utilized. The concentrate mixture can be fed before milking, half in the morning and half in the evening. Half of the roughage diet can be fed in the

morning after the animals have been watered and cleaned. The remaining half is fed in the evening, following milking and watering. High yielding animals can be fed three times per day (roughage and concentrate). Increasing the frequency of concentrate feeding will aid in maintaining normal rumen motility and optimal milk fat levels. Overfeeding concentrates may cause off feed and dyspepsia. Abrupt changes in the feed should be avoided. Grains should be ground to a medium fineness before being fed to cattle. It is critical to assess the production benefit of a "feed to yield" strategy in comparison to minimal concentrates, not only on milk production but also on other crucial variables such as BCS and metabolic condition. Hillset *et, al.*, (2015).

VI. MINERAL MIXTURE

Mineral mixture is a specially formulated blend of essential minerals that dairy animals require for proper growth, reproduction, and overall health. The major minerals include calcium, phosphorus, magnesium, potassium, sodium, chlorine and sulphur. Among those needed in trace amounts are iron, zinc, manganese, copper, iodine, cobalt and selenium. Mineral mixture gives with the diet according to cattle different types of stages. Mineral deficiencies, imbalances, and toxicity can lead to reproductive issues in animals, as minerals are crucial for their health and reproduction. The quantity of minerals in frequently available feed stuffs is vary, and the majority of them may not be sufficient to meet the requirements of animals at different phases of production. Bhanderi *et al.,* (2016). Dietary mineral supplementation can boost dairy cow productivity and generate more cash for producers. Large-scale implementation is necessary to improve dairy animal performance.

VII. BYPASS FAT

Dietary fat that resists lipolysis and bio hydrogenation by rumen microbes but is digested in the lower digestive tract is referred to as bypass fat, rumen protected fat, or inert fat. Oil seed and oil seed cake are main source of bypass fat diet. Erickson *et al.* (1992) found that supplementing Ca-LCFA improved hemicellulose digestibility, resulting in increased NDF and decreased ADF digestibility in cows during early lactation. According to Naik et al. (2009).supplementing dairy animals' diets with bypass fat increases milk output by 5.5-24.0%. Elliott *et al*. (1996). This study aimed to assess the impact of feeding lumen-bypass fat on milk supply, composition, and economics in early-mid lactating dairy cows in the field. Supplementation with bypass fat exhibited no negative effect on rumen fermentation, feed intake, nutritional digestibility, or other blood markers in dairy cows.

VIII. RESULTS AND DISCUSSION

Dairy cows are fed different diets, each of which has its own role and different effects like green fodder contains Vitamin A and other vitamins and easy to digest which increases milk production, silage and Dry fodder works well in the shortage of fodder or works on the quality of milk. It is cheap or good fodder for non-milking animals. Limited bypass fat diet keeps the animal's joints or digestive system healthy and does not affect milk production. Concentrate or mineral mixture is an improvement diet for lactating cows that can increase both the quality and quantity of milk or it can improve the overall health of the animal. From this review article, we have found out which fodder does what work and a good diet is necessary for good dairy and milk production.

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