



Role of bypass fats in dairy animals

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Traditionally fats in livestock rations received less attention compared to other nutrients like proteins, minerals and vitamins and fats were considered essential only as a source of essential fatty acids. However, in recent times there is growing interest in use of fats in livestock rations due to changes in the production potential of animals, changing food habits, higher availability of fats, technological developments and higher production response to added fats. This paper attempts to briefly review the role of fats in the ruminant ration and the recent developments in the bypass fat technology.

Advantages of fats

The body cannot synthesize essential fatty acids and they have to be essentially supplied through the diet for which the diets should invariably contain a minimum percentage of fats to ensure adequate dietary supply. Fats are concentrated source of energy and the net energy of fats, which represents the actual amount of energy that is available to the animal for useful purpose, is four times higher than the energy available through carbohydrates and proteins. Addition of fats improve the efficiency of energy utilization due to incorporation of preformed dietary fat which is energeti-

cally more efficient than the synthesis. Fats help in absorption of fat-soluble vitamins and they also help in reducing the dustiness of the feeds.

Limitations of fat in Ruminants

Generally the fat content of ruminant rations range from 2-3% of the dry matter and attempts to increase the fat content of the rations adversely effect the dry matter intake, palatability and rumen fermentation primarily the fibre digesting microbes resulting in reduced fiber digestibility and lower digestible energy for milk yield resulting in reduction in the milk yield and fat. The effects of fat supplements vary with the nature of fats and the inhibitory effect increases with solubility. Medium chain and unsaturated fatty acids, which are more soluble, are more inhibitory. Unesterified fatty acids are more inhibitory than the esterified and free oils are more inhibitory than those fed in whole seeds. An inhibitory effect of fat is minimized if the diet contains high proportions of forage. Various theories have been put forth by different workers to explain the mechanisms by which fats reduce the ruminal digestion. Fats form a physical coating over the feed particles in the rumen and thereby reduce the microbial digestion and also fatty acids have direct antimicrobial effects. Fats readily react with bivalent cations like calcium and reduce the availability of calcium needed for microbial function. Attempts to improve the nutritional value of milk/meat by increasing the levels of unsaturated fatty acids have not yielded the desired results due to microbial action in the rumen where they undergo biohydrogenation resulting in formation of saturated fatty acids.

An important consideration in the successful feeding of fats is maximizing forage intake. A diet containing a high proportion of forage helps to maintain normal rumen function and environment in which fat is less inhibitory to rumen fermentation.

Added fats increase calcium and magnesium requirements and hence the dietary requirement of calcium and magnesium has to be increased by 20-30% above the recommended levels.

Feed relatively saturated fats, as unsaturated fats are less desirable. Animal fats and blended fats have generally yielded the most positive production re-

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sponses.

With added fats due to increase in the energy content the protein content should be increased to maintain the optimum protein energy ratio.

Rations containing fats should be gradually introduced taking 2-3 weeks to reach maximum intake and it should be fed several times a day instead of the traditional practice of feeding twice or thrice a day.

Recent research works revealed that adding 3-4% fat to the concentrate mix of lactating cows increase milk production by 2-10%.

Potential uses of protected fats

High producing dairy cows are usually in negative energy balance during early lactation (100 days) and protected fats can be supplemented during the early stages to prevent the rapid mobilization of body reserves which results in steeper decline in milk production after the lactation peak, lower milk output, fertility disorders and metabolic disorders like ketosis. The first 100 days of the lactation is critical because the peak production coincides with the lowest point of feed intake and the animal is unable to eat enough to cover its enormous requirements. Bypass fats due to their high-energy content and inertness in the rumen can be used to meet the high-energy requirements without effecting the rumen fermentation. Most beneficial use of supplementation of fats in dairy diets may be in the interval of 5 to 15 weeks of lactation when body fat reserves are depleted and milk production is at maximum.

Dairymen feed large amounts of cereal grains to increase energy intake and maximize milk production. However, when grains are fed in excess of 50-60% of feed dry matter rumen fermentation is affected leading to fattening of cow and production of milk with low fat content. By using protected fat it is possible to maintain the high-energy intake and cut down on the concentrates allowing higher forage intake resulting in normal ruminal fermentation and preventing the milk fat depression.

Supplying cows with about 15% of the metabolizable energy which roughly corresponds to 6-7% fat in the dietary dry matter as long chain fatty acids results in maximum efficiency of energy utilization for milk production.

Although protected fats can be used effectively to improve the production/productivity of livestock there are certain important factors, which can influence the response of the animals to the protected fats,

and these factors are to be taken care for obtaining the desired response. Some of the important factors which can effect the productive response to fat supplements are level of supplement, efficacy of protection, composition of basal diet and physiological status of the animal during supplementation. Further protected fat supplementation in lactating animals results in reduction of protein percent of the milk.

Relevance of protected fats under Indian conditions

Use of protected fats under Indian conditions is still restricted to research institutes and unlike bypass proteins it has not yet been commercially introduced or widely known. Feeding of livestock in India is mainly based on crop residues and energy deficit is one of the major problems affecting the production/productivity of the livestock. Bypass fats are high in energy and they can be used effectively to address this problem. However the widespread use of fats will depend on its availability and economic benefits in relation to use of concentrates.

Poor reproductive performance is a common problem under field conditions and of the various reasons responsible for this, energy deficit is one of the important ones and it is likely that supplementation of bypass fats may improve the energy balance leading to improvement in the reproductive performance.

Acid oils a by-product of oil refining process, is available at about one-third the price of edible oil and contains approx. 95 per cent total fatty matter. However, most of this acid oil is utilized for industrial purposes. This is a potential source of fats for inclusion in the dairy cattle rations either as such or in form of calcium soaps.

Although traditionally Indian farmers making use of the bypass fat technology by feeding cotton seeds which represents a natural source of protected fat supplement, the success of bypass technology in Indian conditions would largely depend on the availability of high producing milch animals where the bypass fats have a greater role to play. Further availability of cheaper fat sources, efficient protection technologies and the economics of production are some of the factors which would determine the utility of the bypass fats in livestock rations.

